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ASSESSMENT OF PHYSICAL – CHEMICAL PARAMETERS AND WATER QUALITY OF SHANIGARAM RESERVOIR OF SIDDIPET DISTRICT TELANGANA STATE

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ABSTRACT:

The current work is designated to investigate the Physical – Chemical parameters and water quality of Shanigaram a fresh water reservoir in Siddipet District of Telangana Sate. To evaluate the quality of water of this reservoir, physical and chemical parameters were studied and assessed over a span of two years, from September 2019 to August 2021. Water samples were gathered from two distinct reservoir stations and examined using conventional laboratory methods and procedures. Various Physical- Chemical parameters such as Temperature, pH, Turbidity, Total Dissolved Solids, Tota Hardness, Alkalinity, Chlorides, Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen Demand, Phosphates, Sulphates and Nitrate were studied. These results revealed that the Physical- Chemical parameters of this fresh water reservoir was within the tolerable limits and can be utilized for household, irrigation, and aquaculture purposes.

KEYWORDS: Shanigaram fresh water reservoir, Physical – Chemical parameters, Water Quality.

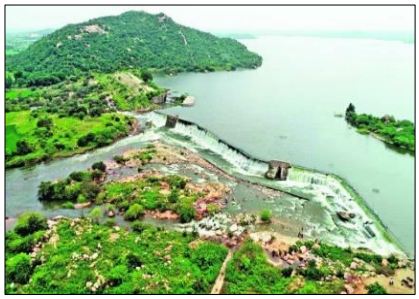
INTRODUCTION:

Water is one of them most important components for human survival. Water resources are of critical importance to both natural ecosystem and human development. It is essential for agriculture, industry and aquaculture. The freshwater resources are actually very precious for the life on our planet. The abiotic and biotic factors of water influence the quality and quantity of aquatic life surviving there. The physical and chemical properties of freshwater bodies are characterized by the climatic, geochemical, geomorphological and pollution, it is very important to study the physical and chemical parameters influencing the biological productivity in the water bodies (Sahni and Yadav,2012). Several studies have been conducted to understand the physical - chemical properties of ponds and reservoirs by Jain et al 1996, Srinivasan et al 1997, Srinivasa goud and Kotaiah 2000. Chaturbhuj Moundioditya et al., 2004. In which the study of characteristics of water bodies were taken into consideration with reference to Physical, Chemical and biological diversity related to health of almost every component of the ecosystem. The interaction of both the Physical and Chemical properties of water play a significant role in the composition, distribution and abundance of aquatic organisms. Generally, the pollution factors of dust, storm, runoff and cause Eutrophication of reservoirs (Kudari et al 2006). The proper balance of Physical – Chemical and Biological properties of water in ponds, reservoirs and reservoirs are essential for successful production of fish and other important aquatic resources. The presence and absence of chemical elements in a water body will affect the life of fresh water resources.

MATERIALS AND METHODS:

STUDY AREA:

Shanigaram Reservoir (SUNIGRAH PROJECT) is positioned in Koheda Mandal, Siddipet District, Telangana State, with geographical coordinates at 18.1861° N, 79.0139° E. Its primary purpose is for irrigation and the cultivation of fish.



Water samples were systematically collected at monthly intervals over the course of two years, spanning from September 2019 to August 2020, and continuing through September 2020 to August 2021. Two distinct locations were designated for the retrieval of water samples as part of the investigation. The investigation involved the examination of physical parameters such as temperature, pH, and turbidity at designated sites, while chemical parameters were evaluated in the laboratory using established methods outlined by APHA (2017). The primary objective of analyzing the physical-chemical properties of the reservoir is to assess the presence and status of various chemical constituents within the reservoir.

RESULTS AND DISCUSSION

Temperature:

Temperature is a prime important factor since it plays crucial role on the flora and fauna of fresh a water body. During present study Reservoir showed considerable variations with the different seasons. The highest temperatures were documented at both stations in May (during the summer), while the lowest temperatures were observed in January (in the winter)

Table 1-A Variation in Temperature (°C) at regular monthly intervals from September -2019 to August -2020

Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	22.7	22.2	21.7	20.3	20	22.2	24.9	25.7	27.1	26.2	24.6	23.4
station II	23.1	22.5	22.1	20.7	20.3	23.2	25	26.1	28.2	27.6	25.6	24.2

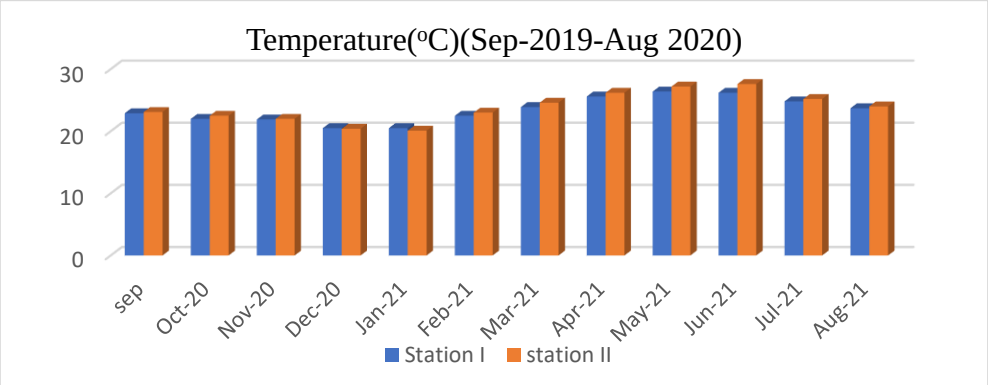
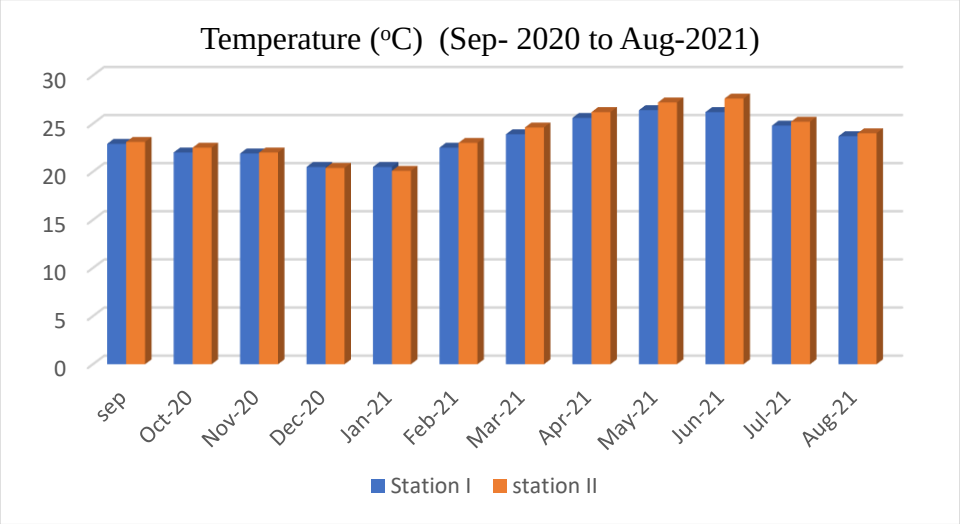


Table 1-B Variation in Temperature (°C) at regular monthly intervals from September -2020 to August -2021

Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	22.9	22	21.9	20.5	20.5	22.5	23.9	25.6	26.4	26.2	24.8	23.7
station II	23.1	22.5	22	20.4	20.1	23	24.6	26.2	27.2	27.6	25.2	24



Turbidity (NTU): Maximum Turbidity values were recorded in the summer months due to the decreased level of water and presence of suspended particulate matter and minimum during winter and monsoon seasons

Table 2-A Variation in Turbidity (NTU) at regular monthly intervals from September -2019 to August -2020												
Month	Sep-19	Oct-9	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	3	3	2	1	1	1	1	1	1	2	2	3
station II	3	3	3	2	1	1	1	1	1	2	2	2

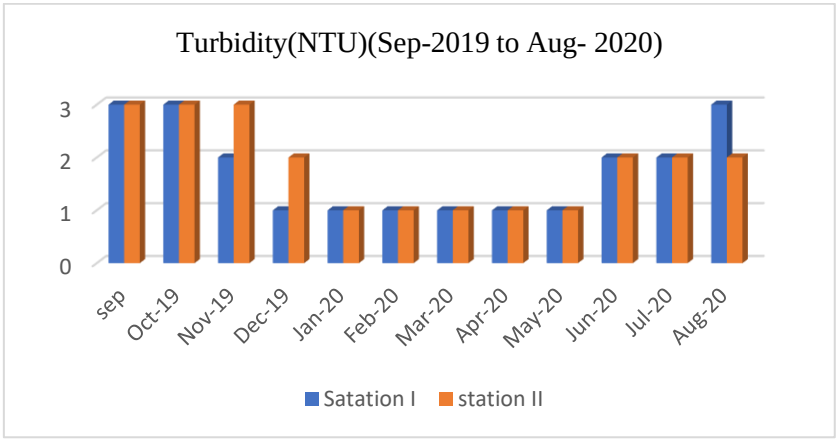
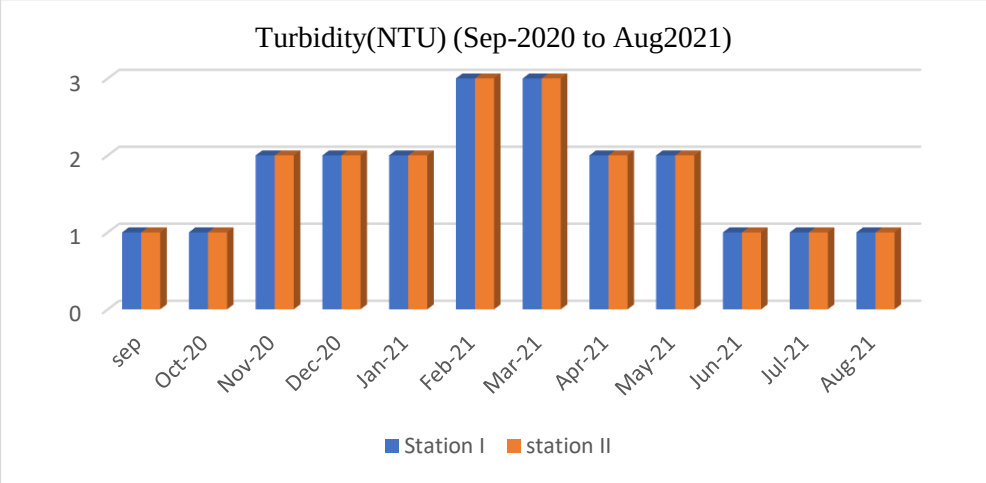


Table 2-B Variation in Turbidity at regular monthly intervals from September -2020 to August -2021												
Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	1	1	2	2	2	3	3	2	2	1	1	1
station II	1	1	2	2	2	3	3	2	2	1	1	1



pH: The reservoir exhibited an alkaline pH, with values ranging from 8.0 to 8.9. The highest pH, 8.9, was noted in May (during the summer), while the lowest, 8.0, occurred in September (during the monsoon).

Table 3 -A Variation in pH at regular monthly intervals from September -2019 to August -2020												
Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	8.1	8.3	8.3	8.4	8.5	8.5	8.6	8.6	8.7	8.8	8.4	8.2
station II	8	8.2	8.2	8	8.1	8.2	8.3	8.5	8.6	8.6	8.3	8.2

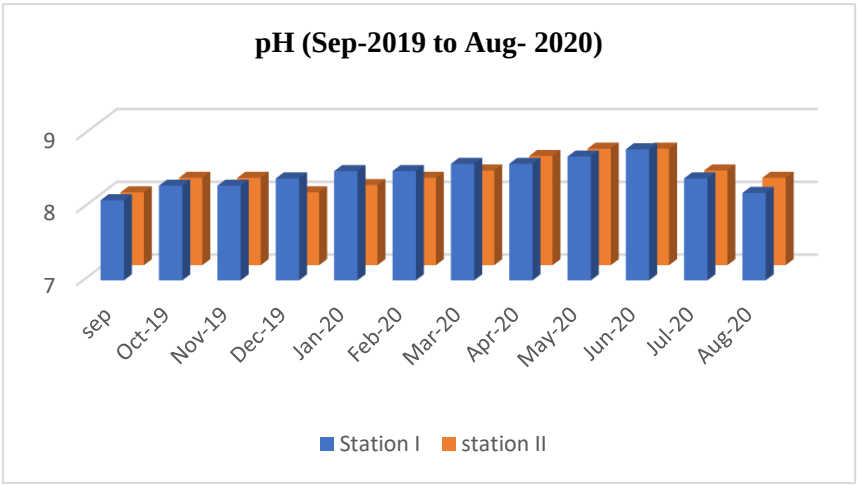
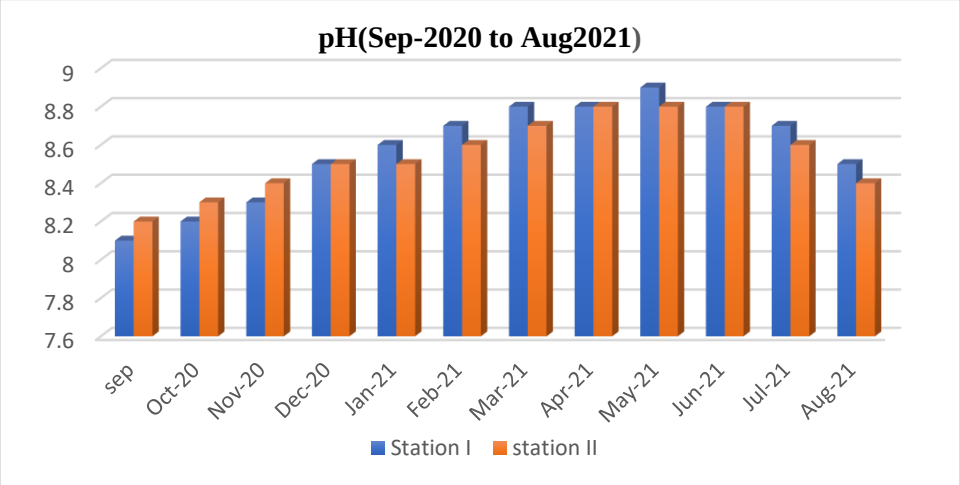


Table 3 -B Variation in pH at regular monthly intervals from September -2020 to august -2021												
	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	8.1	8.2	8.3	8.5	8.6	8.7	8.8	8.8	8.9	8.8	8.7	8.5
station II	8.2	8.3	8.4	8.5	8.5	8.6	8.7	8.8	8.8	8.8	8.6	8.4



Dissolved Oxygen(mg/L): D.O. reading indicates the oxygen level in the reservoir. D.O. values inversely proportionate to the pollution of the water body. Highest D.O. value was noticed during winter and lowest value in summer. Low D.O. levels in summer because of high temperature and high metabolic rate of fauna in reservoir

Table 4-A Variation in Dissolved Oxygen(mg/L)) at regular monthly intervals from September -2019 to August -2020

Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	7.9	8.2	8.6	8.9	9.2	8.8	7.8	7.4	7.1	7.3	7.4	7.6
station II	7.7	8	8.3	8.6	8.9	8.6	7.5	7.2	6.9	7.2	7.3	7.4

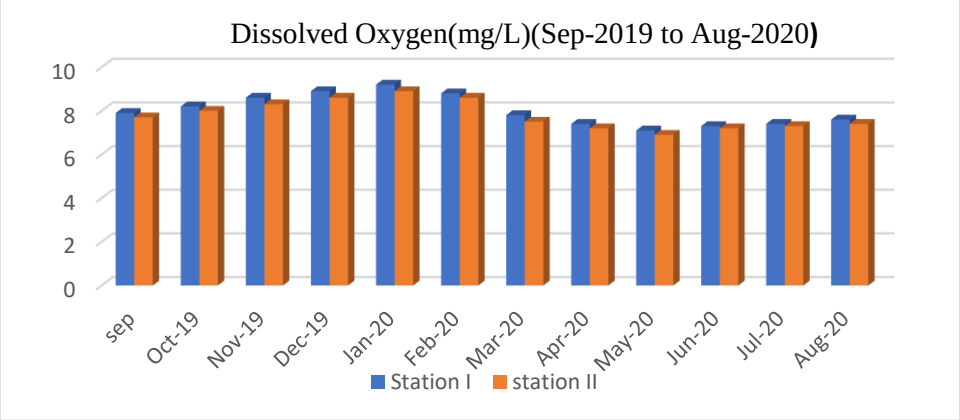


Table 4-B Variation in Dissolved Oxygen(mg/L) at regular monthly intervals from September -2020 to August -2021

Month	Sep-19	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	8	8.4	8.6	9	9.2	8.6	7.8	7.3	7.2	7.3	7.5	7.7
station II	7.9	8.2	8.5	8.9	9.1	8.7	7.7	7.5	7	7.3	7.5	7.7

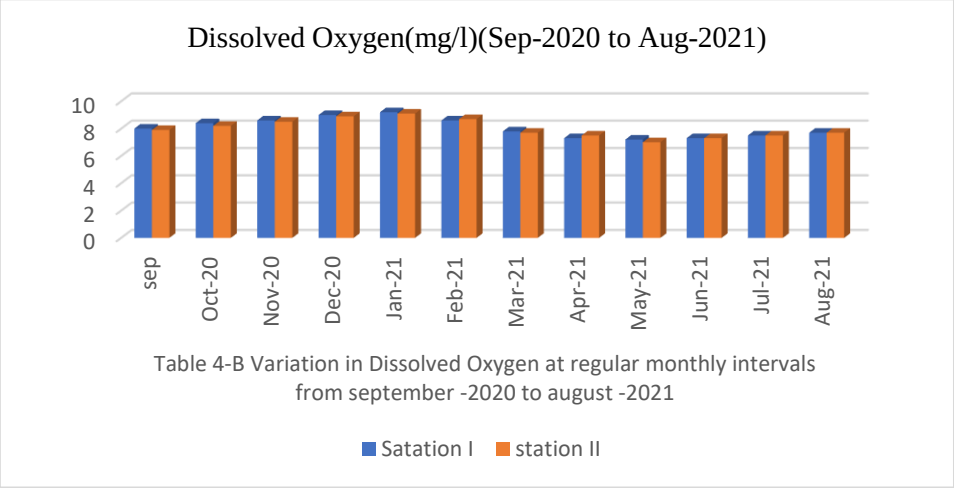


Table 4-B Variation in Dissolved Oxygen at regular monthly intervals from september -2020 to august -2021

Biochemical Oxygen Demand (BOD) (mg/L): BOD is a prominent factor for assessing of water quality since it deals with the amount of Oxygen consumption by aerobic organisms for oxidizing organic compounds.

Table 5-A Variation in Biochemical Oxygen Demand (BOD)(mg/L) at regular monthly intervals from September -2019 to August -2020

Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	2.8	2.78	2.75	2.6	2.55	2.6	2.76	2.85	3.12	3.15	2.85	2.83
station II	2.7	2.75	2.72	2.7	2.65	2.58	2.73	2.81	3	3.11	3	2.9

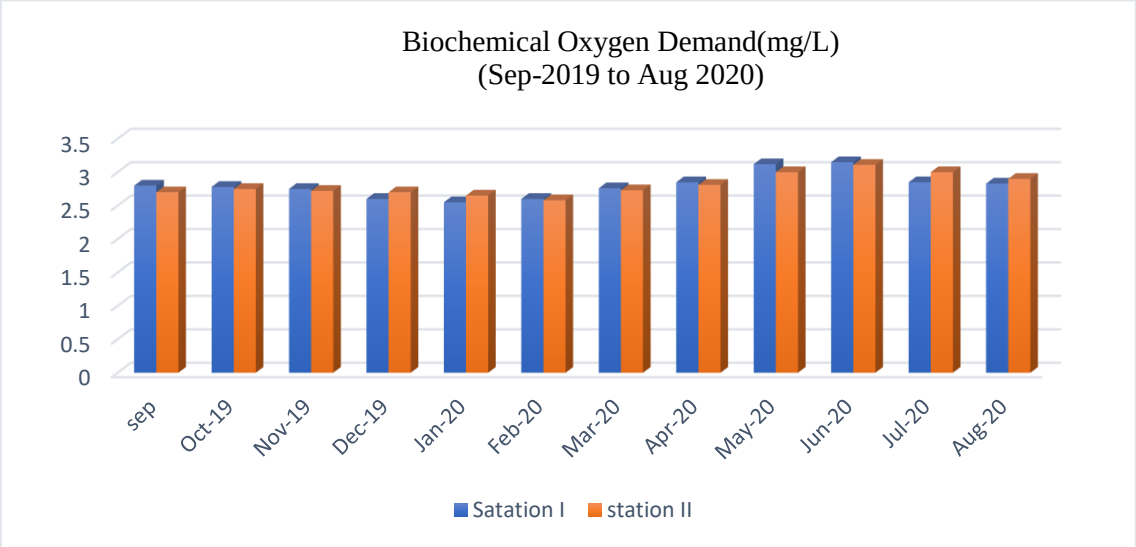
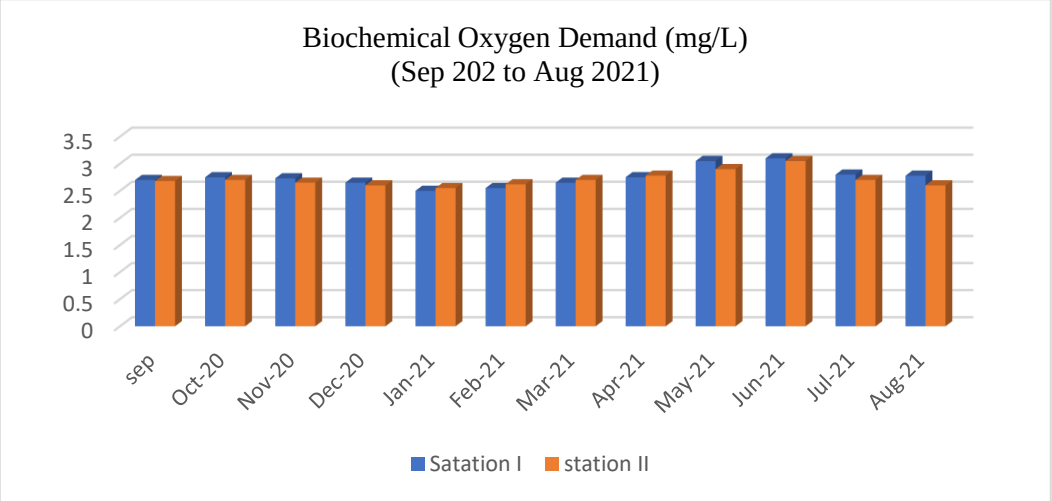


Table 5-B Variation in Biochemical oxygen Demand (BOD)(mg/L) at regular monthly intervals from September -2020 to August -2021

Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	2.7	2.75	2.73	2.65	2.5	2.55	2.65	2.75	3.05	3.1	2.8	2.78
station II	2.68	2.7	2.65	2.6	2.55	2.62	2.7	2.78	2.9	3.05	2.7	2.6



TOTAL HARDNESS (mg/L): It is the sum Calcium and Magnesium ions concentrations. Maximum Total Hardness was recorded In Summer and minimum in monsoon

Table 6-A Variation in Total Hardness (mg/L)at regular monthly intervals from September -2019to August -2020												
Month	Sep-20	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	200	204	208	210	212	214	218	220	225	220	210	206
station II	195	198	201	200	202	205	208	210	215	210	200	198

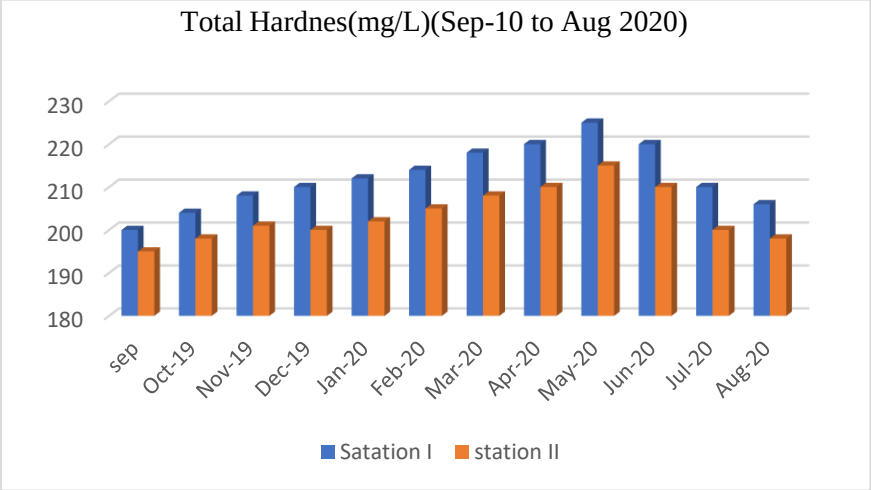
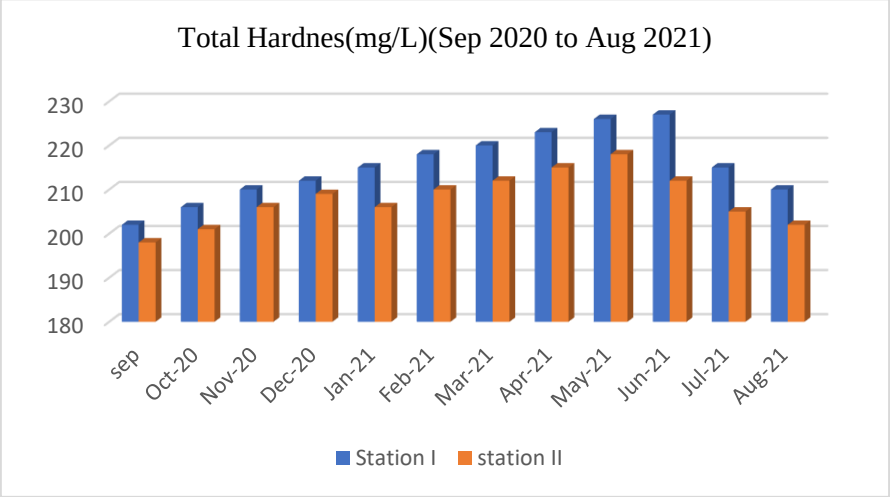


Table 6-B Variation in Total Hardness(mg/L) at regular monthly intervals from September -2020 to August -2021												
Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	202	206	210	212	215	218	220	223	226	227	215	210
station II	198	201	206	209	206	210	212	215	218	212	205	202



TOTAL DISSOLVED SOLIDS (TDS) (mg/L): TDS is the assessment of all substances dissolved in the reservoir, encompassing a combination of both inorganic and organic elements. Maximum amount of TDS was evaluated in the September (Monsoon) and lesser amount in Summer.

Table 7-A Variation in Total Dissolved Solids at regular monthly intervals from September -2019 to August -2020

Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	328	315	308	305	300	298	295	290	290	300	310	320
station II	330	310	306	315	310	308	305	300	295	305	316	325

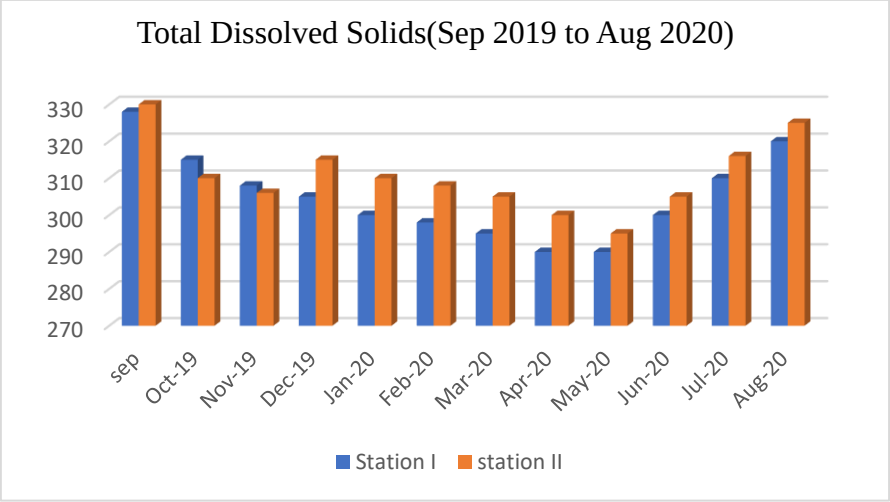
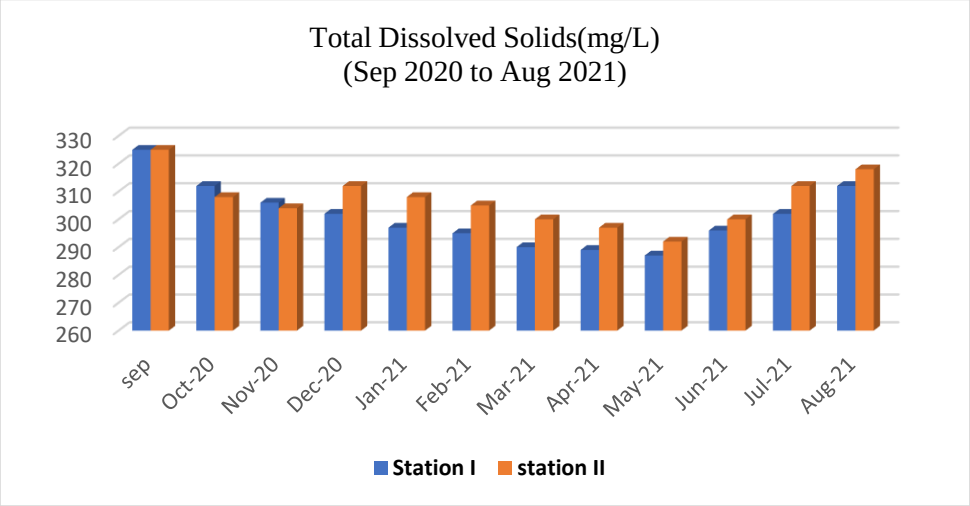


Table 7-B Variation in Total Dissolved Solids(mg/L) at regular monthly intervals from September -2020 to August -2021

Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	325	312	306	302	297	295	290	289	287	296	302	312
station II	325	308	304	312	308	305	300	297	292	300	312	318



TOTAL ALKALINITY (mg/L): Total alkalinity is the assess of alkaline substances present in water. In the present study maximum total alkalinity was recorded in summer and minimum in monsoon.

Table 8- A Variation in Total Alkalinity (mg/l) at regular monthly intervals from September -2019 to August -2020

Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	170	173	180	190	194	197	194	190	186	182	179	174
station II	160	163	165	170	176	170	167	165	162	158	155	152

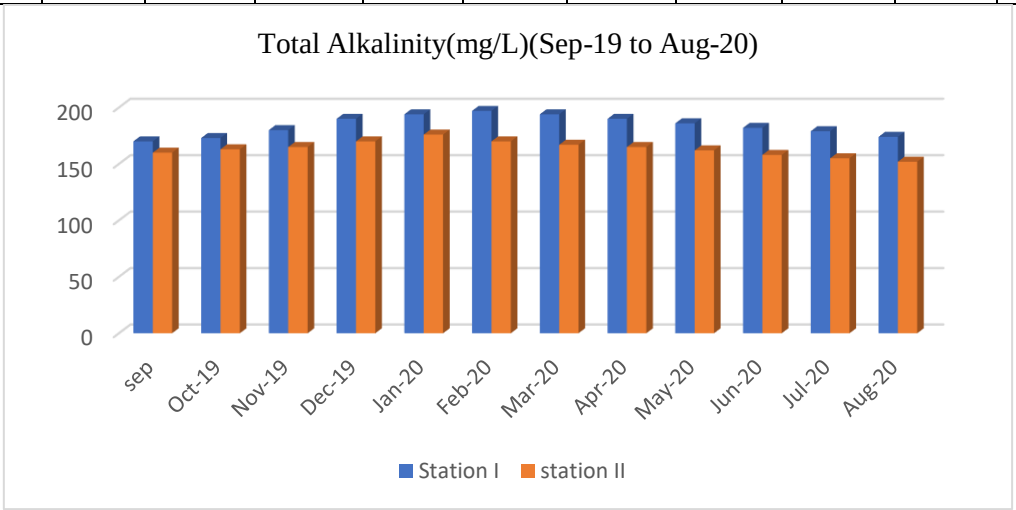
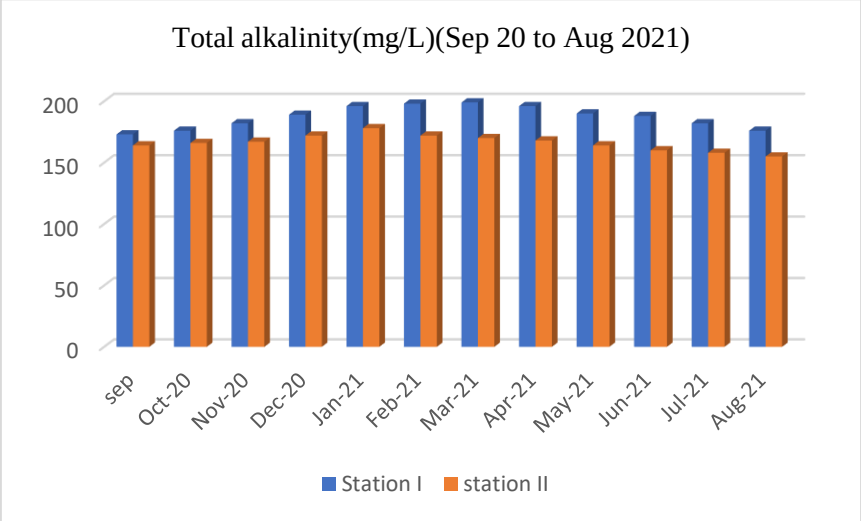


Table 8- B Variation in Total Alkalinity (mg/L)at regular monthly intervals from September -2020 to August -2021

Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	173	176	182	189	196	198	199	196	190	188	182	176
station II	164	166	167	172	178	172	170	168	164	160	158	155



Chlorides(mg/L): The range of chlorides indicates the pollution status of reservoir. The recorded quantity of chlorides range from 88 mg/L to 110mg/L in various seasons

Table 9-A Variation in Chlorides(mg/L) at regular monthly intervals from September -2019 to August -2020												
Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	93	90	88	85	88	90	92	95	98	95	93	90
station II	102	100	98	95	102	105	106	108	109	105	103	101

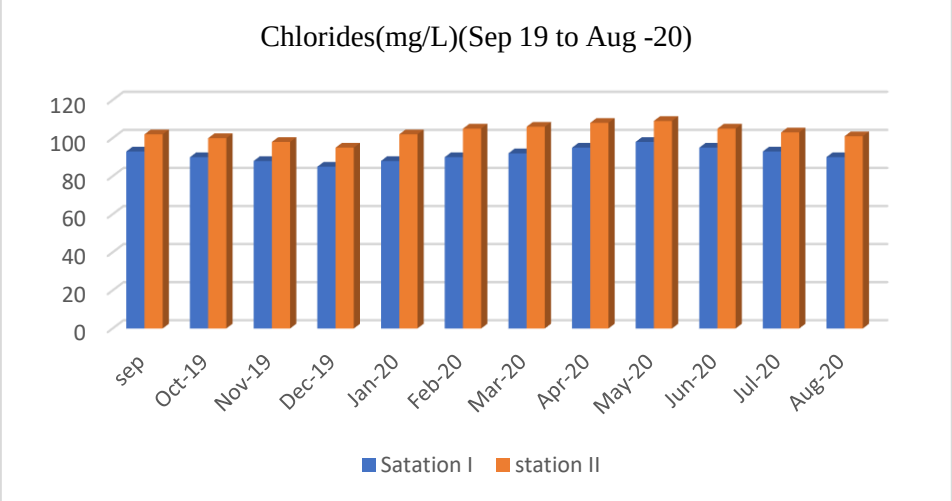
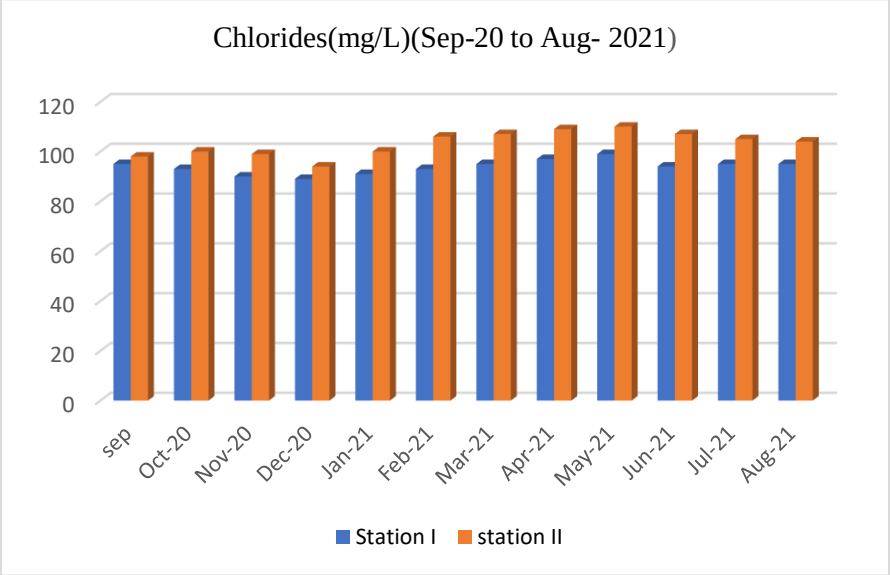


Table 9-B Variation in Chlorides (mg/L)at regular monthly intervals from September -2020 to August -2021												
Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	95	93	90	89	91	93	95	97	99	94	95	95
station II	98	100	99	94	100	16	107	109	110	107	105	104



Nitrates(mg/L): Nitrate concentrations are highly variable during reservoir seasonal cycles. Maximum values of Nitrates were recorded during summer and minimum during monsoon and winter.

Table 10-A Variation in Nitrates(mg/L) at regular monthly intervals from September -2019 to August -2020												
Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	2	2	2	2	2	2	2.5	3	3.5	4	3.5	2
station II	2	2.5	2	3	2	2	3	2.5	3	3.5	4	3

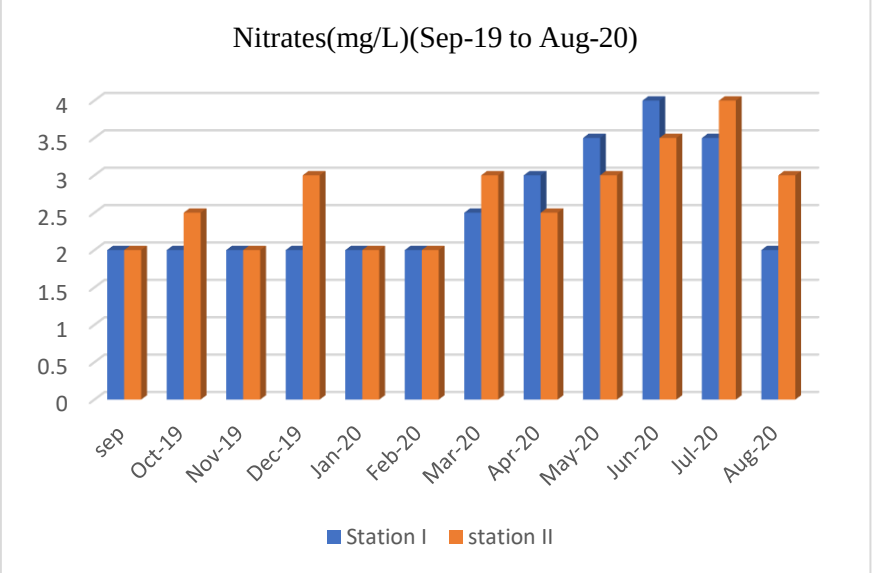
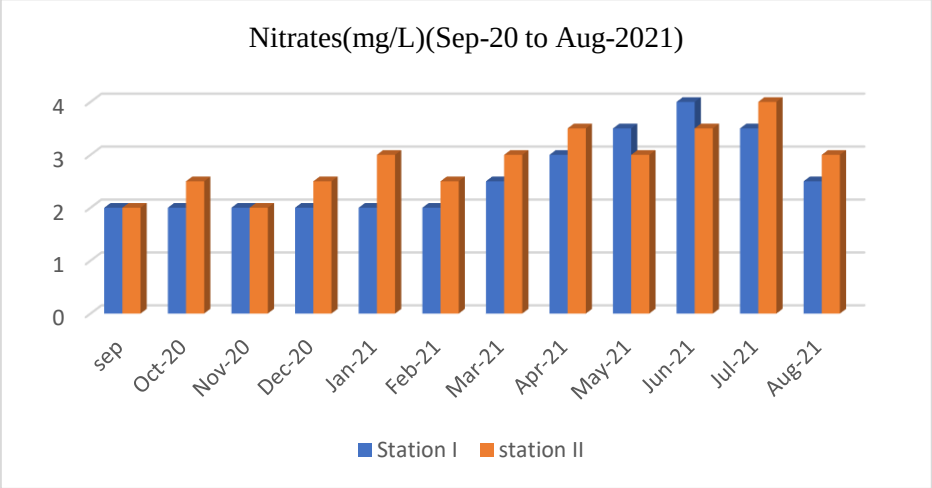


Table 10-B Variation in Nitrates(mg/L) at regular monthly intervals from September -2020 to August -2021												
Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	2	2	2	2	2	2	2.5	3	3.5	4	3.5	2.5
station II	2	2.5	2	2.5	3	2.5	3	3.5	3	3.5	4	3



Phosphates (mg/L): The more value of phosphates increases the growth of algae in reservoir. Maximum phosphate values were recorded during winter and minimum during monsoon

Table 11-B Variation in Phosphates(mg/L) at regular monthly intervals from September -2020 to August -2021												
Month	Sep-19	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	0.66	0.7	0.76	0.8	0.82	0.75	0.71	0.69	0.66	0.63	0.6	0.58
station II	0.65	0.68	0.74	0.76	0.78	0.76	0.7	0.68	0.66	0.64	0.61	0.6

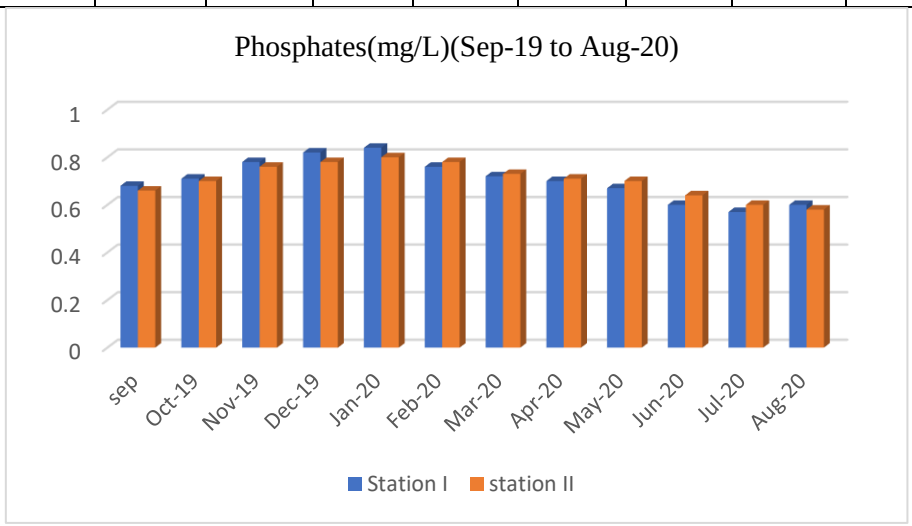
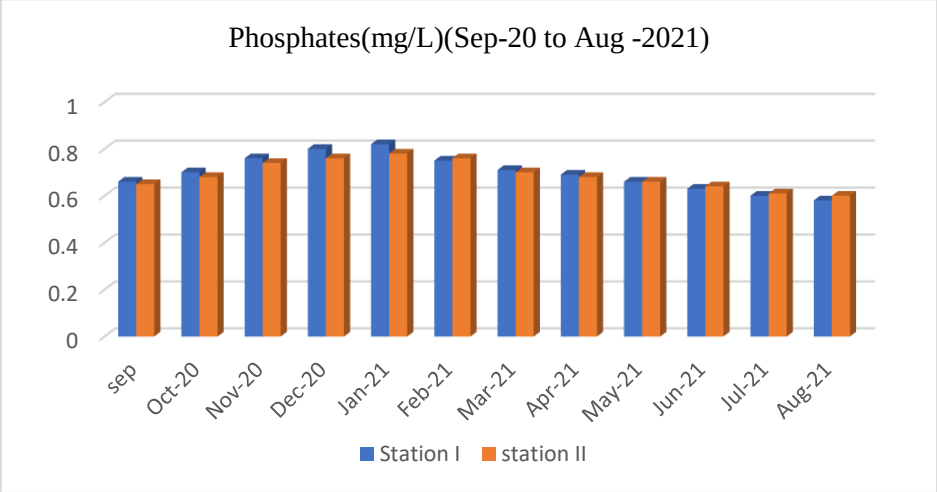


Table 11-B Variation in Phosphates(mg/L)at regular monthly intervals from September -2020 to August -2021												
Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	0.66	0.7	0.76	0.8	0.82	0.75	0.71	0.69	0.66	0.63	0.6	0.58
station II	0.65	0.68	0.74	0.76	0.78	0.76	0.7	0.68	0.66	0.64	0.61	0.6



Calcium(mg/L): Calcium is one of the important cations of reservoir which is in the form of Ca^{2+}.the concentration of Calcium ions found in a range of 4omg/L to 55mg/L in various seasons

Table 12-A Variation in Calcium(mg/L) at regular monthly intervals from September -2019 to August -2020												
Month	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20
Station I	44	46	48	50	53	51	48	47	46	44	42	40
station II	43	45	46	50	55	52	50	48	45	43	41	40

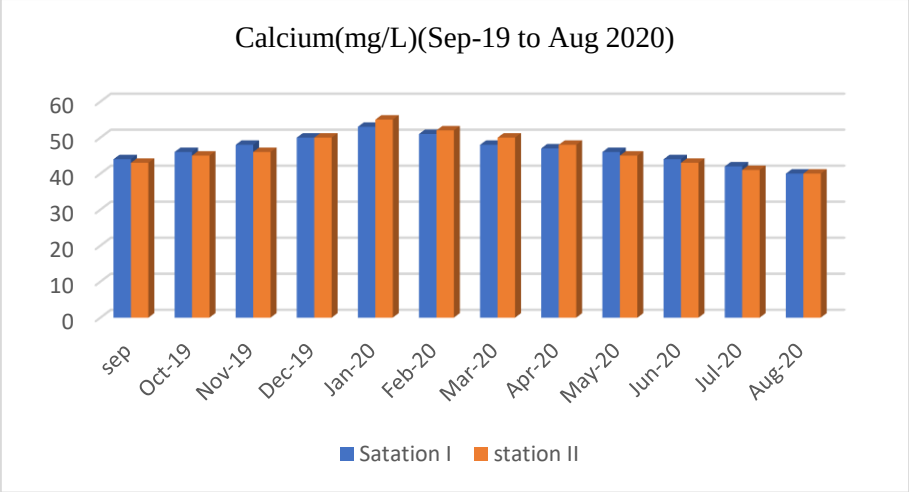
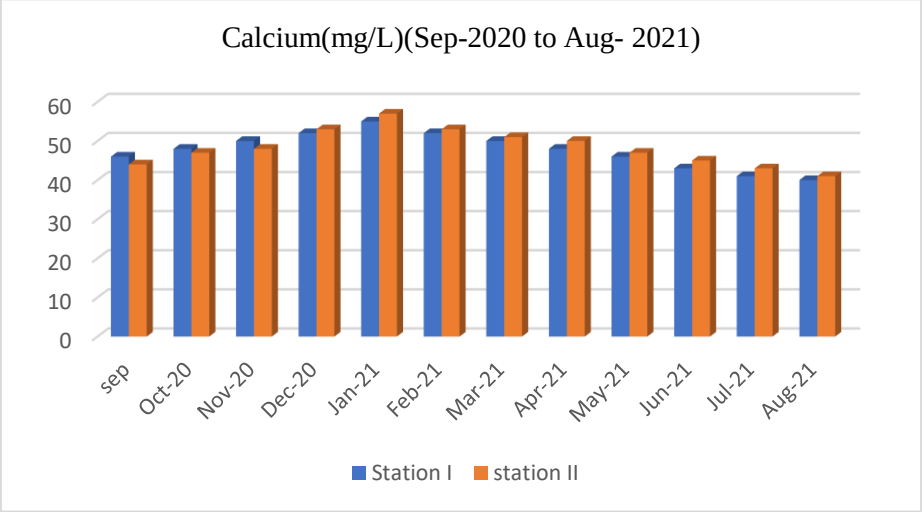


Table 12-B Variation in Calcium(mg/L) at regular monthly intervals from September -2020 to August -2021												
Month	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
Station I	46	48	50	52	55	52	50	48	46	43	41	40
station II	44	47	48	53	57	53	51	50	47	45	43	41



CONCLUSION:

Throughout the study duration, the physical-chemical parameters within the reservoir exhibited noticeable fluctuations and seasonal variations. Examination of these parameters indicated that the physical-chemical characteristics of the freshwater reservoir consistently fell within acceptable limits, making the water suitable for both irrigation and aquaculture purposes.

REFFERENCES

1) D. Srinivas and K. Shailaja. **2022**. Physico Chemical Parameters and Algal Diversity of Pedda Cheruvu Lake in Rajgopalpet, Siddipet District, Telangana, India. Res. Jr. of Agril. Sci. (Sep-Oct 2022) 13(5): 1621–1627.
2) Yogitha, s babu. **2018**. A Study on Physical Chemical Parameters of Errerajan Reservoir of Bangalore Rural. International journal of Scientific Research 7(2): 401-402.
3) APHA. **2017**. Standard Methods for the Examination of Water and Waste Water APHA, Washington D.C. 23rd edition .
4) Patil. P.N, Sawant. D.V, Deshmukh. R.N. **2012**. Physical-chemical parameters for testing of water – A review; International Journal of Environmental Sciences, Volume 3; 2012.
5) Ajit M. Kalwale, Padmakar A. Savale. **2012**. Determination of Physical-Chemical Parameters of DeoliBhorus Dam water; Advances in Applied Science Research
6) Basavaraja, Simpi, S. M., Hiremath, K. N. S. Murthy, K. N. Chandra shekarappa, Anil N. Patel, E.T.Puttiah. **2011**. Analysis of Water Quality Using Physical-Chemical Parameters Hosahalli Tank in Shimoga District, Karnataka, India, Global Journal of Science Frontier, Research, 1(3), pp 31-34.
7) Adefemi S. O. and E. E. Awokunmi. **2010**, Determination of physical-chemical parameters and heavy metals in water samples from Itaogbolu area of Ondo-State, Nigeria, African Journal of Environmental Science and Technology, 4(3), pp 145-148.
8) Brekke, L.D., Kiang, J.E., Olsen, J.R., Pulwarty, R.S., Raff, D.A., Turnipseed, D.P., Webb, R.S., and White, K.D. **2009**. Climate change and water resources management— A federal perspective: U.S. Geological Survey Circular 1331.
9) Garg, R.K. Saksena, D.N. Rao, R.J. **2009**. Water quality and conservation management of Ram sager reservoir, Datia, M.P. Journal of Environmental Biology; 30(5) 909-916.
10) Drever JI. **2005**. Surface and Ground Water, Weathering, and Soils: Treatise on Geochemistry (Second Edition, Volume 5). Elsevier Ltd. Oxford, UK.