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PRELIMINARY STUDY ON SEASONAL VARIATION OF PHYSICOCHEMICAL PARAMETERS OF CHANNABASAVA PATTADEVARU LAKE BHALKI, BIDAR DISTRICT

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Abstract: Quality of water is most common term which refers to a general explication about various properties ofa water body. Lakes that have a highwater quality possess properties that make it a high valued resource many creature and nature. The present limnological work is an attempt to evaluate the seasonal variation in the physico chemical parameters of the Chennabasava Pattadevaru Lake, Bhalki, Bidar. Present work was also aimed to determine suitability of the water for human consumption and other domesticuses. During the study every month water samples were collected from various sampling sites oflake during the period of January 2023 to December 2023. Analysis of samples was carried out to study physico-chemical parameters such as temperature, pH, potassium, total hardness, calcium, magnesium, alkalinity, chloride, dissolved oxygen, biochemical oxygen demand (BOD), nitrate and phosphate. Results of the present investigation when compared with the standard values prescribed by Bureau of Indian Standards(BIS) and World Health Organization (WHO) revealed that all the values of physicochemical parameters of present study area within the permissible limit.

Keywords: Water, lake, physicochemical parameters, Seasonal Variation, Analysis,Samples,pH, Dissolved Oxygen, Bhalki and WHO.

1.INTRODUCTION:

Water is the most abundant and essential natural resource on the planet earth and life is not possible without water, the 2/3rdmass of our body is water and 70% surface of the earth is covered by water Khare et al., 2008). We have extensive resource on the earth amounting to about 13, 481, 96000 Km3 of water. Due to its unique distinctive properties water is of multiple uses for living organismsand 77% of water is used in agricultural sector (Mullar et al., 2010). The wetlands are important sources of drinking water and feeding ground for the animals living around it. Therefore, the health and productivity of these wetlands become important for various creatures and mankind (Vogt et al., 2007).

Out of the total water reserves of the world, about 97% is salty water and only 3% is fresh water. Even this small fraction of fresh water is not available to us as most of it is locked up in polar ice caps and just 0.003% is readily available to us in the form of ground water and surface water (Tharumaratnam V and Deon C 2010). In semi-arid regions, the droughts and the highly irregular rainfall together with high evaporation rates, cause the loss of a great part of the surface waters. As a result, almost the entire hydrologic network is alter, which leads to a severe problem for the storage and use water resource. Therefore, many reservoirs and manmade lakes are constructed in these regions with the main purpose of storing water for various purposes (Balakrishna et al., 2013).

Now a day's Water bodies are frequently contaminated by many kinds of pollutants resulting from increasing human population, Unplanned urbanization, rapid industrialization, toxic agricultural drains and other anthropogenic activities which results in massive and diverse pollution in aquatic environment leading to deterioration of fresh water quality and depletion of aquatic fauna(Khalid et al., 2020).Therefore it is important to check the water quality of drinking water at regular time of interval, because due to use of contaminated drinking water, human population suffers from different water borne diseases.(Basavaraja Simpi et al., 2011).

Water as an universal solvent contains minerals and organic origin and used for irrigation, industrial purposes and domestic uses which include fishing, washing, and drinking (Khune et al., 2021). The quality and productivity of water depends on the ecological functions of water body (Shiddamallayya, 2007). Physicochemical parameters are an important criterion for determining the suitability of water. The human being always being depended on water resource for almost every preliminary and developmental activities. Disposal of domestic wastes in wetlands will cause undesirable changes in physico-chemical and biological characteristics of this water bodies. Organic enrichment of these water bodies results in high Oxygen demand and low Oxygen content (Sharma, 2008).

Considerable hydro biological investigations have not been carried out on Lake in selected study area of Bhalki and little hydro-biological information is available. Channabasava Lake was initially constructed for irrigation purposes, however the as time passed pattern of water usage has been changed from agricultural to domestic purpose such as washing, bathing, and fishing, etc. There is a lack of minimum limnological data on physico-chemical characteristics of the this lake. Hence present study has been carried out for one years from January 2023 to December 2023to study seasonalvariation of selected physico-chemical parameters.

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2. Study Area:

The selected water body is situated in the Bhalki taluk of Bidar District. The bhalki town lies at 18 º03'latitude of 77º12' longitude and located 590 meters above the sea level. The climate of the town is very dry and temperature fluctuations are between 10 ºc to 45 ºc. The Selected study place Bhalki received 782.4 m.m rainfall during the study year of 2023.Major amount of tank is used for irrigation and fishery. The water body also used for domestic uses like cattle bathing, cloth washing, amusement and disposing some anthropogenic wastes.

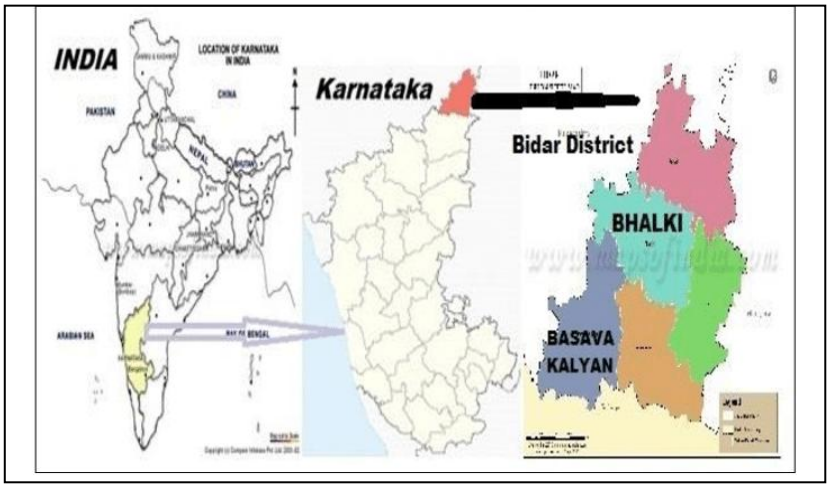

Plate 1(A)

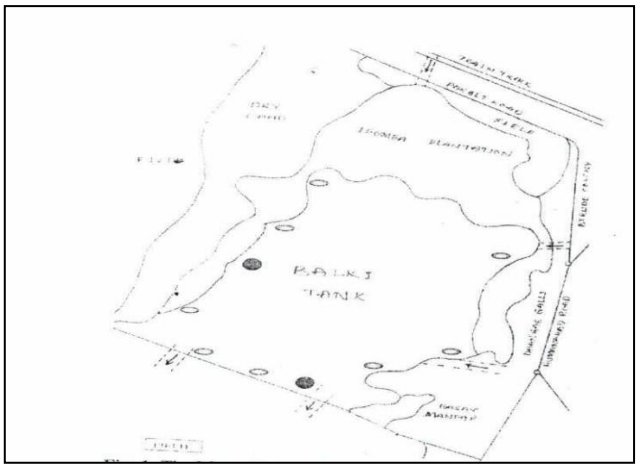

Plate 1(B)

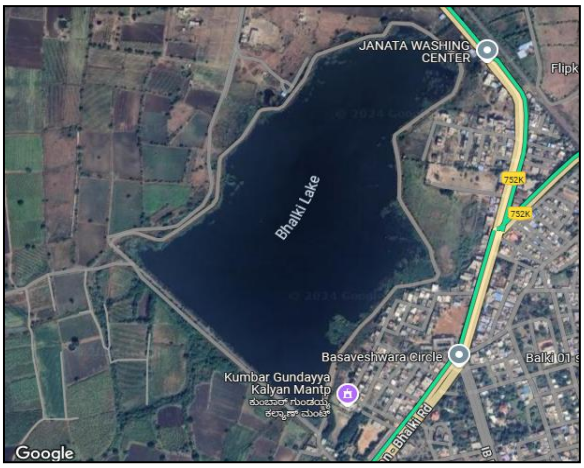

Plate (C)

Plate 1 (A), (B) and (C): showing Map of the Bhalki and Channabasava Pattadevaru Lake.

3.METERIALS AND METHODS:

Sample Collections: During present research investigation, Every month water samples are collected from selected study sites of Channabasava Lake of Bhalki, Karnataka. Samples are collected in fresh unsullied plastic bottles and brought to the laboratory for analysis of physico-chemical parameters by standard methods. The surface water samples were collected January 2023 to December 2023. Collected samples were carried in plastic cans for later analysis. Samples were collected during 07:00 am to 9:30 am to analyze the physicochemical parameters. A few tests particularly pH, DO, free CO2 were performed on the spot during the study at the site of research. The air and water temperature were recorded at the site using mercury thermometer. The pH was measured using pH meter (Hanna Model Champ). The transparency of water to the light was measured using secchi-disc.

Water samples collected for the purpose of estimation of various parameters are brought to the laboratory and analysis was done as soon as possible. Analysis of physicochemical parameters viz., Dissolved Oxygen, Free Alkalinity, Hardness, Calcium, Magnesium, Chloride, nitrate, Phosphorus and Biochemical Oxygen Demand was carried out by following the standard methods suggested by NEERI (2012), APHA(1985),Trivedi andGoel (1986) and WPCI (2005)

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Plate 2(A)

Plate2 (B)

Plate 2(C)

Plate2 (D)

Plate 2 (A), (B), (C) and (d):Sample collection at Channabasava Pattadevaru Lake.

4. RESULTS AND DISCUSSION:

Always the Water quality of any of the freshwater body will be varied from time to time and place to place due to influence of regional factors. The main objective of the seasonal variations in physico-chemical analysis of water was to determine its biological status of the present lake. After analysis of the data about various sites of study area we have a clear picture about changing pattern of physicochemical parameters. The data about various parameters during different months of the study duration is represented in the Table No.1. The results of each parameter and its seasonal variation discussed below separately.

Month	Physicochemical Parameters (mg/l)												
	Atm Tempº C	Water Tempº C	pH	Total Alkalinity	Total Hardness mg/l	DO	Free CO2	BOD	Ca	Cl	Mg	PO4	Nitr. (NH3-N)
Jan	30.5	23.3	7.8	50	72	7.5	5.3	10.3	17	16.6	6.8	2.06	0.006
Feb	32.3	27.1	7.5	52	82	7.2	5.9	11	20	17.6	6.9	2.6	0.008
Mar	34.7	27.3	7.4	53	76	6.7	7.4	10	21	18.3	7.5	4.3	0.006
Apr	38.0	31.8	7.8	54	98	6.5	7.5	11	19	18.4	7.7	4.6	0.007
May	38.3	31.1	7.9	55.6	105	6.2	7.9	15.3	22	22.8	7.9	4.9	0.009
Jun	36.5	30.1	8.4	65	102	6.6	6.9	16.1	26	23.1	8.5	3.9	0.016
Jul	33.8	28.4	7.8	67	99	6.3	6.2	16.3	29	26.2	8.0	3.5	0.019
Aug	32.5	27.4	7.5	64	78	6.8	6.1	16.0	27	28.4	6.7	2.9	0.013
Sep	30.3	26.1	7.5	62.4	76	6.9	5.9	15.3	26.3	28.0	6.1	2.6	0.009

Oct	29.1	24.2	7.6	61	74	7.7	5.6	13.5	25	26.8	5.0	2.7	0.008
Nov	25.9	22.7	7.3	59	84	7.9	5.1	10	23	25.7	4.9	2.3	0.007
Dec	24.9	20.3	7.6	58	81	8.3	4.9	9.8	21	24.1	4.6	2.1	0.002

Table No.1. Seasonal variation of Physico-chemical Parameters at Channabasava Pattadevaru Lake.

1) Atmospheric and Water Temperature:

Temperature of Surface water is an important factor in aquatic environments affecting Various biological processes, in this present study atmospheric temperature varied seasonally. Temperature is one of the physical factors which will changes the water characteristics and considered as an important factor in controlling the fluctuation of plantation and functioning of water bodies. (Dwivedi and Pandey, 2002 ; Singh and Mathur , 2005)The temperature is one of the most important ecological factors which controls the physiological behavior and distribution of the organisms.

During the present research investigation seasonal variation of both the atmospheric and water temperature has been observed. The energy released in the form of heat due to the decomposition of organic matter in water body and respiration also slightly added to the temperature. Air temperature varied minimum of 24.9°C to 29.1 °C and maximum of 38.3°C wasrecorded in summer season. Eventually water temperature ranges from 20.3 °C to 31.8 °C respectively. The maximum temperature was noticed in summer season. In the present study seasonal variation in atmospheric and water temperature have been observed. The results clearly shows that, water temperature always remained lesser than air temperature during the study period. Similar observations were madeby Ade and Vankhede (2001). Atmospheric and Water Temperature was moreand during summer comparatively less during monsoon and minimum during winter. Kannan and Job (1980) and Joshi and Singh (2001) also found similar results as observed in the present study.

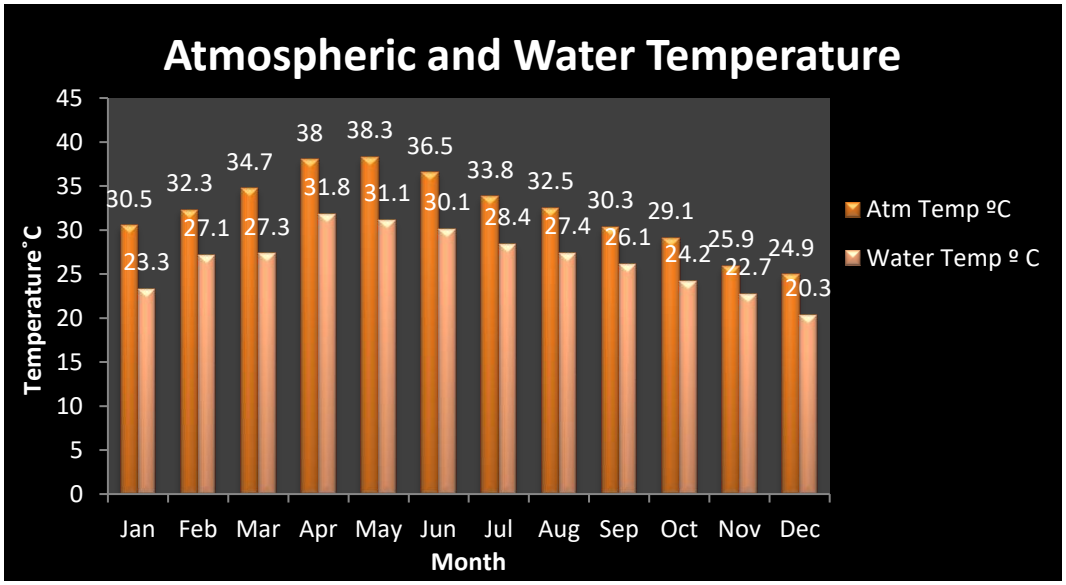

Fig 1. Histogram showing monthly variation ofAtmospheric and Watertemperature (˚C)at Channabasava Pattadevaru Lake.

2) pH:

pH of any aqueous system is suggestive of its acidbase equilibrium achieved by various dissolved compounds in it. pH of water is a master variable because many reactions that control water quality are always dependent on pH levels. The Decrease in pH during monsoon may be due to heavy inflowof water and during winter could be due increased photosynthetic activity of phytoplanktons (Chalapathi K, 2018). As an important parameter pH will determines the suitability of water for various purposes. pH of a water body is most important for the biotic communities because most of the plant and animal species can survive in a narrow range of pH from slightly acidic to slightly alkaline condition.

During the study period pH values of the Lake has shown alkaline mode with a few variations during some months of study period. High pH value of8.4 in the month of June and low pH of7.3 was recorded in month of November. In the present research work we observed a direct relationship between water temperature and pH and similar results were recorded by Puttaiah (1986). The pH of the water was recorded high in summer compared to monsoon and winter seasons and of the lake was seems to be slightly alkaline in summer due to increased pH. Results of Simpi B (2011) also recorded gradual increase of pH from winter to summer. High value also helps the growth of algae and results maximum bloom of phytoplankton (Nandan and Patel, 1992).

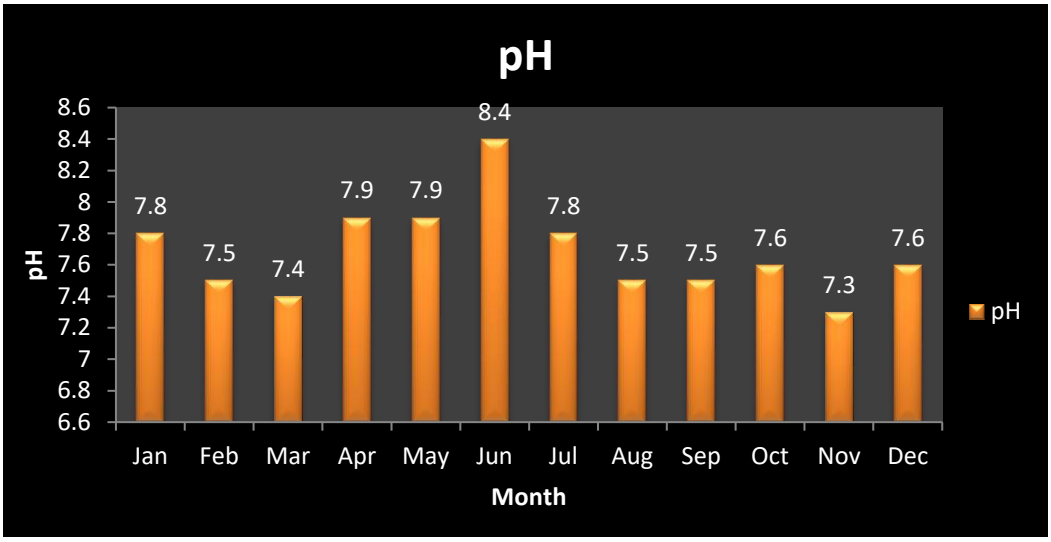

Fig 2. Histogram showing monthly variation of pH at Channabasava Pattadevaru Lake.

3) Total Alkalinity:

In water body the alkalinity of is most important for biological activity. Alkalinity is an important parameter for aquatic life in fresh water because it equipoise the pH changes. Alkalinity in natural fresh water bodies due to the function of bicarbonate and carbonates produced by decomposition of minerals. Alkalinity of the water is the capacity to neutralize strong acids that gives primarily a function of carbonate, bicarbonate and hydroxide content and formed due to the dissolution of carbon dioxide in water. In the present study, alkalinity values were fluctuated between 50 mg/L to 67 mg/L. During investigation seasonal variation displayed the highest values of alkalinity during northeast monsoon season. During study months seasonally high alkalinity was recorded during rainy and it was lowest during the summer season. The findings of Padma and eriakali, 1999 also are in line with results of present study. Further Narashimha R and Jaya R (2001) recorded that alkalinity values varied between 90 to 265 mg/L in a fresh water body pond at Nambur.

The observed monsoon higher values compared to summer and winter seasons might have resulted from the effect of pH on the relative proportions of different forms (CO2, HCO3- and CO3-2) of inorganic carbon. Same type of observations were made by Pulugandi (2014) and Srinivas Kumar G (2021).

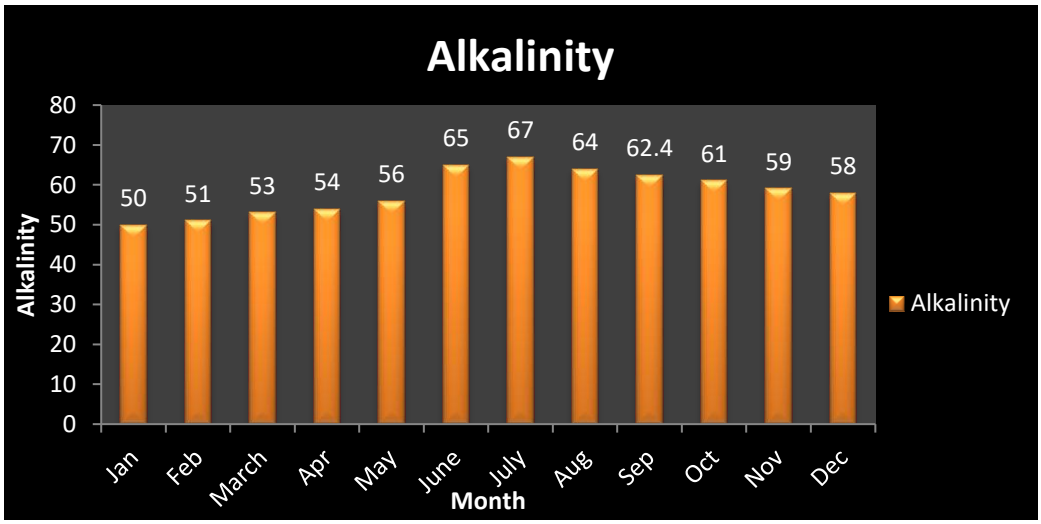

Fig 3. Histogram showing monthly variation of Alkalinity at Channabasava Pattadevaru Lake.

4) Total Hardness:

Hardness of water is due to association of minerals like calcium, magnesium, carbonates, bicarbonates, sulphates, chlorides, nitrates and other organic matter.In surface waters principle ions causing hardness in water are the divalent cations, especially calcium and magnesium. In the present investigation, the highest hardness values recorded as 105 mg/l in the month of May 2023 and minimum of 72 mg/l in the month of January2023.Hardness is positively correlated with water temperature and pH of the water. In present work it was observed that hardness seasonally varied and gradually increased in summer and also in north east monsoon. Study of Hulyal and Kaliwal (2011) also recorded that higher value in summer and lower in winter season. Observations made by were found by various workers Naiak and Purohit, 1996; and Nair, 2002.

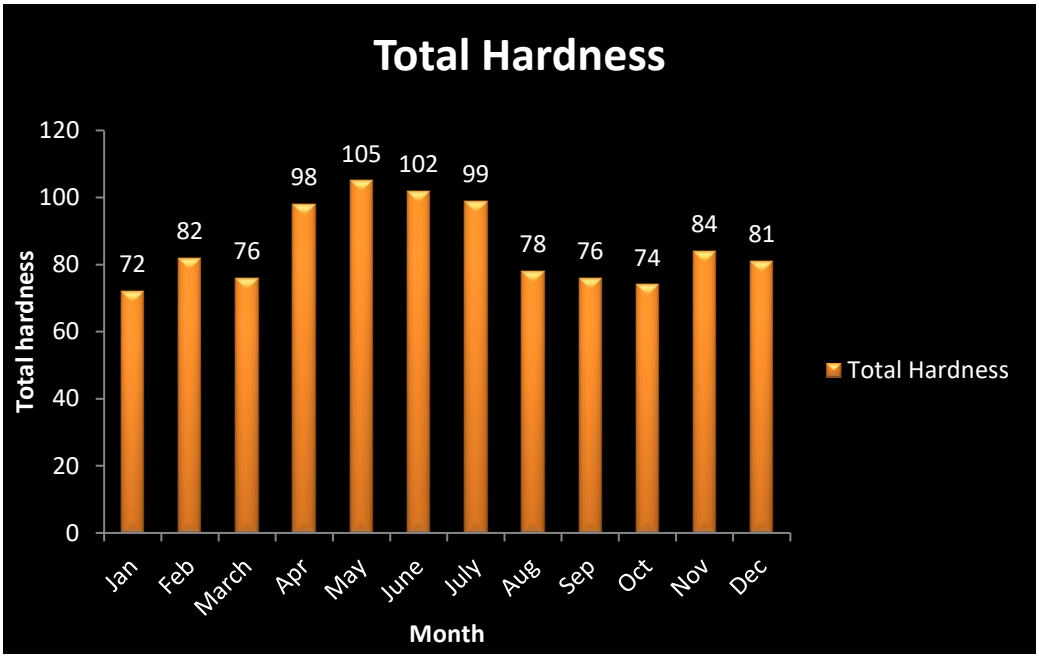

Fig 4. Histogram showing monthly variation of Total hardness at Channabasava Pattadevaru Lake.

5) Dissolved Oxygen:

Dissolved oxygen is one of prime important factor in natural waters as regulator of metabolic processes of biota and as a vital indicator of water quality, ecological estimation of a fresh water body. The oxygen is most important for all organisms and affects the solubility of many nutrients (Wetzel, 1983). By the entry of organic and inorganic materials into water causes depletion of DO levels of water bodies. During the present investigation the dissolved oxygen was found to be maximum of 8.3 mg/l in the month of December 2023 and minimum value of 6.2 mg/l are recorded in the month of May 2023. To witness Ramulu and Benarjee (2013) also recorded higher values of dissolved oxygen during winter. Results of the present study are similar and in line with findings of Raut et al., (2011).

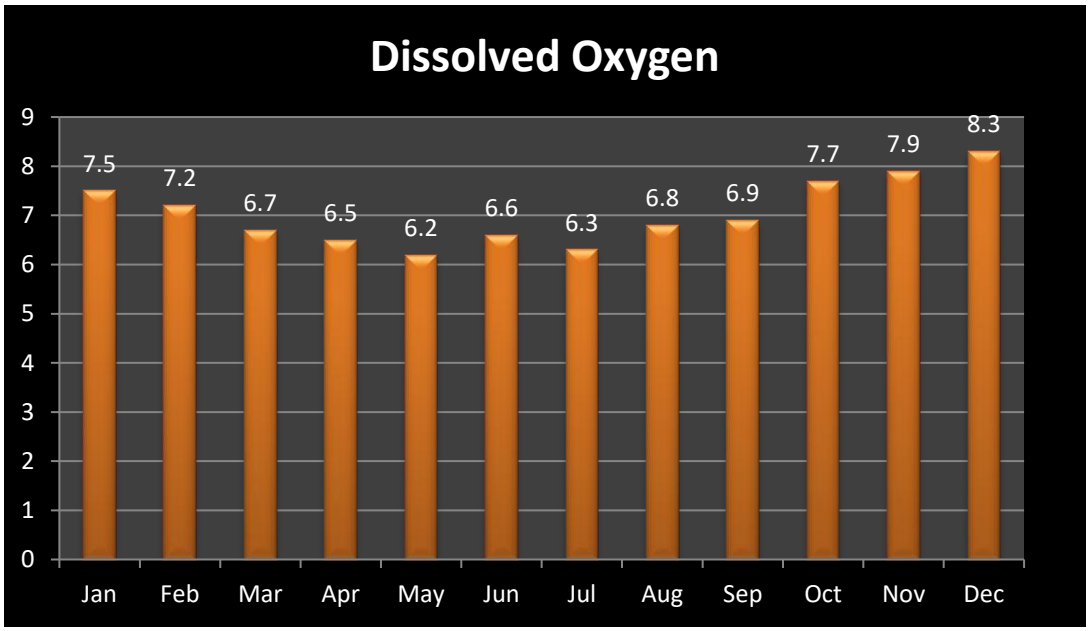

Fig 5. Histogram showing monthly variation of Dissolved Oxygen at Channabasava Pattadevaru Lake.

6) Free Carbon Dioxide:

Free Carbon dioxide is an important parameter as it is requires for photosynthesis in plants. In the study period maximum free carbon dioxide values of 7.9mg/was observed in the month of May and minimum values of 4.9mg/l was observed in the month of December.

The free carbon dioxideconcentration depends on the respiration of organisms (plants and animals) and photosynthesis rate. During present investigation the minimum free CO2 was recorded in winter season which might bedue to low biodegradable material at the bottomwhere as its higher value during summer may be dueto organic load from summer crop agricultural runoffand domestic wastes. The findings of the study are similar with studies of Sarang et al., (2015).

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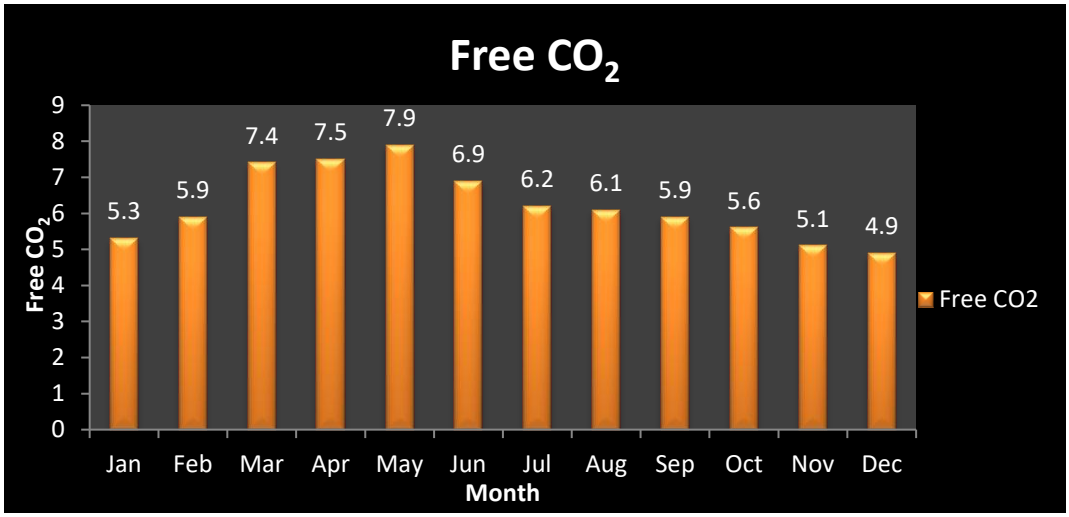

Fig 6. Histogram showing monthly variation of Free Carbon Dioxide at Channabasava Pattadevaru Lake.

7) Biochemical oxygen demand (BOD):

Biochemical oxygen demand is dissolved oxygen required for aerobic decomposition of organic matter present in water. BOD is amount of oxygen utilized by microorganisms to stabilize the organic matter and it determines the strength of effluents and other polluted waters and provides data on the pollution load in natural waters bodies. Observations of the present study showed that maximum BOD of 16.3 mgl-1 was recorded in July 2023 and minimum BOD of 9.8 mgl-1 in December.In the present study gradual increase of BOD was observed in the summer and early rainy season.Pal et al., (2013) noticed same trend of seasonal variation of BOD and findings of present study are in line with them.Higher BOD values in summermay be due to organic load and reduced water flow.Mehta et al., (2016) observed the BOD value fluctuating between 2 to 8 mg/lit.

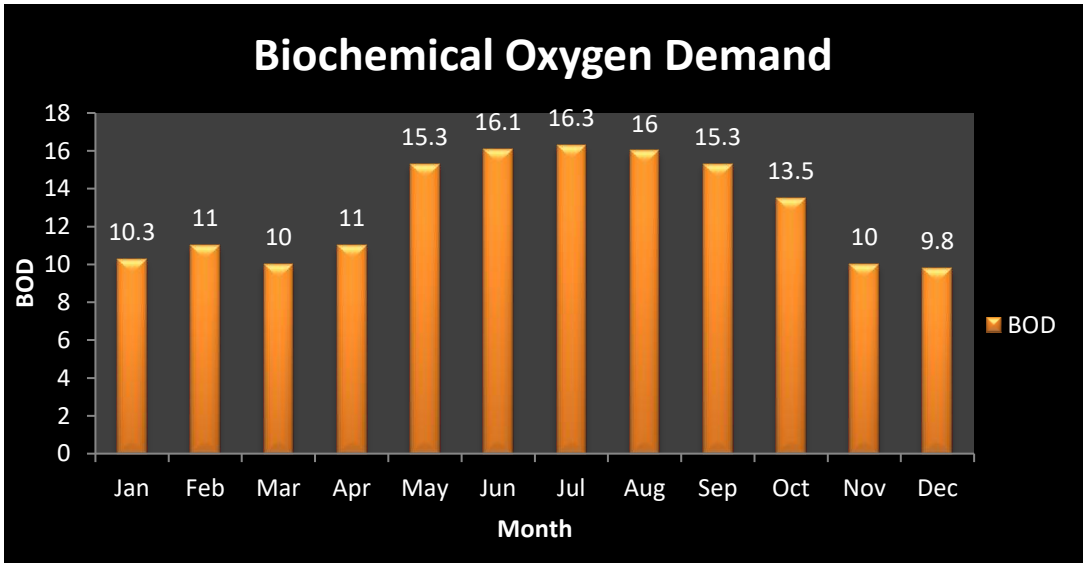

Fig. 7. Histogram showing monthly variation of Biochemical oxygen demand at Channabasava Pattadevaru Lake.

8)Calcium:

Calcium is one of the most abundant divalent ion in fresh water bodies and it is necessary for shell formation, bones of vertebrates and plant lime precipitation.Calcium is found in all natural waters; however it is augmented by the discharge of various sewage and waste water (Saluja DS, 2018).Calcium is found in all natural waters;however the discharge of sewage and waste water increases calcium concentration.Seasonal variation of calcium is shown in Fig.8 below.It was observed that the value of calcium gradually increases from July to November in the rainy season and maximum value of 29 mgl-1 is recorded in the month of July and Minimum value of 17 mgl-1 is recorded in January. From January to April calcium value slightly increases and later reaches peak in July.Results of current study ae similar to findings of Sudarshan Bhat et al., (2019) and Rajini (1989) who also recorded similar values and also reported that calcium concentration increases during monsoon season.

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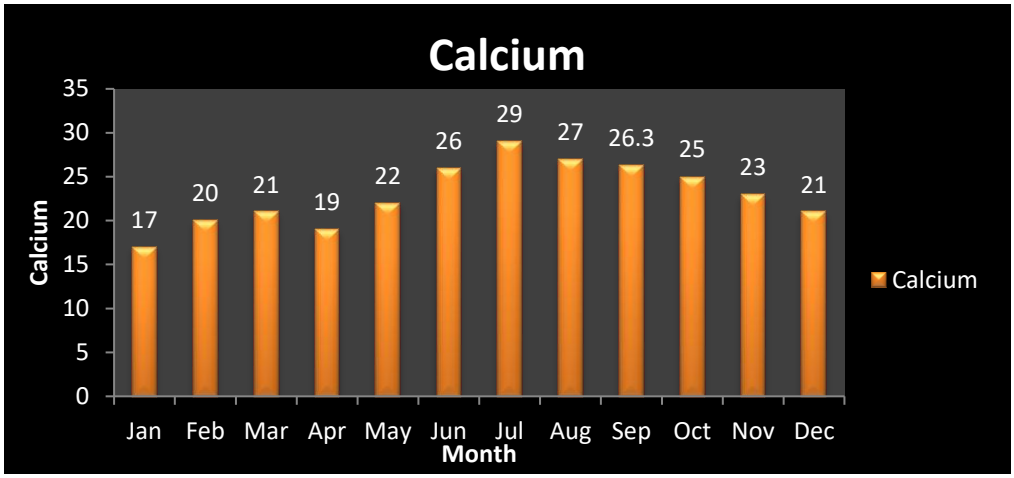

Fig. 8. Histogram showing monthly variation of Calcium at Channabasava Pattadevaru Lake.

9)Chloride:

The high chloride concentration in water is main cause of pollution. Chloride is mainly present in sewage, effluents, farm drainage and remains unaltered during purification of sewage (Patil et al. 2018).The excess chloride may reduce the Dissolved oxygen levels in the water body and can affect aquatic organisms adversely(Deepa et al.2016). Figure.9 gives the seasonal variation of chlorides during the study period. Chloride values were lower (16.6) in January 2023 and highest (28.4) in August 2023. Seasonal variations suggest that chloride is comparatively high in the north east monsoon of 2023. Similar results were noticed by Archana Gupteand Nisar Shaikh (2013).

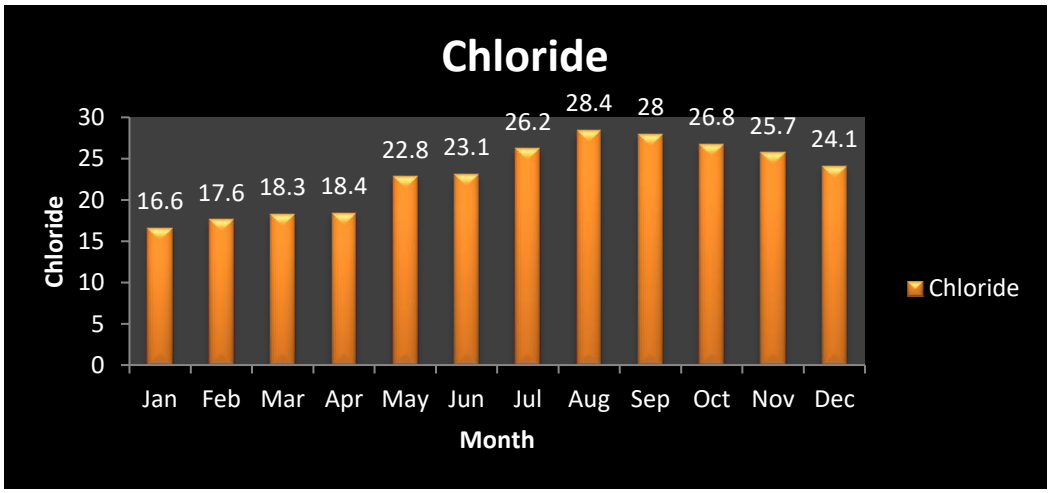

Fig. 9. Histogram showing monthly variation ofChloride at Channabasava Pattadevaru Lake.

10)Magnesium:

Magnesium is an important element of usually it but present in very low concentration and it also contributes for the hardness of water along calcium. is found along with calcium. The magnesium values at the selected aquatic body were fluctuated between 4.6 to 8.5 mg/l shown in Fig 10. During the present study high values of Mg areobserved in monsoon and lower values were observed during the winter season. The studies of Sudarshan P et al (2019) also also witnessed similar seasonal variations in magnesium .

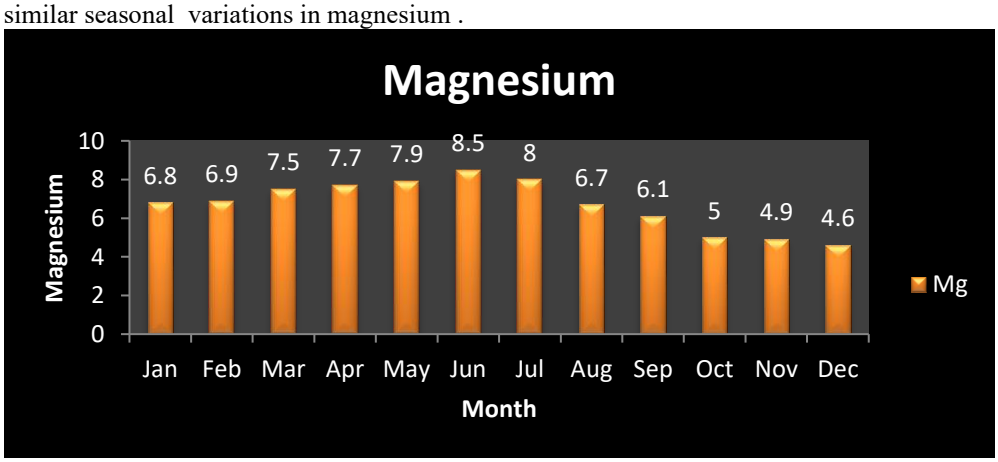

Fig. 10. Histogram showing monthly variation ofMagnesium at Channabasava Pattadevaru Lake.

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11) Phosphate:

During the present investigation the values of the Phosphate are fluctuated between 2.06 mg/l to 4.9 mg/l.Phosphates is one of essential parameter which helps in the growth of organisms and it is a nutrient which limits primary productivity of the water body. Highest values are recorded in rainy season and lowest values in winter. From the present study it is clear that seasonally phosphate concentration in the pond was more in summer followed by rainy followed by a decline in winter season. Similar results were observed in findings of Chaurasia Mand Pandey G (2007).

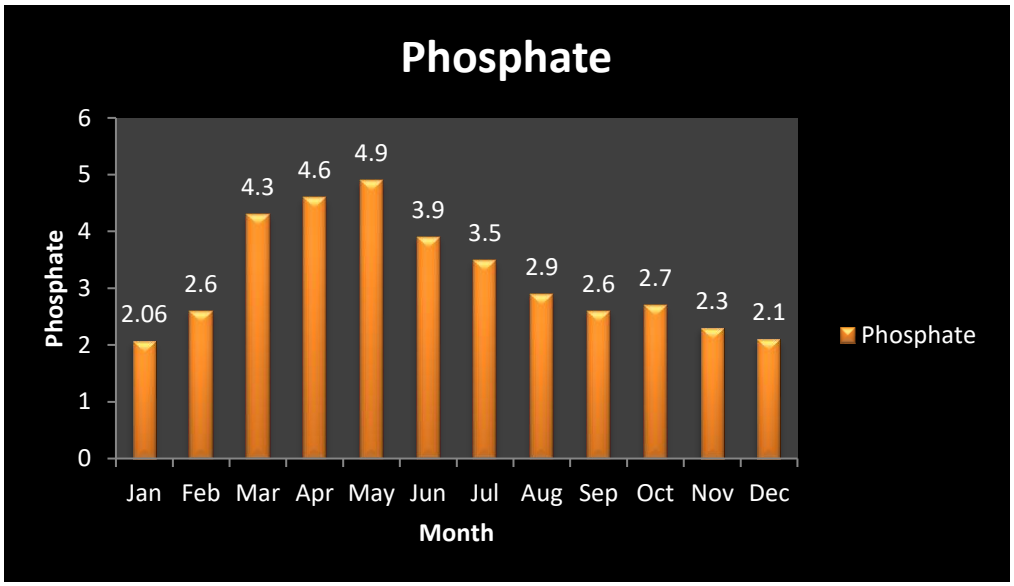

Fig. 11. Histogram showing monthly variation ofPhosphate at Channabasava Pattadevaru Lake.

11) Nitrate:

Nitrate plays key role in deciding the productivity of aquatic system and helps in growth of algae and macrophytes.Nitrate occurs due to many natural sources and also because of human activities like food production, agriculture and manure, disposal of domestic and industrial sewage (Lodh et al. 2014).In the present investigation the lower values of Nitrates were recorded during the winter season at all lakes whereas the higher values of Nitrates were recorded during monsoon seasons. During the present investigation the values of the Nitrate are fluctuated between 0.002 mg/l to 0.019 mg/l.The presence of nitrate infresh water bodies depends mostly upon theactivity of nitrifying bacteria, domestic and agricultural source. Similar results were recorded in study of Shastri et al (2008).Jadhav et al., (2013) observed maximum Nitrate value in post summer and monsoon at Nirmal lake, Vasai, Thane which is similar to present study.

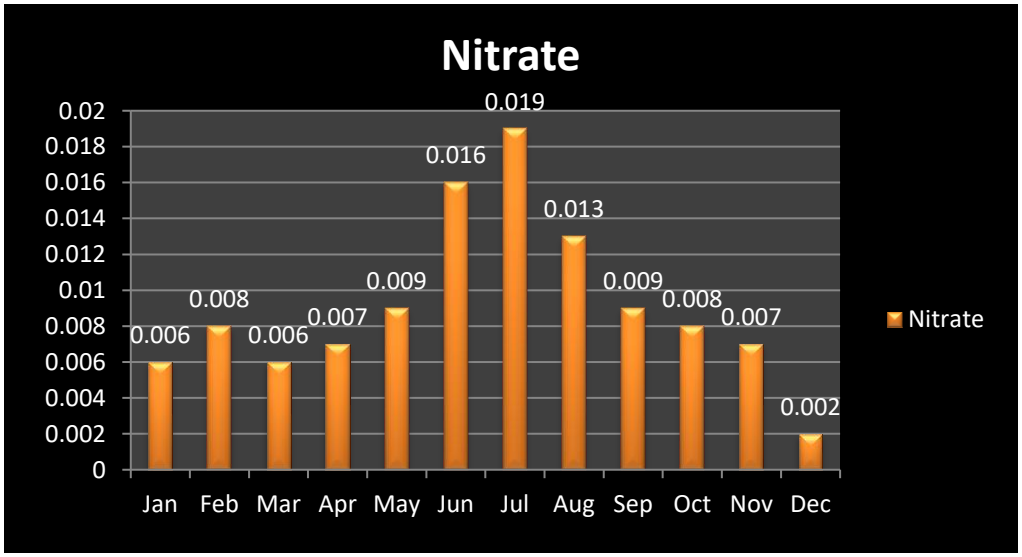

Fig. 12. Histogram showing monthly variation ofNitrate at Channabasava Pattadevaru Lake.

5. CONCLUSION:

Main objective of study was to know Physico-chemical and biological characteristics of Channabasava Pattadevaru Lake and to study seasonal variation of parameters. The results of present research investigation revealed that there were variations in certain physico-chemical properties of Channabasava Pattadevaru Lake, Bhalki, District Bidar, Karnataka, (India). Variations may be due to the surface run-off and other excessive human activities. Water temperature was lower

during winter might be due to high water level and low solar radiation where as in summer higher temperature was recorded which might be due to low water level, heavy solar radiation. During the study period pH was recorded in the range of 7.3 to 8.4 which was found to be alkaline. The lower pH during monsoon may be due to the turbidity of water. Chloride content in the present study showed seasonal variation, chloride values are recorded lower in post monsoon and higher content in pre monsoon. The productivity of the lake was found to be average.

In the selected aquatic body all physico-chemical parameters were recorded under permissible limit during the study period. The results were compared with the standard values prescribed by the Bureau of Indian Standards (BIS) and World Health Organization (WHO) are under permissible limit. The management of freshwater bodies like lakes as natural ecological sources is most important now a day.

REFERENCES:

- Khune C J Raut M B and Nagpurkar L P. A Study on Water Quality Parameters of Malijunga Lake in Gondia District of Maharashtra State, India. International Journal of Life Sciences. 2021;9(1):114-118.
- Mullar R M, Rajashekhar M, Vijaykumar K and Haliked N.S. Seasonal variation in physico-chemical parameters of Hirahalla reservoir, Koppal District Karnataka. International Journal of Systems Biology. 2010;2(2):0975-2900.
- Ade P.P. and Vankhede G.N. (2001) Ph.D. Thesis, Amravati University, Amravati.
- Tharumaratnam V and Deon Canyon (2010) Sustainable water from collector well systems and sustainable heat from ground-source energy systems in Sri Lanka Book. https://www.researchgate.net/publication/235423615. ISBN: 978-0-9803924-2-5.
- Bashir I, Lone F, Bhat R A, Mir S A, Dar Z A , Dar S A. Concerns and Threats of Contamination on Aquatic Ecosystems. Bioremediation and Biotechnology, Springer. 2020. https://doi.org/10.1007/978-3-030-35691-0_1.
- Balakrishna D, Reddy T R, Reddy K and Samatha D (2013). Physico-Chemical Parameters And Plankton Diversity Of Ghanpur Lake, Warangal, A.P., India. International Journal of Zoology Research. 2013;3(1):44-48.
- Basavaraja Simpi, S.M. Hiremath, KNS Murthy, K.N. Chandrashekarappa, Anil N Patel, E.T. Puttiah. Analysis of Water Quality Using Physico-Chemical Parameters Hosahalli Pond in Shimoga District, Karnataka, India, Global Journal of Science Frontier Research. (2011);11(3):30-31.
- Shiddamallayya N Pratima M. Studies on phytoplankton community with special reference to physico-chemical factors in Bhalki tank, Bhalki, Karnataka, India. Ecology Environment and Conservation. 2007;13(2): 361-365.
- NEERI (2012): Water testing- A laboratory manual salient parameters: council of scientific and industrial research, National Environmental Engineering Research Institute, Nehru Marg, Nagpur.
- APHA (American Public Health Association). Standard methods for the examination of water and wastewater (21sted.). American Public Health Association, Washington, DC; 2005.
- Trivedi R K, Goel P K. Chemical and Biological methods for water pollution studies. Environmental Publications(Karad, India). 1986; 34-96.
- Dwivedi B K and Pandey G C. Physicochemical factors and algal diversity of two ponds in Faizabad, India, Pollution Research. 2002; 21(3), 361-370.
- Efford I E. Temporal and Spatial differences in phytoplankton Productivity in Marine Lake, British Columbia. J. Fisheries Res. Board, Can. 1967; 24:2283-2307.
- Singh R.P. and Mathur P. Investigation of variations in physicochemical characteristics of a fresh water reservoir of Ajmer city, Rajesthan, Indian Journal of Environmental Science.2005; 9: 57-61.
- Kannan V. and Job S.V. Diurnal depth wise and seasonal changes of physicochemical factors in Sathio reservoir. Hydrobiologia. 1980; 70: 103-117.
- Joshi P C and Singh A. Analysis of certain physicochemical parameters andplankton of freshwater hill stream at Nanda Devi biosphere reserve. Uttar Pradesh Journal of Zoology. 2001; 21:177-179.
- Chaurasia M and Pandey G C. Study of physic- Chemical characteristic of some water pond of Ayodhya-Faizabad. Indian Journal of Environmental protection. 2007;27(11): 1019-1023,
- June and Fred C. Physical, chemical and biological characteristics of lake Sharpe, South Dakota (USA). US Fish wild. Serv. Fish wild L., Tech. Rep. 1987; 8: 1-20.
- Chalapathi K, Madhavi K, Ramalingaiah D, Jesintha N, Adnan A, Gowri G, Satyanarayana B, Thirunilath S, Jaini J. Studies on physico-chemicalparameters of Kanigiri reservoir, Nelloredistrict, Andhra Pradesh. International Journal of Current Microbiology and Applied Sciences.2018;7(08):979-996
- Nandan S N and Patel R J. Ecological studies of algae in aquatic ecology (ed. by Mishra, S. R. andb Saksena, D. N. Ashis Publishing House New Delhi, 1992:89-99.
- Simpi B, Hiremath SM, Murthy K N, Chandrasekarappa K N, Patel A N, Puttaiah E T. Analysis of water quality using physicochemical parameters, Hosahalli tank in Shimoga district, Karnataka, India. Glo. J. Sci. Fron. Res. 2011;11(3):31-34.
- Padma S. and Periakali. Physicochemical and geochemical studies in Pulicat slake, east coast of India, Indian Journal of Marine Sciences. (1999); 28: 434-437.
- Srinivas Kumar G And Rajendar G (2021) Analysis of Physico-Chemical Parameters Of kinnerasani Reservoir Water in Bhadradri Kothagudem District of Telangana, India. Uttarprdesh Journal of Zoology. 2021; 42(3): 79-87.

- Naik S and Purohit K M. Physicochemical analysis of some community ponds of Rourkela, International Journal of Environment and pollution.1996; 16(9), p. 679-684.
- Priyanka Y, Yadav V K, Yadav A K and Khare A. Physico-Chemical Characteristics of a Fresh Water Pond of Orai, U. P., Central India. Octa Journal of Biosciences.2013; 1(2): 177-184.
- Nair M.S. Rajendran. Seasonal variations of physicochemical factors andits impact on the ecology of a village pond at Imala (Vidisha)", Journal of Ecobiology. 2002;12(1):21-27.
- Raut K, Shinde S, Pathan T and Sonwane D. Monthly variations physico-chemical parameters, Ravivar-peth lake at Ambajogi district, Beed, Marathwada region, India. Global Journal of Environmental Research. 2011; 5 (2): 70-74.
- Sarang S, Somani V. Water quality and phytoplankton diversity from temple pond, Titwala, Maharashtra. Proceedings of U.G.C. sponsored National seminar on Wetlands present water status, Ecology and Conservation. 2015; pp227-231.
- Mehta G, Deshbhratar S. Sonali R. and Mahely J. Assessment of certain physico-chemical parameters of Satpala lake, Virar, Palghar, Maharashtra, International Journal of Innovative Research in science. Engineering and Technology. 2016;5(14):598-605.
- Jadhav R, Pimpliskar M and Handa S. Seasonal variations in physico-chemical characteristics of Nirmal Lake, Vasai district, Thane, Maharashtra, India. IOSR Journal of Pharmacy and Biological Sciences. 2013;8(6): 48-51.
- Pal A, Kumari A, and Zaidi J. Water quality index (wqi) of three historical lakes in Mahoba district of Bundelkhand region, Uttar Pradesh, India. Asian Journal of Science and Technology. 2013;4(10):48-53.
- Rajani Gupta and Sadhu D.N. Environment and Ecology. 2004; 22(2): 419-423.
- Sudarshan M K, Mahesh and Ramachandra T V. Assessment of Seasonal Variation in Water Quality and Water Quality Index (WQI) of Hebbal Lake, Bangalore, India. Journal of Ecology and Environment. 2019; 37(1B):309-317.
- Saluja D S. Physico-Chemical Analysis of Potable Water Quality of Machna River at District Betul (M.P.). International Journal of Science and Research. 2018; 9(4):1294-1296.
- Archana G and Nisar S. Seasonal Variations in Physico-chemical Parameters and Primary Productivity of Shelar Lake Bhiwandi, Thane, Maharashtra. Universal Journal of Environmental Research and Technology. 2013;3(4):523-530
- Lodh R, Paul R, Karmakar B, Das M K Physico-chemical studies of water quality with special reference to ancient lakes of Udaipur City, Tripura, India. International Journal of Scientific and Research Publications. 2014; 4 (6): 1—9.