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Assessment of Water Quality (Physico-Chemical) of B. Thandrapadu Tank (Gangamma Cheruvu), B. Thandrapadu, Kurnool District, Andhra Pradesh, India

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Abstract: ***Various physicochemical parameters of B.Thandrapadu tank (Gangamma Cheruvu) in B. Thandrapadu, Kurnool District, Andhra Pradesh, were estimated for a periods of one year from 1st January 2019 to 31st December 2019 to assess its quality. Monthly changes in the various physicochemical parameters such as Temperature, pH, conductivity, turbidity, total dissolved solids, total hardness, dissolved oxygen, free carbon dioxide, salinity, alkalinity, chloride, phosphates, nitrates and nitrites were carried out by standard methods. The results indicate that the tank is Non- polluted and can be used for Domestic, Irrigation and Pisciculture.***

Keywords: B. Thandrapadu tank, Physicochemical parameters, water quality, monthly changes

1. Introduction

Water is one of the most important resources crucial for the survival of all the living beings. It is even more important for human being they depend upon it for food production, industrial and waste disposal, as well as Cultural requirement [1]. This tank is used for fish culture and this water is used for irrigation of different crops of this area. However, unfortunately, this tank is regularly used for fishing is done by the local people regularly besides water is used for washing animals, tractors, and cloths. Natural calamities are completed beside the tank and dumping of domestic solid water and waste water due to this tank has become polluted. This is a major concerned as it has been affected because of anthropogenic activities. The deterioration of water quality has affected aquatic life including fish cultures.

In India, much research has been carried out with regard to assessment of water quality of different tanks like fish pond in Thanjavur [2], Kolong river [3], Bolinj Ram mandir talao [4], Kadamba tank [5], Urban pond in Thiruvananthapuram district [6], Fish pond of Shahdol [7], Eutrophication costal lake [8], Lalpur pond [9], Two temple ponds of Karnataka [10], and different pond water of Bilaspur district [11]. Andhra Pradesh has good number of lakes, tanks, and reservoirs. Some of the reservoirs currently located in Kurnool district, Andhra Pradesh are Owk reservoir, Velugodu reservoir, Sunkesula dam and Gajuladinne reservoir at Gonegandla.

In the present study involves the Analysis of water quality in terms of Physico- chemical parameters of B.Thandrapadu tank (Gangamma Cheruvu), B. Thandrapadu, Kurnool district, Andhra Pradesh. It is located 3 Km from Kurnool. Geographical coordination of B. Thandrapadu tank is at 15°45'35''N Latitude and 78° 3' 39" E longitude. The Ayakut of the tank is 25.27 ha. Storage capacity of this tank is 12.309 Mcft. The tank water is basically used for Domestic, Agriculture Purpose and Fisheries Activity. In India still now several Researchers have done study on Physicochemical and Biological characteristic of standing and running water resources [12], [13], [14].

2. Materials and Methods

2.1 Sample Collection and Analysis

The water samples from B.Thandrapadu tank were collected from four different stations in the morning hours between 9.00 AM to 11.00 AM, in polythene bottle regularly for every month. The water samples were immediately brought in to laboratory for the estimation of various physico-chemical parameters like water Temperature and pH were recorded at the time of sample collection, by using thermometer and pocket digital pH meter. The conductivity of the water was measured using the help of conductivity meter. While other parameters such as turbidity, total dissolved solids, total hardness, dissolved oxygen, free carbon dioxide, salinity, alkalinity, chloride, phosphates, nitrates and nitrites were estimated in the laboratory by using standard methods as prescribed by APHA [15], AWWA [13], [14].

3. Results and Discussion

Temperature:
In the present study of the water temperature ranges from 23°C to 28°C. The maximum (28°C) temperature was recorded in the month of May 2019 (summer) and minimum (23°C) in the month of January 2019 (winter) (Figure.a). It showed that higher temperature in summer and relatively lowers in winter. Similar study, Jayabhaye et al., (2006) [16], Salve and Hiware (2008) [17] Observed that during summer, Water temperature was high due to low water level, High temperature and clear atmosphere. Water temperature plays an important factor which influences the chemical, Biochemical and Biological characteristics of water body.

pH:
The pH was alkaline values ranges from 6.9 to 8.6. The maximum pH value (8.6) was recorded in the month of May 2019 (summer) and minimum (6.9) in the month of October 2019 (Figure.b). The factors like air temperature bring about changes the pH of water. Most of bio-chemical and chemical reactions are influenced by the pH. The reduced rate of photosynthetic activites reduces the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH, the low oxygen values coincided with high temperature during the summer month [18].

Conductivity:
The monthly variability in conductivity of water has fluctuated between 1.1 ms (January, 2019) and 8.2 ms (May, 2019) [Figure.c]. The high value of conductivity was recorded in the month of May due to higher temperature and stabilization of water to sedimentation and increased the concentration of salts, whereas low value was recorded in January month [19], [20].

Turbidity:
The turbidity of water fluctuates from 0.8 NTU to 11.0 NTU. The maximum value (11.0NTU) was recorded in the month of February 2019 (summer) (Figure.d). It might be due to human activities, decrease in the water level and presence of suspended particulate matter, and minimum value (0.8 NTU) in the month of July, 2019.

Total dissolved solids:
The total dissolved solids of water varied between 69 mg/l (August 2019) and 214 mg/l (May 2019) (Figure.e). Seasonal variations showed maximum values in summer (May) due to high temperature, high turbidity, and minimum during in the month of August [21], [22].

Total Hardness:
The value of hardness fluctuates from 73 mg/l to 183 mg/l. The maximum value (183 mg/l) was recorded in the month of April 2019 (summer) and minimum value (73 mg/l) in the month of October 2019 (Figure.f). Hujare, M. S. (2008) [23] was reported total hardness was high during summer than monsoon and winter. High value of hardness during summer can be attributed to decrease in water volume and increase of rate of evaporation of water. Similar results were obtained in the present study.

Dissolved Oxygen:
The values of Dissolved Oxygen fluctuates from 6.7 mg/l to 15.6 mg/l. The maximum values (15.6 mg/l) was recorded in the month of May 2019 (summer) and minimum values (6.7 mg/l) in the month of November 2019 (winter) (Figure.g). The high dissolved Oxygen in summer is due to increase in temperature and duration of bright sunlight has influence on the percentage of soluble gases (O_2 & CO_2). The long days and intense sunlight during summer seem to accelerate photosynthesis by phytoplankton, utilizing CO_2 and giving of Oxygen. This possibly accounts for the greater qualities of O_2 recorded during summer. The quality is slightly lesser during winter, reported by Masood Ahmed and Krishnamurty R. (1990) [24].

Free Carbon dioxide:
The concentration of free carbon dioxide of water ranged between 3.4 mg/l (February 2019) and 18.5 mg/l (May 2019) (Figure. h). High carbon dioxide is due to increase in the decomposition of organic matter, low temperature, and photosynthetic activities of phytoplankton. The absence of free carbon dioxide is due to its utilization by alge during photosynthesis or carbonates present [25].

Alkalinity:
Total alkalinity ranges from 120.7 mg/l to 180.0 mg/l. The maximum value (180.0 mg/l) was recorded in the month of May 2019 (summer) and minimum value (120.7 mg/l) in the month of January 2019 (Winter) (Figure. i). The alkalinity was maximum value in April (summer) due to increase in bicarbonates in the water. Hujare, M. S. (2008) [23] also reported similar results that it was maximum in summer and minimum in winter due to high photosynthetic rate.

Chlorides:
The values of chlorides range from 32.9 mg/l to 60.6 mg/l. The maximum value (60.6 mg/l) was recorded in the month of May 2019 (summer) and minimum value (32.9 mg/l) in the month of February 2019 (Figure. j). In the present study maximum value of chloride reaches in summer. Similar results were reported by Swarnalatha, S. and A. Narsing rao (1998) [26].

Phosphate:
The value of phosphate fluctuates from 0.14 mg/l to 10.9 mg/l. The maximum value (10.9 mg/l) was recorded in the month of August 2019 (monsoon) and minimum value (0.14 mg/l) was recorded in the month of October 2019 (winter) (Figure.k). The high values of phosphate in August (monsoon) months are mainly due to rain, surface water runoff, agriculture runoff, washer man activity could have also contributed to the inorganic phosphate content. Similar results reported by Arvindkumar, (1995) [27].

Nitrates:
The seasonal variability in the nitrate concentration was a low 4.7 mg/l in September 2019 and as high as 33.6 mg/l in May 2019 [Figure.l]. During summer season (May), lesser nitrates are due to algal assimilation and other biochemical mechanisms and nitrate higher values are due to surface runoff and domestic sewage and specially washing activities in the month of September [28], [29].

Nitrites:
Monthly variation of nitrites content of ranged between 0.04 mg/l (May 2019) and 1.61 mg/l (April 2019) [Figure.m]. The concentration of nitrite was maximum during the pre-monsoon period and minimum during post -monsoon period observed in Kadamba tank, Thoothukudi district of Tamil Nadu [5], [8].

4. Conclusion

From all the above mentioned research findings, it is finally concluded that B. Thandrapadu tank (Gangamma cheruvu) water is partially contaminated by effluents coming from runoff through the fields and fishing cleaning vehicles, washing clothes etc. So the physico-chemical parameters

were beyond the permissible limits which may cause harmful effects on cultured fish. Consuming this water by animals affect their heath and using this water for agriculture my drastically affects the Agricultural produce.

References

[1] Akpoveta, O.V; Okoh, B.E; and Osakwe, S.A ," Quality Assessment of Borehole Water used in the Vicinities of Benin, Edo State and Agbor, Delta State of Nigeria." Current Research in Chemistry, 3, 62-69, 2011.
[2] Kumar G.D, Karthik M, Rajkumar R., "Study of seasonal water quality assessment and fish pond conservation in Tanjavur, Tamil Nadu, Inida." J Entamol Zool Stud, 5:1232-38, 2017.
[3] Sharma J, Saikia M.D, Bormudoi A, " Analysis of water quality index parameters and its seasonal variations along the Kolong River, Assam, India." Int Res J Eng Technol, 4:2589-98, 2017.
[4] Kini A, Varkey J, Tripathi A, Pillai S, Raut S, Deshbharatar S, " Seasonal variation of some physico-chemical parameters of bolinj ram mandir talao, Virar, Palghar, Maharashtra, India." Int Res J Biol Sci, 5:36-9, 2016.
[5] Karthick S, Aanand S, Srinivasan A, Jawahar P, " Assessment of seasonal variations in water quality parameters of Kadamba tank in Thoothukudi district of Tamil Nadu, India." Int J Appl Res, 2:329-3, 2016.
[6] Mol P.A, Shaji E., "Physico-chemical characteristics of surface water quality of urban ponds in Thiruvananthapuram district, Kerala." Int J Emerg Trends Sci Technol, 3:3431-7, 2016.
[7] Patel P.K., "Water quality analysis of fish pond of Shahdol (M.P.) India." Int J Appl Res, 2:235-8, 2016.
[8] Abhijna U.G., "Monitoring and assessment of a eutrophicated coastal lake using multivariate approaches." Glob J Environ Sci Manage, 2:275-88, 2016.
[9] Patel P.K., " Water quality assessment of Lalpur pond, Shahdol District, Madhya Pradesh, India." Int J Res Appl Sci Eng Technol, 3:462-5, 2015.
[10] Shivalli P.B, Giriyappanavar B.S., " Application of NSF-WQI for the assessment of water quality of Two Temple tanks of Karnataka, India." J Int Acad Res Multidiscip, 3:221-6, 2015.
[11] Dixit K, Pandey S.K, Mehta R, Ahmad N, Gunjan, Pandey J., " Study of physico-chemical parameters of different pond water of Bilaspur District, Chhattishgarh, Indian." Environ Sceptics Crit, 4:89-95, 2015.
[12] Pandey, A. K., Siddiqi S. Z. and Rama Rao., " Physico-chemical and biological characteristics of Husain sagar, an industrially polluted lake, Hyderabad." Proc. Acad. Environ. Biol., 2(2), 161-167, 1993.
[13] Trivedy, R. K. and Goel P. K., " Chemical and biological methods for water pollution studies," Environmental Publication, Karad, Maharashtra, 1986.
[14] Kodarkar M. S., " Methodology for water analysis, physico-chemical," Biological and Microbiological Indian Association of Aquatic Biologists Hyderbad, Pub.2: pp. 50, 1992.
[15] APHA., " Standard Methods For Examination of Water and Wastewater," 20th Edition, American Public Health Association, Washington D. C, 1985.
[16] Jayabhaye, U. M., Pentewar M. S. and Hiware C. J., " A Study on Physico- Chemical Parameters of a Minor Reservoir, Sawana, Hingoli District, Maharashtra," J. Aqua. Biol, Vol:23 (2), 56-60, 2006.
[17] Salve, V. B. and Hiware C. J., "Study on water quality of Wanparakalpa reservoir Nagpur, Near Parli Vaijnath, District Beed. Marathwada region," J. Aqua. Biol., 21(2): 113-117, 2008.
[18] Kamble, S. M.; Kamble A. H. and Narke S. Y., " Study of physico-chemical parameters of Ruti dam, Tq. Ashti, dist. Beed, Maharashtra." J. Aqua. Biol. 24(2): 86-89, 2009.
[19] Harney N.V, Dhamani A.A, Andrew R.J., "Seasonal variations in the physico-chemical parameters of pindavani ponds of central India." Sci Wkly, 1:1-8, 2013.
[20] Mishra M.K, Mishra N, Pandey D.N., "An assessment of the physico-chemical characteristics of bhamika pond, Hanumana, Rewa District, India." Int J Innov Res Sci Eng Technol, 2:1781-7, 2013.
[21] Pradeep V, Deepika C, Gupta U, Solanki H., " Water quality analysis of an organically polluted lake by Investigating different physical and chemical parameters." Int J Res Chem Environ, 2:105-11, 2012.
[22] Bhat M, Narain M.K, Ahmad A, Shukla R.N, Yunus M., "Seasonal variations of Physico-Chemical characteristics in several ponds of Luknow city affected by urban drainage." Adv Environ Biol, 6:2654-62, 2012.
[23] Hujare, M. S., "Seasonal variation of physico-chemical parameters in the perennial tank of Talsande, Maharashtra." Ecotoxicol. Environ. Monit. 18(3): 233-242, 2008.
[24] Masood Ahmed and Krishnamurthy R., " Hydrobiological studies of Wohar reservoir Aurangabad (Maharashtra state) India." J. Environ. Biol. 11(3), 335- 343, 1990.
[25] Manjare S.A, Vhanahkare S.A, Muley D.V., "Water quality assessment of vadgaon tank of Kolhapur (Maharastra), with special reference to Zooplankton." Int J Adv Biotechnol Res, 1:91-5, 2010.
[26] Swaranlatha, S. and A. Narsingrao., " Ecological studies of Banjara lake with reference to water pollution." J. Envi. Biol. 19(2): 179-186, 1998.
[27] Arvindkumar, "Some Immunological Aspects of the Fresh water Tropical Wetland of Santhal. Pargana (Bihar) India," J. Envi. Poll.2 (3): 137-141, 1995.
[28] Pathak B.N, Mankodi P.C., "Hydrological status of Danteswar pond, Vadodara, Gujarath, India." Int Res J Environ Sci, 2:43-8, 2013.
[29] Shinde S.E, Pathan T.S, Raut K.S, Sonawane D.L.," Studies on Physico-Chemical parameters and correlation coefficient of Harsool-Savangi dam, District Aurangabad, India." Middle East J Sci Res, 8:544-54, 2011.

Author Profile

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Table 1: Physico-chemical parameters of B. Thandrapadu tank, Kurnool District

Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature	23	25	24	27	28	24	24	26	25	25	24	24
pH	8.2	8.1	8.4	8.1	8.6	7.9	7.9	8.1	7.3	6.9	7.7	8.0
Conductivity	1.1	2.2	2.5	5.5	8.2	2.8	3.7	4.3	5.3	6.4	7.4	2.4
Turbidity	8.1	11.0	10.8	7.5	6.0	10.5	0.8	1.4	1.6	4.2	3.0	1.7
TDS	126	70	172	162	214	210	148	69	130	137	94	120
TH	85	84	106	183	158	164	74	96	105	73	116	90
DO	9.4	9.4	12.3	14.1	15.6	11.5	9.4	9.1	9.3	9.1	6.7	8.6
CO_2	4.0	3.4	3.6	4.3	18.5	7.8	8.6	6.1	17.6	12.2	15.7	3.5
Alkalinity	120	123	168	133	180	160	165	178	178	165	143	133
Chloride	44.5	32.9	44.3	59.0	60.6	44.3	47.3	50.7	41.7	46.3	48.2	50.8
Phosphates	1.8	3.3	3.2	3.9	4.2	10.0	9.4	10.9	4.5	0.1	0.2	4.9
Nitrates	8.3	10.6	11.7	23.6	33.6	12.3	33.1	11.5	4.7	5.6	4.8	5.6
Nitrites	0.07	0.9	0.8	1.6	0.04	0.1	0.1	0.8	0.8	0.5	0.9	1.2

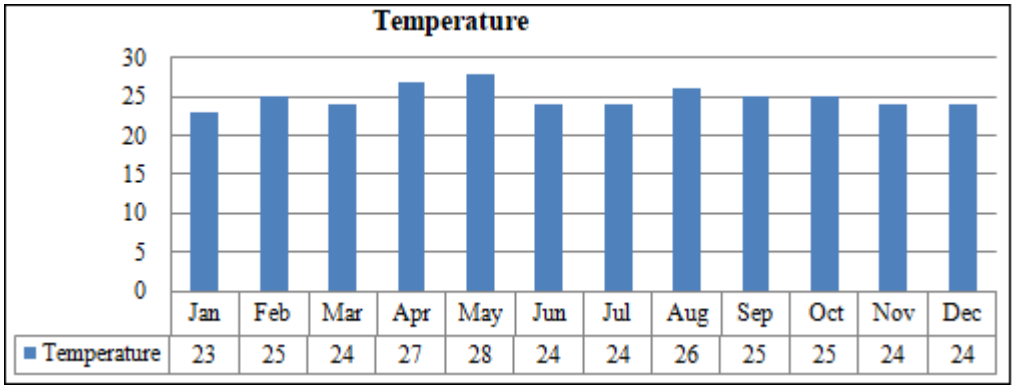

Figure a: Variations in Temperature

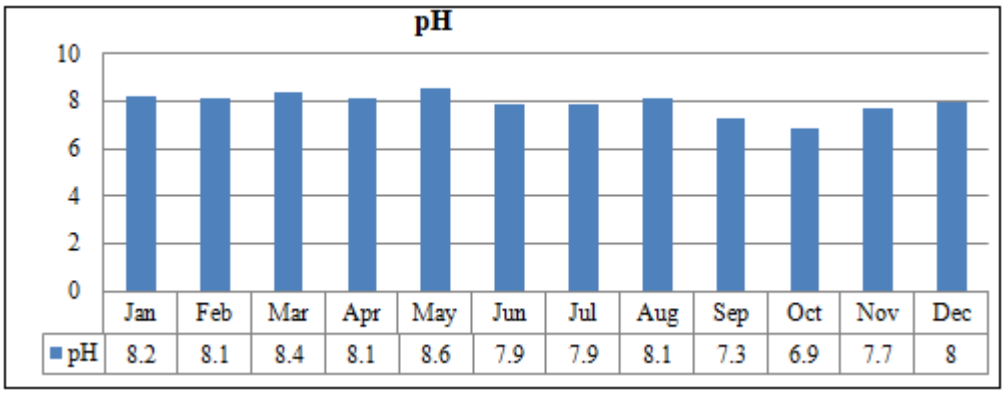

Figure b: Variations in pH

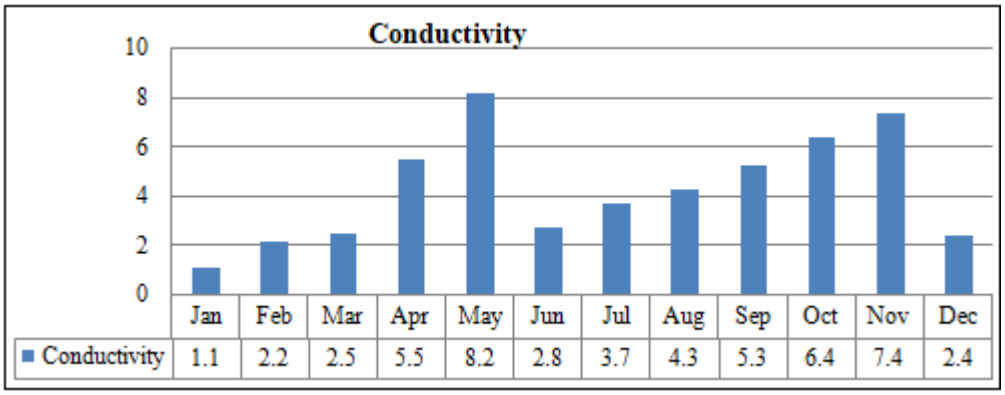

Figure c: Variations in Conductivity

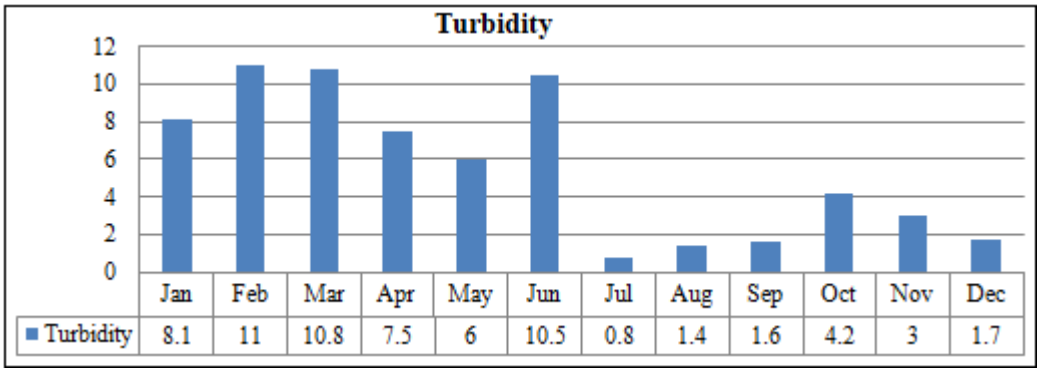

Figure d: Variations in Turbidity

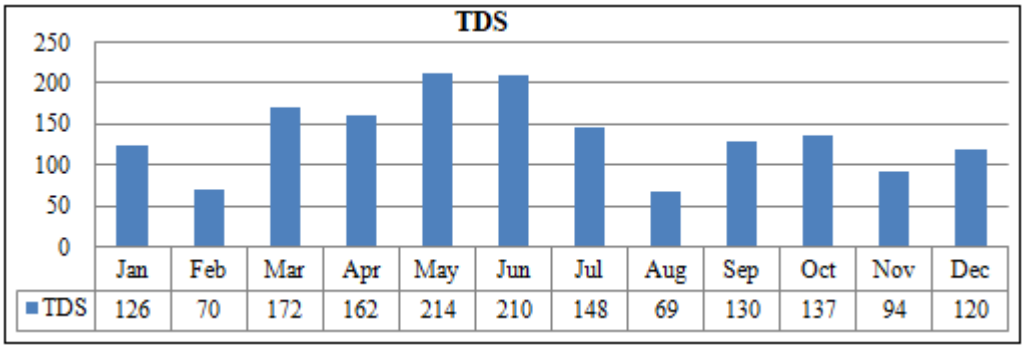

Figure e: Variations in Total Dissolved solids

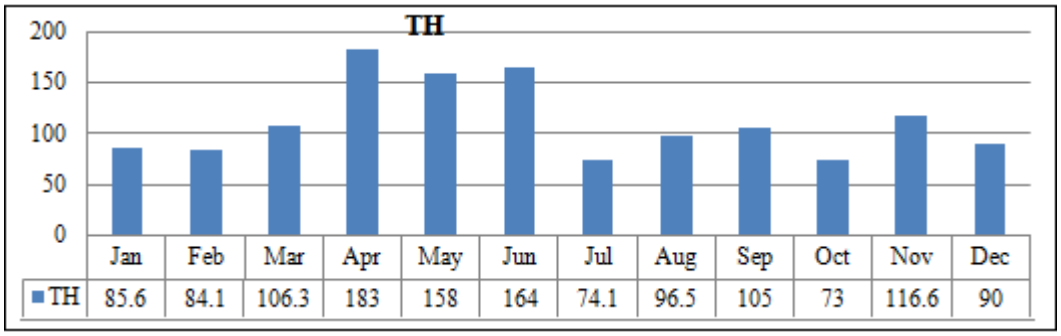

Figure f: Variations in Total Hardness

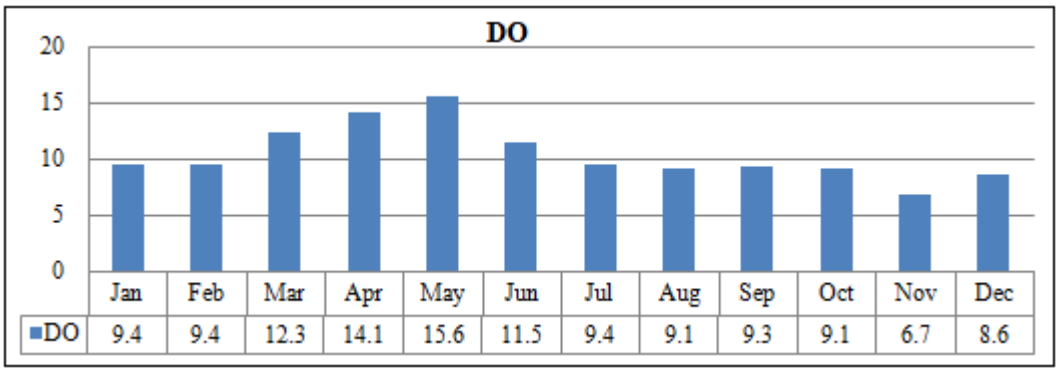

Figure g: Variations in Dissolved Oxygen

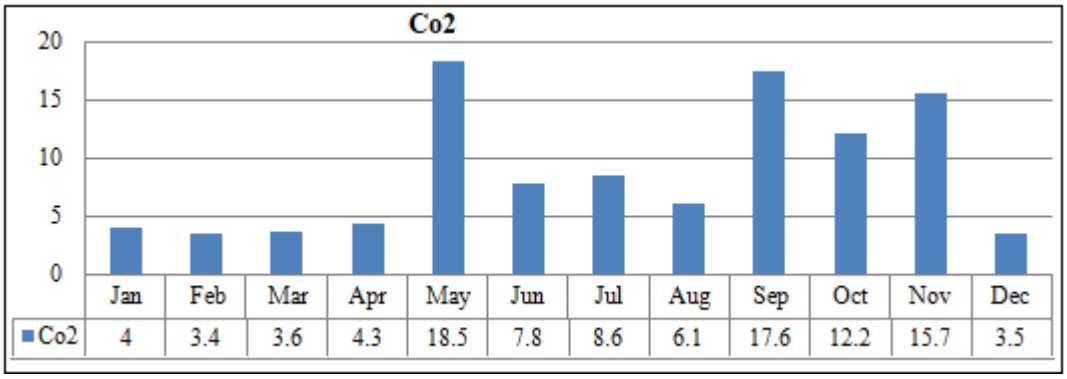

Figure h: Variations in Free Carbon dioxide

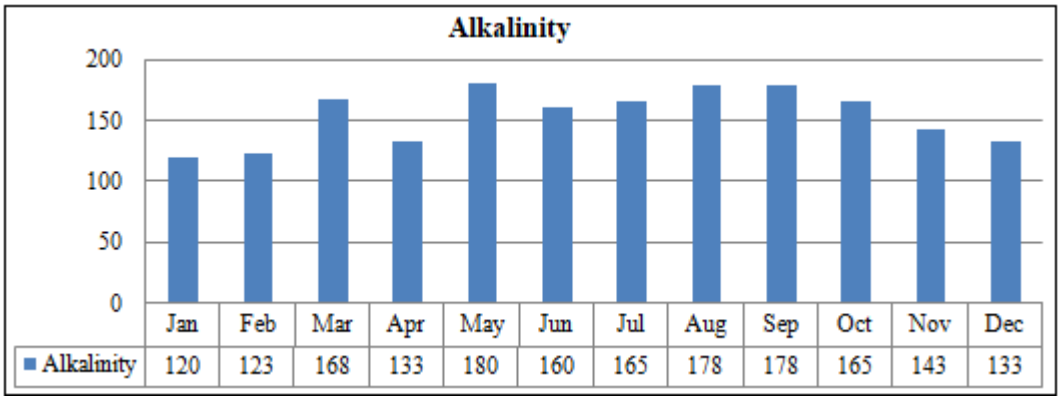

Figure i: Variations in Alkalinity

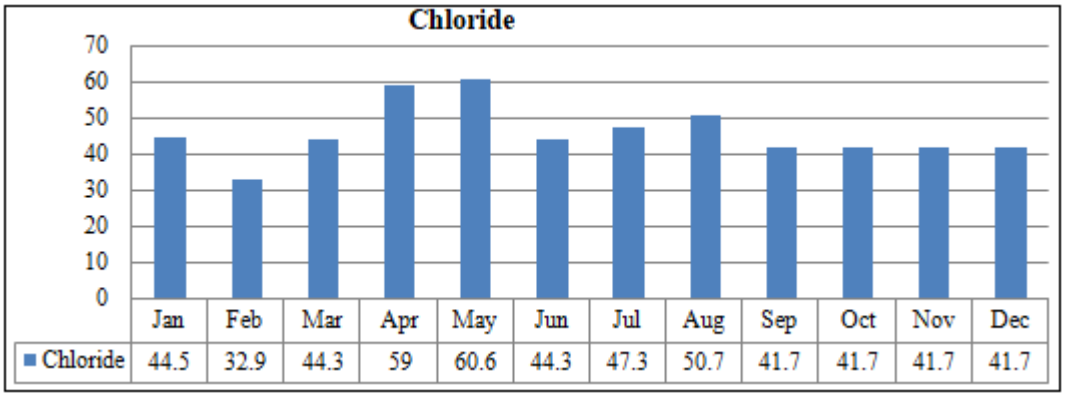

Figure j: Variations in Chloride

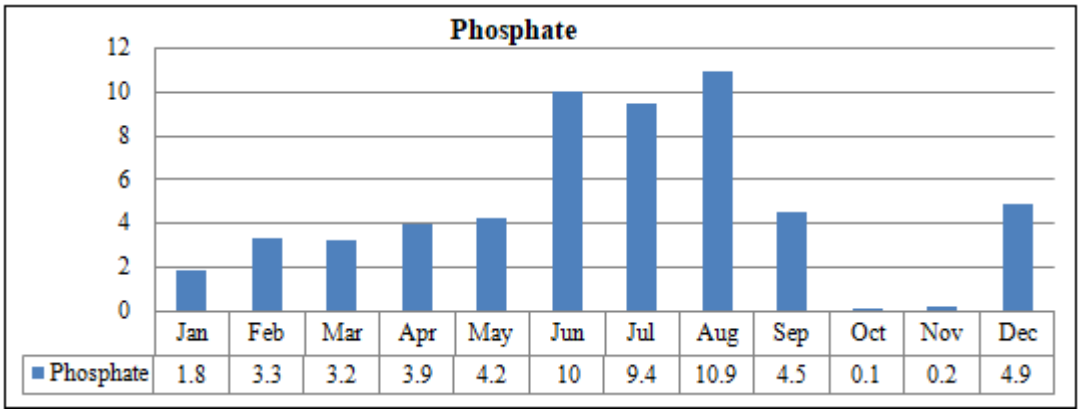

Figure k: Variations in Phosphate

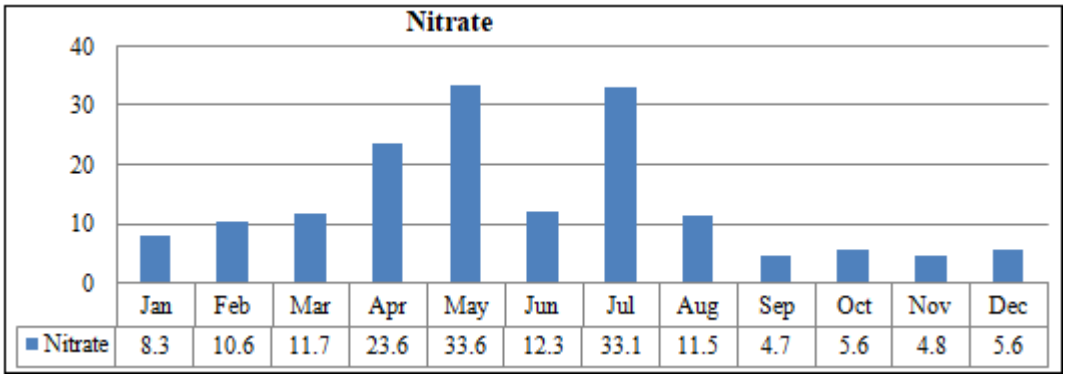

Figure l: Variations in Nitrate

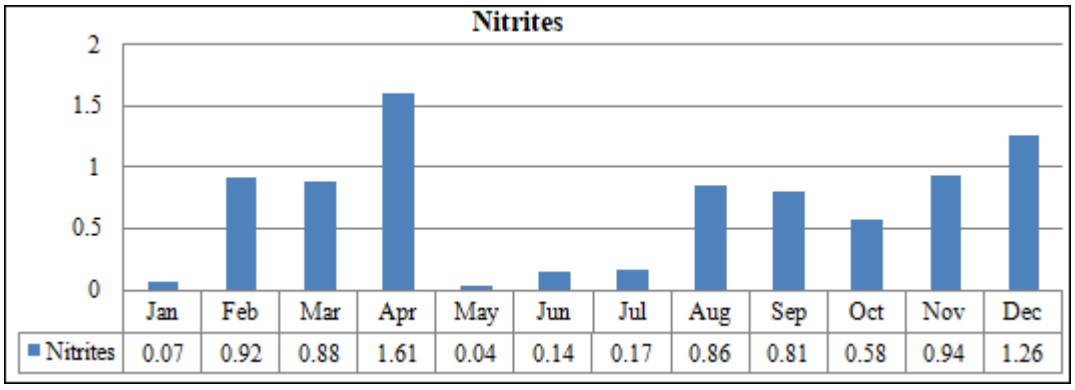

Figure m: Variations in Nitrites