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Assessment of Physico-Chemical Characteristics of Water from Different Sampling Sites of Karmaveer Kannamwar Reservoir Regadi; Tahsil Chamorshi, District Gadchiroli (M.S.), India

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Abstract: ***Physico-chemical parameters of water are essential indicators of the quality of a water body. They reflect the interaction between water and its surrounding environment and are crucial for monitoring aquatic health, water treatment, and pollution levels. Karmaveer Kannamwar reservoir (Dena Project) is one of the major irrigation projects in the district Gadchiroli of Maharashtra, India. The Karmaveer Kannamwar Reservoir (Regadi) data, spanning two consecutive years (2014-15 and 2015-16), provides valuable insight into the water's quality at three distinct sites (S1, S2, and S3). This analysis focuses on examining changes in various physico-chemical parameters over the two years. Analysis of physico-chemical parameters of water was done using the standard literature of APHA et al. (2005) and Trivedi & Goel (1986). In the present study physico-chemical characteristics of water like temperature, pH, dissolve oxygen (DO), free carbon dioxide (CO_2), Turbidity, Conductivity, Hardness, total solids, total dissolved solids, total suspended solids, sulphates, nitrates and phosphates were analyzed. Ambient temperature in the present study were recorded between 21.9 ^{0}C to 43.8 ^{0}C, water temperature recorded between 18.2 ^{0}C to 39.6 ^{0}C, pH of water found between 6.89 to 8.78. Electrical conductivity in the present study was recorded between 0.159 Mmhos/cm to 0.387 Mmhos/cm., water transparency between 28.8 cm to 79.1 cm., total alkalinity between 121 mg/l to 247 mg/l., total hardness between 82 mg/l to 173 mg/l., Ca-hardness 39 mg/l to 97 mg/l., Mg-hardness 32 mg/l to 86 mg/l., total solids (TS) 264 mg/l to 682 mg/l., total dissolved solids (TDS) 157 mg/l to 563 mg/l. Dissolved oxygen in the present investigation recorded between theranges of 6.14 mg/l to 10.30 mg/l., free CO2 estimated between 1.82 mg/l to 6.82 mg/l. The reservoir water shows seasonal fluctuations in various physico chemical parameters. All water parameters were within permissible limit according WHO and ISI standard for drinking purpose during the study period and can be categorized into oligotrophic nature.***

Keywords: Karmaveer Kannamwar Reservoir, physico-chemical, TDS, DO, TS

1. Introduction

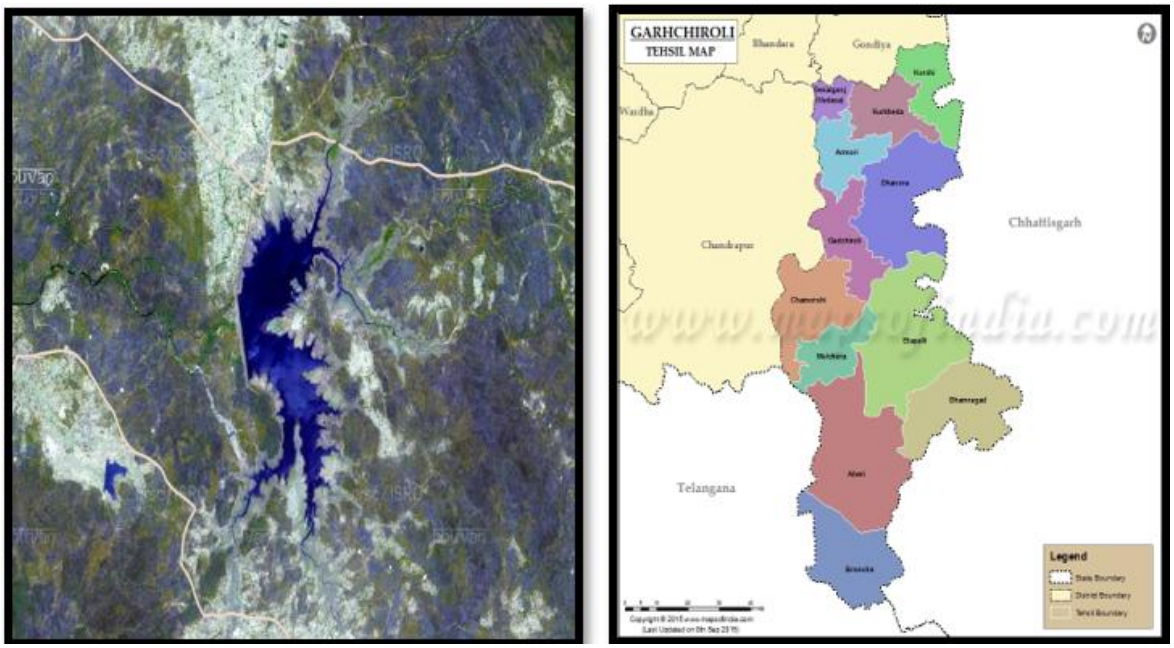
Water is most important for existence for life. Freshwater's most basic and important benefit is health of people, ecosystem and societies. The physico-chemical and biological characteristics determine the healthy status of aquatic ecosystem (Venkatesharaju, *et. al.,* 2010). Physicochemical parameters such as temperature, pH, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), alkalinity, hardness, and free carbon dioxide (CO_2) are important indicators of water quality. Regular monitoring of physicochemical parameters is necessary to assess water quality and ensure environmental sustainability. Such studies are useful for understanding pollution status, evaluating seasonal variations, and implementing effective water management strategies (Trivedi and Goel, 1986; Wetzel, 2001).

2. Study Area

Gadchiroli district is tribal and severely naxalite affected district of the eastern Maharashtra. The Karmaveer Kannamwar reservoir is earth fill dam and is the only complete major irrigation project of Gadchiroli district. It is situated at Regadi village of Chamorshi Tahsil of district Gadchiroli. The reservoir is constructed on the Deena Riverand hence it is also known as "Deena Project". The reservoir is situated in the dense forest and is surrounded by small hills.

The Karmaveer Kannamwar reservoir geographically lies between 19°47'0" altitude and 80°7'0" longitude. Dam has a catchment area of 1376.52 hectares. The maximum gross storage capacity of the reservoir is 61.15 cubic cm.

This study area is selected for the study to reveal the physico-chemical status, to explore aquatic biodiversity of the reservoir that would help the local fisherman society for effective fish culture, other aquaculture practices and local farmers for proper irrigation.



Source: Google and Bhuvan Map

3. Material Methods

The water sampling was carried for the period of 24 months from July 2014 to June 2015 and July 2015 to June 2016. Water samples were collected in three different seasons (Monsoon, winter and summer) from three different sampling stations S1, S2 and S3 of Karmaveer Kannamwar reservoir, Regadi (Deena Project) and collected samples have been analyzed to study physico chemical characteristics of water.

Water samples for physico-chemical analysis were collected in polythene plastic cans of 5 liter in the morning hours between 08.30 and 10.30. The water samples for determination of dissolved oxygen were collected in 300 ml capacity DO bottles from each selected sites from just below the water surface gently to avoid air bubbles in the samples. The samples were fixed by Winkler's A and B solutions at the stations.

Analytical techniques as described in APHA et al. (2005) and Trivedi & Goel (1986) were used for the physico-chemical analysis.

4. Observation

Table: Yearly variations in Physico-chemical Characteristics of water at Sites (S1, S2 & S3) of Karmaveer Kannamwar Reservoir, Regadi during 2014-15 & 2015-16

Year		2014-15			2015-16		
S. N.	Parameters	S1	S2	S3	S1	S2	S3
1	Ambient Temp.	40.2±5.7	32±5.9	33.6±6.05	29.73±5.18	30.47±5.56	31.44±5.54
2	Water Temp.	26.11±5.4	27.5±5.7	28.7±5.46	25.35±4.7	25.82±5.41	26.55±5.25
3	pH	7.65±0.4	7.8±0.5	7.68±0.38	7.69±0.52	7.92±0.51	7.86±0.43
4	Conductivity	0.276±0.1	0.268±0.1	0.276±0.06	0.282±0.06	0.274±0.06	0.275±0.06
5	Transparency	56.22±13.4	61.2±14.1	56.5±13.15	55.93±11.8	59.3±14.19	58.01±12.39
6	Total Alkalinity	172.2±29.6	175±36.4	170±27.25	182±33.7	174.3±33.32	183.1±31.96
7	Total Hardness	124.3±22.1	121±21.5	123±20.54	123.3±21.5	128.3±25.97	128.8±14.14
8	Ca - Hardness	65.58±17.1	67.6±11	72.6±10.68	67.17±13.3	76.92±14.77	73.42±9.95
9	Mg - Hardness	58.67±8	52.9±10.9	50.3±14.07	56.33±12.1	51.33±16.37	55.33±7.98
10	Total Solids	498.9±123.2	513±88	500±108.29	485.3±119	514.08±90.13	488.08±104.4
11	T.D.S.	356.8±114.6	315±77.5	363±113.8	335.6±98.3	325.3±58.28	339.5±95.81
12	D.O.	7.74±1.1	7.88±0.9	7.69±1.04	7.95±0.97	8.09±0.99	7.62±1.02
13	Free CO2	3.92±1.8	4.09±1.4	4.36±1.63	3.93±1.11	4.13±1.28	4.16±1.63

1) Ambient Temperature (^{0}C):

- **Site-1**

During the year 2014-15, the annual average value of the ambient temperature was recorded 40.2 ± 5.68^{0}C and in the year 2015-16 it was recorded 29.73 ± 5.18 ^{0}C.

- **Site-2**

During the year 2014-15, the annual average value of the ambient temperature was recorded 31.98 ± 5.9 ^{0}Cand in the year 2015-16 it was recorded 30.47 ± 5.56 ^{0}C

- **Site-3**

During the year 2014-15, the annual average value of the ambient temperature was recorded 33.59 ± 6.05 ^{0}Cand in the year 2015-16 it was recorded 31.44 ± 5.54 ^{0}C.

2) Water Temperature (^{0}C):

- **Site-1**

During the year 2014-15, the annual average value of the water temperature was recorded 26.11 ± 5.42 ^{0}Cand in the year 2015-16 it was recorded25.35 ± 4.7 ^{0}C.

- **Site-2**

During the year 2014-15, the annual average value of the water temperature was recorded 27.5 ± 5.7 ^{0}Cand in the year 2015-16 it was recorded 25.82 ± 5.41 ^{0}C.

- **Site-3**

During the year 2014-15, the annual average value of the ambient temperature was recorded 28.72 ± 5.46 ^{0}Cand in the year 2015-16 it was recorded 26.55 ± 5.25 ^{0}C.

3) pH:

- **Site-1**

During the year 2014-15 the annual average value of pH of water was recorded 7.65 ± 0.4 and 7.69 ± 0.52 during the year 2015-16.

- **Site-2**

During the year 2014-15 the annual average value of pH of water was recorded 7.80 ± 0.5 and 7.92 ± 0.51 during the year 2015-16.

- **Site-3**

During the year 2014-15 the annual average value of pH of water was recorded 7.68 ± 0.38 and 7.86 ± 0.43 during the year 2015-16.

4) Conductivity (Mmhos/cm):

- **Site-1**

The annual average value of conductivity of water during the year was recorded 0.276 ± 0.06 Mmhos/cm and 0.282 ± 0.06 Mmhos/cm was recorded during the year 2015-16.

- **Site-2**

The annual average value of conductivity of water during the year was recorded 0.268 ± 0.1 Mmhos/cm and 0.274 ± 0.06 Mmhos/cm was recorded during the year 2015-16.

- **Site-3**

The annual average value of conductivity of water during the year was recorded 0.276 ± 0.06 Mmhos/cm and 0.275 ± 0.06 Mmhos/cm was recorded during the year 2015-16.

5) Transparency (cm):

- **Site-1**

During the year 2014-15, the annual average value of transparency of water was observed 56.22 ± 13.4 cm and 55.93 ± 11.8 cm was recorded during the year 2015-16.

- **Site-2**

During the year 2014-15, the annual average value of transparency of water was observed 61.19 ± 14.1 cm and 59.30 ± 14.19 cm was recorded during the year 2015-16.

- **Site-3**

During the year 2014-15, the annual average value of transparency of water was observed 56.53 ± 13.15 cm and 58.01 ± 12.39 cm was recorded during the year 2015-16.

6) Total Alkalinity (mg/ltr):

- **Site-1**

During the year 2014-15, the annual average value of the total alkalinity was observed 172.17 ± 29.6 mg/ltr and 182.0 ± 33.7 mg/ltr was recorded during the year 2015-16.

- **Site-2**

During the year 2014-15, the annual average value of the total alkalinity was observed 175.3 ± 36.4 mg/ltr and 174.3 ± 33.32 mg/ltr was recorded during the year 2015-16.

- **Site-3**

During the year 2014-15, the annual average value of the total alkalinity was observed 170 ± 27.25 mg/ltr and 183.1 ± 31.96 mg/ltr was recorded during the year 2015-16.

7) Total Hardness (mg/ltr):

- **Site-1**

During the year 2014-15, the annual average value of the total alkalinity was observed124.25 ± 22.1 mg/ltr and 123.3 ± 21.5 mg/ltr was recorded during the year 2015-16.

- **Site-2**

During the year 2014-15, the annual average value of the total hardness was observed 120.5 ± 21.5 mg/ltr and 128.25 ± 25.97 mg/ltr was recorded during the year 2015-16.

- **Site-3**

During the year 2014-15, the annual average value of the total hardness was observed 122.6 ± 20.54 mg/ltr and 128.75 ± 14.14 mg/ltr was recorded during the year 2015-16.

8) Calcium Hardness (mg/ltr):

- **Site-1**

During the year 2014-15, the annual average value of calcium hardness of water was observed 65.58 ± 17.1mg/ltr and 67.17 ± 13.3mg/ltr was recorded during the year 2015-16.

- **Site-2**

During the year 2014-15, the annual average value of calcium hardness of water was observed 67.58 ± 11.0 mg/ltr 76.92 ± 14.77 mg/ltr was recorded during the year 2015-16.

- **Site-3**

During the year 2014-15, the annual average value of calcium hardness of water was observed 72.58 ± 10.68 mg/ltr 73.42 ± 9.95 mg/ltr was recorded during the year 2015-16.

9) Magnesium Hardness (mg/ltr):

- **Site-1**

The average annual average value of the total alkalinity during the year 2014-15 was observed 58.67 ± 8.0 mg/ltr and 56.33 ± 12.1 mg/ltr was recorded during the year 2015-16.

- **Site-2**

The average annual average value of the total alkalinity during the year 2014- 15 was observed 52.9 ± 10.9 mg/ltr and 51.33 ± 16.37 mg/ltr was recorded during the year 2015-16.

- **Site-3**

The average annual average value of the total alkalinity during the year 2014-15 was observed 50.3 ± 14.07 mg/ltr and 55.33 ± 7.98 mg/ltr was recorded during the year 2015-16.

10) Total solids (mg/ltr):

- **Site-1**

The average annual average value of the total solids of water during the year 2014-15 was observed 498.9 ± 123 mg/ltr and 485.3 ± 119 mg/ltr was recorded during the year 2015-16.

- **Site-2**

The average annual average value of the total solids of water during the year 2014-15 was observed 512.8 ± 88.0 mg/ltr and 514.08 ± 90.13 mg/ltr was recorded during the year 2015-16.

- **Site-3**

The average annual average value of the total solids of water during the year 2014-15 was observed 499.7 ± 108.29 mg/ltr and 488.08 ± 104.40 mg/ltr was recorded during the year 2015-16.

11) Total Dissolved solids (mg/ltr):

- **Site-1**

The average annual average value of the total dissolved solids of water during the year 2014-15 was observed 356.8 ± 115 mg/ltr and 335.6 ± 98.3 mg/ltr was recorded during the year 2015-16.

- **Site-2**

The average annual average value of the total dissolved solids of water during the year 2014-15 was observed 314.5 ± 77.5 mg/ltr and 325.25 ± 58.28 mg/ltr was recorded during the year 2015-16.

- **Site-3**

The average annual average value of the total dissolved solids of water during the year 2014-15 was observed 363.1 ± 113.80 mg/ltr and 339.5 ± 95.81 mg/ltr was recorded during the year 2015-16.

12) Dissolved Oxygen (mg/ltr):

- **Site-1**

During the year 2014-15, the annual average value of the dissolved oxygen was observed 7.74 ± 1.1 mg/ltr and 7.95 ± 0.97 mg/ltr was recorded during the year 2015-16.

- **Site-2**

During the year 2014-15, the annual average value of the dissolved oxygen was observed 7.88 ± 0.9 mg/ltr and 8.09 ± 0.99 mg/ltr was recorded during the year 2015-16.

- **Site-3**

During the year 2014-15, the annual average value of the dissolved oxygen was observed 7.69 ± 1.04 mg/ltr and 7.62 ± 1.02 mg/ltr was recorded during the year 2015-16.

13) Free Carbon dioxide (mg/ltr):

- **Site-1**

During the year 2014-15, the annual average value of the free carbon dioxide of water was observed 3.92 ± 1.8 mg/ltr and 3.93 ± 1.79 mg/ltr was recorded during the year 2015-16.

- **Site-2**

During the year 2014-15, the annual average value of the free carbon dioxide of water was observed 4.09 ± 1.4 mg/ltr and 4.13 ± 1.28 mg/ltr was recorded during the year 2015-16.

- **Site-3**

During the year 2014-15, the annual average value of the free carbon dioxide of water was observed 4.36 ± 1.63 mg/ltr and 4.16 ± 1.63 mg/ltr was recorded during the year 2015-16.

5. Result and Discussion

Ambient temperature is a key environmental parameter that significantly affects aquatic ecosystems by influencing biological diversity as well as gas solubility. In the present study, average ambient temperature fluctuated between **29.7°C and 40.2°C.** The highest temperatures were recorded during summer due to intense solar radiation, while the lowest values occurred in winter as a result of decreased solar intensity and shorter daylight duration. Comparable seasonal variations have been reported by Nakhate and Kale (2018) in Kankaleshwar Lake, Beed, and by Reddy and Satya (2016) in Saralasagar Reservoir, Mahabubnagar. Similar trends were also observed by Mahajan and Pokale (2017) in Mohabala Lake near Bhadrawati, Chandrapur.

Water temperature, which directly regulates metabolic and physiological functions of aquatic organisms, average water temperature ranged from **23.5 °C to 39.6 °C** in the present investigation. Maximum values were observed in June, whereas minimum temperatures were recorded in January. These variations are primarily controlled by seasonal changes in solar radiation and atmospheric conditions. Sharma and Uchchariya (2019) documented water temperatures ranging from 20.42°C to 34.72°C in Pagara Reservoir, Joura. Similarly, Arun Raj and Sevarkodiyone (2018) reported temperatures between 23.0°C and 32°C in Urinjikulam Pond, Thiruthangal, while Mahajan and Pokale (2017) recorded a range of 18.07°C to 36.55°C in Mohabala Lake.

The average **pH** values recorded during the study varied from **7.65 to 7.92**, indicating a slightly alkaline nature of the water, which is generally suitable for aquatic organisms. The highest pH was observed in May, whereas the lowest was recorded in July, likely due to variations in photosynthetic activity and decomposition processes. Similar pH ranges were reported by Nakhate and Kale (2018) (7.96–8.29) in Kankaleshwar Lake, Nama and Dhanraj (2018) (7.2–8.3) in Palasani Pond, Jodhpur, and Mohammad et al. (2015) (7.2–7.74) in Wyra Reservoir, Khammam.

The average **Electrical conductivity** ranged from **0.274 to 0.282** mmhos/cm, reflecting a moderate concentration of dissolved ions. These fluctuations are mainly associated with variations in dissolved solids and salinity levels. Durge et al. (2018) reported conductivity values ranging from 156.50 to 206.50 µmhos/cm in Malgujari Pond, Ghugus (Chandrapur district), while Tejaswi and Prasad (2017) observed values between 264 and 305 µS/cm in water bodies of Andhra Pradesh.

The average **Transparency** of the water varied from **55.93 cm** to **61.2 cm.** Lower transparency during the monsoon season may be attributed to increased turbidity caused by suspended particles, whereas higher transparency during winter and summer is likely due to reduced inflow and sediment load. Durge et al. (2018) reported transparency values ranging from 19.95 cm to 31.34 cm in Malgujari Pond, while Ravat and Trivedi (2018) recorded values between 29.19 cm and 102.32 cm in Dholawad Dam, Ratlam.

The average **total alkalinity** ranged from 170 to 183.1 mg/L, indicating that the water body has a good buffering capacity. Higher alkalinity during the monsoon may result from increased decomposition and runoff, whereas lower values in winter may be due to reduced biological activity. Arun Raj and Sevarkodiyone (2018) recorded alkalinity values between 81 and 271 mg/L, while Barve and Sonewane (2017) observed values ranging from 125.50 to 175.10 mg/L in Lower Dudhana Dam. Shastrakar and Tijare (2015) reported values between 159 and 365 mg/L in Asola Mendha Lake, Chandrapur. The increase in alkalinity is often associated with the release of carbon dioxide during decomposition, which forms bicarbonates in water (Trivedi and Goel, 1984).

The average **Total hardness** in the present study ranged from 82 to 173 mg/L, indicating moderately hard water. The higher values observed during the monsoon season may be due to surface runoff carrying dissolved minerals into the water body. Similar findings were reported by Durge et al. (2018), who recorded values between 71.19 and 150.40 mg/L in Malgujari Pond. Tejaswi and Prasad (2017) also reported seasonal variation in hardness, with higher values during the monsoon.

Calcium hardness ranged from 39 to 97 mg/L, with maximum values observed during the monsoon season, likely due to leaching of minerals from surrounding rocks. **Magnesium hardness** ranged from 32 to 86 mg/L and varied depending on geological conditions and biological utilization. Durge et al. (2018) reported calcium hardness between 36.50 and 95.18 mg/L, while Tyagi and Malik (2018) observed values ranging from 30.28 to 56.8 mg/L. Magnesium concentrations reported by Durge et al. (2018) ranged from 15.75 to 51.25 mg/L. Lower magnesium levels may be attributed to its uptake by aquatic plants during photosynthesis (Pawar and Pulle, 2005), while Tyagi and Malik (2018) reported higher magnesium concentrations during winter.

The average **total solids** ranged from **485 to 514.08 mg/L**, with higher values recorded during summer, possibly due to increased evaporation, and lower values during the monsoon due to dilution effects. Similarly the average value of **total dissolved solids** ranged between **315 mg/L to 363 mg/L**. Similar seasonal trends were observed by Salve and Hiware (2006) in Wanparakalpa Reservoir, Beed.

Dissolved oxygen (DO), which is influenced by atmospheric diffusion and photosynthetic activity, The average value of **DO** ranged from **7.62 to 8.09 mg/L** in the present study. DO levels are affected by temperature, water movement, light penetration, and biological activity (Chaurasia and Pandey, 2007). Comparable ranges were reported by Rawat and Trivedi (2018) (6.2–9.9 mg/L) in Dholawad Dam, Chalapathi et al. (2018) (4.8–8.3 mg/L) in Kanigiri Reservoir, and Tyagi and Malik (2018) (8.42–9.66 mg/L) in Ramganga Reservoir.

The average value of **free carbon dioxide** concentrations ranged from **3.92 to 4.36 mg/L**, which lies within the range suitable for photosynthetic activity (Bhatnagar et al., 2004). Similar findings were reported by Gupta et al. (2019) (2.0–5.0 mg/L) in Moulvi Bandh, Ambikapur; Arun Raj and Sevarkodiyone (2018) (0.98–4.34 mg/L); Tijare and Shastrakar (2015) (2.02–4.65 mg/L) in Asola Mendha Lake; and Mahajan and Billore (2014) (1.21–4.11 mg/L) in Nagchoon Pond, Khandwa, with higher values generally recorded during summer and lower values during winter.

6. Conclusion

The study reveals that water quality is moderately stable and suitable for aquatic life, with seasonal variations mainly influenced by climatic factors. Continuous monitoring is recommended to prevent ecological imbalance.

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References

[1] APHA (1985): Standard methods of examination of water & waste water.American Public Health Association, 19th Ed. Inc. New York, 1170.

[2] APHA (2005): Standard Methods for the examination of water and waste water.

[3] ArunRaj and Sevarkodiyone, S. P. (2018): A study on physico-chemical parameters of Urinjikulam Pond, Thiruthangal (Virudhunagar District, Tamil Nadu); International Journal of Aquaculture and Fishery Science 4(1); 010-012.

[4] Barve, M. B. and Sonawane, D. L. (2017): Water Quality Assessment With Reference To Physicochemical Parameters of Lower Dudhana Dam (M.S.) India. World Journal of Pharmacy And Pharmaceutical Sciences, 6 (8); 985-1007.

[5] Bhatnagar A., Jana S. N., Garg S. K., Patra B. C., Singh G. and Barman U. K. (2004): Water Quality Management in Aquaculture., In: Course Manuel of Summer school on Development of Sustainable Aquaculture Technology in Fresh and Saline Waters., CS Hargyana Agricultural, Hisar, India., 203-10.

[6] Chalapathi, K., Madhavi, K., Ramalingaiah, D., Jesintha, N., Adnan Amin, G. Gowri, Boda Satyanarayana, Sajhunnneesa Thirunilath and Jeshwanthi Jaini (2018): Studies on Physico-chemical Parameters of Kanigiri Reservoir, Nellore District, Andhra Pradesh. International Journal of Current Microbiology and Applied Sciences, 7(8): 979-996.

[7] Chaurasia Mahima and Pandey, G. C. (2007): Study of Physico-chemical characteristics of some water ponds of Ayodhya.-Faizabad. Indian Journal of Environmental Protection, 27 (11); 1019-1023.

[8] Durge, L. S., Chilke, A. M. and Chavhan, R. N. (2018): Seasonal Variations in the Physico-Chemical Parameters of Malgujari Pond of Ghugus, District Chandrapur (Maharashtra); International Journal of Scientific Research in Biological Sciences, Vol. 5(5); 52-57.

[9] Gupta, A. P., Ranga, M. M. and Banerjee, A. (2019): Physico-chemical Properties of Moulvi Bandh, Ambikapur, Sargujawith reference to Water Quality; The International Journal of Engineering and Science (IJES), Vol 8 (3), Series I; 19-24.

[10] Mahajan, V. S. and Pokale, S. S. (2017): Studies on Physico-chemical analysis of Mohabala Lake near Bhadrawati, District - Chandrapur (MS), India: International Journal of Life Sciences, Vol. 5 (3); 438-446.

[11] Mahajan, V. S. and Pokale, S. S. (2017): Studies on Physico-chemical analysis of Mohabala Lake near Bhadrawati, District - Chandrapur (MS), India: International Journal of Life Sciences, Vol. 5 (3); 438-446.

[12] Mohammad, M. J., Krishna, P.V., Lamma, O. A. and Khan, S. (2015): Analysis of Water Quality using Limnological Studies of Wyra Reservoir, Khammam District, Telangana, India. International Journal of Current Microbiology and Applied Science, 4(2); 880-895.
[13] Nakhate, A. B and Kale, M. K. (2018): studies on physico-chemical parameters in Kankaleshwar Lake, Dist. Beed (MS) India; International Journal of Universal Print, Vol. 4 (06); 347-352.
[14] Nama, P and Dhan, R. (2018): Water Quality Assessment Using Physico-Chemical Parameters of Palasani Pond, Jodhpur District, Rajasthan,India. International Journal of Research and Analytical Reviews, 5(3); 935-938.
[15] Pawar, S. K. and Pulle, J. S. (2005): Studies of physic-chemical parameters in Pethwadaj dam, Nanded district in Maharashtra, India. Journal of Aquatic Boilogy, 13(1&2); 57-59.
[16] Rawat Roshani and Seema Trivedi (2018): Seasonal Diversity of Phytoplankton in Relation to Seasonal Changes in physicochemical Parameters of Khedi Kalan Station of Dholawad Dam of Ratlam District M. P. International Journal of Pure & Applied Bioscience, 6 (2); 448-454.
[17] Reddy and Satya (2016): Water Quality Studies of Saralasagar Reservoir with Reference to Physico–Chemical Parameters. Indian Journal of Science and Technology, Vol 9(29);1-8.
[18] S. Mahajan and Dilip Billore (2014) : Seasonal Variations and Assessment of Water Quality of Nagchoon Pond of Khandwa District (M. P.) India.An International Research Journal of Environmental Science; Vol. 9(3), 829-836.
[19] Salve, B. S. and Hiware, C. J. (2006): Studies on water quality of Wanparakalpa Reservoir, Nagapur, near Parli Vaijnath, District Beed, and Marathwada region. Journal of Aquatic Biology, 21; 113-117.
[20] Sharma Dushyant Kumar and Uchchariya Rakhi (2019): Studies on physico–chemical parameters of Pagara Reservoir, Joura, district Morena (M.P.). International Journal of Fisheries and Aquatic Studies , 7(1); 293-298.
[21] Tejaswi, T. and Prasad, M. K. (2017): Analysis of physico-chemical parameters of water of Madduvalsa reservoir, India. International Journal of Research In Applied Science and Engineering Technology, 5 (8); 1506-1510.
[22] Tijare, R. V. and Shastrakar, A. J. (2015): physico-chemical status of Asolamendha reservoir district Chandrapur (Maharashtra); Golden Research Thoughts, Vol. 5 (1); 1-6.
[23] Trivedi, R. K. and Goel, P. K (1986): Chemical and Biological Methods for Water Pollution Studies; Environmental Publisher, Karad, 247.
[24] Trivedi, R. K. and Goel, P. K. (1984): Chemical and Biological Methods for water pollution studies, Environmental Publications, Karad.
[25] Tyagi Divya and Malik, D. S. (2018): Assessment of physico-chemical parameters and water quality index of Ram-Ganga reservoir at Kalagarh (Uttarakhand). International Journal of Current Research in Life Sciences Vol. 07(03); 1234-1239.
[26] Venkatesharaju, K., Ravikumar, P., Somashekar, R. K. and Prakash, K. L. (2010): Physico-chemical and Bacteriological Investigation on the river Cauvery of Kollegal Stretch in Karnataka, Journal of science Engineering and technology, 6 (1); 50-59.
[27] Wetzel, R. G. (2001). *Limnology: Lake and River Ecosystems* (3rd ed.). Academic Press.