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# Water Quality Analysis of selected Lakes in Gandhinagar District, Gujarat, India

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***Abstract:*** *The study was carried out for a period of summer seasons in a year. The physicochemical parameters such as pH, Electrical conductivity (EC), Alkalinity, Total Solids (TS), Hardness, Chloride, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD) & Most Probable Number (MPN) were evaluated at selected lakes of Gandhinagar District. The lakes are subjected to severe domestic and sewage pollution at selected sites of Gandhinagar.*

***Key Words:*** *Lakes, Gandhinagar, physico-chemical, water quality, analysis*.

## 1. INTRODUCTION:

Water is the most abundant compound of the ecosystem. All the living organisms on the earth need a water for their survival and growth (Patil.P.N *et al*, 2012). The lakes, rivers and wetlands provide a number of environmental, social and educational benefits to mankind. The quality and quantity of these resources is an indicator of sustainable development of a country. Everything oriented in the water and everything is sustained by water. All life on the earth depends on water. Water is not only essential to life but is the predominant inorganic constituent of living matter, forming in general nearly three quarters of the weight of living cell. The pHysico-chemical methods are used to detect the effects of pollution on the water quality. Changes in the water quality are reflected in the biotic community structure. Water quality in the water bodies is generally dependent on physical, chemical and biological parameters (Prachi and Rajiv, 2020)

Pollution is one of the most burning problems before mankind. It reasons harms to the human being on the hand and his substance (forest land, crop, animals, Industrial Area etc.) the Pollution is an unwanted change in the physical in the physical, chemical or biological characteristic of air, water and soil that have damaging effect on the life or create a probable health danger of any living organisms.

Water pollution is a serious problem in all the main lakes of India (Bhargava, 1987). The lake also receives arrival of contaminated water from the surrounding slum area. The colored water containing chemical was also released by the dhobis, small scale industries also free their waste openly into the lake.

## 2. METHODOLOGY:

### Study area:

The Water Samples from Gandhinagar district was collected from four Different Stations in the Morning Hours between 9 to 4pm, in Polythene Bottle in summer season. All samples were collected from a depth of 1m from surface. The sample bottle was labeled with date and location.

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Figure 2.1: Adalaj lake

Figure 2.2 Nardipur lake

Figure 2.3 Mansa Lake

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Figure 2.4 Isanpur mota lake

The Water samples were immediately brought in to Laboratory for the Estimate of various Physico-chemical Parameters like Water Temperature Transparency and pH were recorded at the time of Sample Collection, by using Thermometer and Pocket Digital pH Meter. While other Parameters Such as DO, TDS, Free CO2, Hardness, Chlorides, Alkalinity, Phosphate and Nitrate were estimated in the Laboratory By using Standard Methods as Prescribed by APHA.

Table: 1: Different analytical water quality parameters with their analytical technique

| Sr no | Parameters | Technique used |
|---|---|---|
| 1 | Electrical conductivity | Conductivity meter |
| 2 | Dissolved oxygen | Redox titration |
| 3 | pH at 25°C | pH meter |
| 4 | Total Dissolved Solids mg/L | Conductivity meter |
| 5 | Alkalinity | Acid – Base titration |
| 6 | Turbidity | Turbidity meter |
| 7 | Bi carbonate (as HCO3) mg/L | Titration |
| 8 | B.O.D mg/L | Incubation followed by titration |
| 9 | C.O.D mg/L | C.O.D digester |
| 10 | Chloride (as Cl) mg/L | Argentometric titration |
| 11 | Magnesium (as Mg) mg/L | Complexometric titration |
| 12 | Nitrate (as NO3) mg/L | UV Visible Spectrophotometer |
| 13 | Potassium (as K) mg/L | Flame Photometer |
| 14 | Sodium (as Na) mg/L | Flame Photometer |
| 15 | Sulphate (as SO3) mg/L | Nephelometer |
| 16 | Fluoride (as F) mg/L | Spectrophotometer |

## 3. RESULT & DISCUSSION:

Table: 2: Showing values of different analytical parameters of selected lakes.

| SR NO | PARAMETERS | ADALAJ | MANASA | NARDIPUR | ISANPUR MOTA |
|---|---|---|---|---|---|
| 1 | Electrical conductivity | 2410 | 380 | 390 | 1220 |
| 2 | Dissolved oxygen | 4.2 | 4.2 | 4.2 | 4.0 |
| 3 | pH at 25°C | 7.76 | 10.38 | 8.63 | 9.81 |
| 4 | Total Dissolved Solids mg/L | 1660 | 255 | 280 | 865 |
| 5 | Alkalinity | 575 | 110 | 140 | 450 |
| 6 | Turbidity | 14 | 5 | 4 | 30 |
| 7 | Bi carbonate (as HCO3)mg/L | 573 | 61 | 159 | 403 |

| | | | | | |
|---|---|---|---|---|---|
| 8 | B.O.D mg/L | 350 | 82 | 98 | 244 |
| 9 | C.O.D mg/L | 820 | 206 | 240 | 590 |
| 10 | Chloride (as Cl) mg/L | 408 | 48 | 24 | 144 |
| 11 | Magnesium (as Mg) mg/L | 33 | 6 | 12 | 24 |
| 12 | Nitrate (as NO3) mg/L | 5.30 | 31.0 | 4.60 | 2.30 |
| 13 | Potassium (as K) mg/L | 5.4 | 1.0 | 1.2 | 1.4 |
| 14 | Sodium (as Na) mg/L | 450 | 64 | 15 | 222 |
| 15 | Sulphate (as SO3) mg/L | 150 | 7.1 | 5.8 | 34 |
| 16 | Fluoride (as F) mg/L | 0.08 | 0.02 | 0.01 | 0.10 |

Flora available on a bank of different localities of lakes.

| Sr no | **Plant name** | **Common name** | **Family** | **Habit** |
|---|---|---|---|---|
| 1 | *Azolla pinnata R. Br.* | Water velvet | Azollaceae | Free floating |
| 2 | *Aeschynomene indica* L. | Curly indigo | Fabaceae | Herb |
| 3 | *Alternanthera philoxeroides* (Mart.) Griseb. | Pigweed | Amaranthaceae | Herb |
| 4 | *Antigonon leptopus* Hook. & Arn. | Ice cream creeper | Polygonaceae | Climber |
| 5 | *Azadirachta indica* Juss. | Limbdo | Meliaceae | Tree |
| 6 | *Adhatoda vasica (L.)* Nees. | Ardusi | Acanthaceae | Shrub |
| 7 | *Achyranthes aspera* L. | Prickly chaff flower | Amaranthaceae | Herb |
| 8 | *Bergia ammannioides* Roxb. | Waterwort | Elatinaceae | Shrub |
| 9 | *Cuscuta chinensis* Lam. | Amarvel | Cuscutaceae | Climber |
| 10 | *Commelina forskaolii* Vahl. | Rat's ear | Poaceae | Herb |
| 11 | *Chloris barbata* Sw. | Swollen windmill grass | Poaceae | Herb |
| 12 | *Cressa cretica* Linn. | Rudravati | Convolvulaceae | Shrub |
| 13 | *Cocculus hirsutus (L.)* | Vevdi | Menispermaceae | Climber |
| 14 | *Colocasia esculenta* (L.) Schott | Alvi | Araceae | Herb |
| 15 | *Caesalpinia pulcherrima (L.)* Sw. | Galtoro | Caesalpinaceae | Tree |
| 16 | *Cyperus difformis* L. | Rice sedge | Cyperaceae | Herb |
| 17 | *Calotropis gigantea (L.)* Dryand | Akado | Asclepiadaceae | Shrub |
| 18 | *Cassia fistula* L. | Garmalo | Caesalpinaceae | Tree |
| 19 | *Delonix regia (Boj.G.HKP)* Raf. | Gulmohar | Caesalpinaceae | Tree |
| 20 | *Diospyros montana* Roxb. | Timbaru | Spotaceae | Tree |
| 21 | *Dactyloctenium aegyptium* (L.) Willd. | Crowfoot grass | Poaceae | Herb |
| 22 | *Euphorbia antiquorum L.* | Thor | Euphorbiaceae | Shrub |
| 23 | *Euphorbia neriifolia* L. | Thor | Euphorbiaceae | Shrub |
| 24 | *Eichhornea crassipes* (Mart.) Solms. | Water hyacinth | Pontederiaceae | Herb |
| 25 | *Eleocharis atropurpurea* (Retz.) Presl. | Purple spike rush | Cyperaceae | Herb |
| 26 | *Eleocharis dulcis* (Burm.f.) Trinius ex Henschl. | Water chestnut | Cyperaceae | Herb |
| 27 | *Ficus benghalensis* L. | Vad | Moraceae | Tree |
| 28 | *Ficus religiosa* L. | Pipal | Moraceae | Tree |
| 29 | *Ficus racemosa* L. | Umbaro | Moraceae | Tree |
| 30 | *Gomphrena celosioides* | Globe Amaranth | Amaranthaceae | Herb |
| 31 | *Ipomoea aquatica* Forsk. | Water spinach | Convolvuaceae | Herb |
| 32 | *Ischaemum rugosum* Salisb. | Wrinkle duck beak | Poaceae | Herb |
| 33 | *Justicia adhatoda L.* | Ardusi | Acanthaceae | Shrub |
| 34 | *Nymphoides cristatum (Roxb.) O. Ktze* | Poyana | Gentianaceae | Aquatic herb |

| | | | | |
|---|---|---|---|---|
| 35 | *Nasturtium officinale* R.BR., | watercress | Brassicaceae | Herb |
| 36 | *Physalis minima* L. | Popti | Solanaceae | Herb |
| 37 | *Pithecellobium dulce* (Roxb.) Benth | Goras- aamli | Mimosaceae | Tree |
| 38 | *Phyllanthus emblica L.* | Aavla | Euphorbiaceae | Tree |
| 39 | *Prosopis juliflora (Sw.) DC.* | Gando baval | Mimosaceae | Tree |
| 40 | *Hygroryza arista* (Retz.) | Asian water grass | Poaceae | Herb |
| 41 | *Limnophyton obtusifolium* (L.) Miq. | Blunt arrowhead | Alimanthaceae | Herb |
| 42 | *Peristrophe paniculata* (Frossk.) | Panicled foldwing | Acanthaceae | Herb |
| 43 | *Phyllanthus amarus* Schumach. & Thonn. | Stonebreaker | Phyllanthaceae | Herb |
| 44 | *Salanum surattense* Burm.f. | Yellow fruit nightshade | Solanaceae | Herb |
| 45 | *Spirodela polyrhiza* (orth. var. S. polyrrhiza) | Duckweed | Araceae | Herb |
| 46 | *Ludwigia adscendens* L. | Talav bhaji | Onagraceae | Aquatic Herb |
| 47 | *Sphaeranthum indica* Linn. | Gorkhmundi | Asteraceae | Herb |
| 48 | *Typha angustata* Bory & Chaub. | Gha bajri | Typhaceae | Herb |
| 49 | *Tamaridus indica* L. | Amli | Caesalpinaceae | Tree |
| 50 | *Vachellia nilotica* (L.) P.J.H. Hurter & Rashmi Sharma | Baval | Mimosaceae | Tree |

The electrical conductivity is a measurement of capability of water to conduct electric current in water bodies. It signifies the total concentration of soluble salts/mineral salts in water (Trivedy and Goyal, 1986), thereby making it dry and inappropriate for drinking. In the current study, the EC varies from 380 to 2410.EC signifies the amount of TDS in water.

The pH of water is important for the biotic compound because most of the plants and animals can survive in a narrow range of pH from slightly acidic to slightly alkaline condition. According to data selected lakes pH recorded 7.76 to 10.38. (Table 2)

The dissolved oxygen varied from 4.0 to 4.2 mg /L during study. The dissolved oxygen in water is temperature dependent. It is required to all the plants and animals for respiration. (Table 2)

The biochemical oxygen demand was recorded in range 82 to 350 mg /L. and chemical oxygen demand was recorded in range 260 to 820 mg/L. These are also a temperature dependent (Table 2). High level of B.O.D decrease level of dissolved oxygen. High amount of C.O.D may cause oxygen depletion on account of decomposition of microbes to a level detrimental to aquatic life.

The chloride ranged from 24 to 408 mg/L. chloride in urban areas are indicator of large amount of non-point source pollution by pesticide, oil, metals and other toxic materials. (Table 2)

The total alkalinity ranged from 110 to 575 mg/L. The alkalinity might be due to high pH (Table 2).

The total dissolved solids ranged from 255 to 1660 mg/L. the excessive total dissolved solids generally affect the portability (Table 2). The high content of dissolved solids increases the density of water and influences osmoregulation of water organism.

The turbidity of the lake water ranged from 4 to 30 which is higher as per the permissible limit <5 NTU APHA (1992) (Table 2). Turbidity is caused by wide variety of Suspended partials.

Magnesium value was recorded 6 to 33 mg/L. Nitrate resulted from range 2.30 to 31mg/L. Sulphate recorded from 5.8 to 150 mg/L. Natural water contains sulphate ions and most of these ions are also soluble in water. Potassium recorded from 1.0 to 5.4 mg/L. Sodium value recorded from 15 to 450 mg/L. Fluoride value range 0.01 to 10 mg/L (Table 2). The increased use of of containing high content of heavy metals it may cause all living organism in water bodies and also soil microorganisms.

Total 50 plants were recorded in different localities.

**4. Conclusion :**

The water quality considers physical, chemical and biological parameters for defining the quality of water and its maintenance. The result obtained during study was compared with standards and it was found that maximum number of parameters in selected lakes were above desirable limit in all the summer season. This result shows that the selected lakes obtain very high amount of pollution from the nearby. And the water of lake is highly polluted and if the similar condition carries on for the extended period, selected lakes may soon become ecological inactive. Water budget and drought condition have primary importance in the quality of the lake. These physic-chemical parameters and have been resulted as an outcome of efforts and research and development carried out by district government agencies and experts in these areas.

**REFERENCES:**

1. Patil, P. N., Sawant, D. V., & Deshmukh, R. N. (2012). Physico-chemical parameters for testing of water–A review. *International journal of environmental sciences*, *3*(3), 1194-1207.
2. Vasistha, P., & Ganguly, R. (2020). Water quality assessment of natural lakes and its importance: An overview. *Materials Today: Proceedings*, *32*, 544-552.
3. APHA. Standard methods for the examination of water and waste water. 19th Edition, American Public Health Association, American Water Work Association and Water Pollut. Contl. Federation, Washington, D.C., NewYork, (1995).
4. Bhargav, D.S. (1987). Nature and the Ganga. Environmental Conservation, 14(4):307-318.
5. Trivedy, R.K. and Goyal, P.K. (1986). Chemical and Biological Methods for Water Pollution Studies. Env. Publications, Karad, 35-96.
6. Prakash, J.W., Aamon, J. and Regini, G.S. (2007). Water Quality Assessment of Thirparappu Reservoir, Kanyakumari. IJEP, 27 (8): 733-736.
7. Versari, A., Parpinello, G. P., & Galassi, S. (2002). Chemometric survey of Italian bottled mineral waters by means of their labelled physico-chemical and chemical composition. *Journal of food composition and analysis*, *15*(3), 251-264.