



Study Of Seasonal Variations In Physico-Chemical Parameters Of Morana Gureghar Dam, Tehsil- Patan Satara District, Maharashtra, (India).

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ABSTRACT:

The present study estimates the water quality of Morana Gureghar dam of tehsil Patan, Satara District of Maharashtra state. The location of it shows latitude 17.2912585°N and longitude 73.8337765°E. This dam is presents Krishna basin in Satara district of Maharashtra. This dam is present within Koyana Wildlife Sanctuary and surrounded by forest area. No any industrial waste is dumped in this water. Very small domestic waste is dumped in this reservoir. The study was for a period of one year (Jan- Dec. 2021). The physicochemical parameters (P^H , temperature, Dissolved oxygen, free carbon dioxide, total alkalinity, total dissolved solids, total suspended solids, total solids and chlorides have not indicated much significant variations from standard values. Maximum readings were observed before monsoon season and minimum values observed in post monsoon season.

Keywords: Morana Gureghar dam, seasonal variations, physic-chemical parameters.

Introduction:

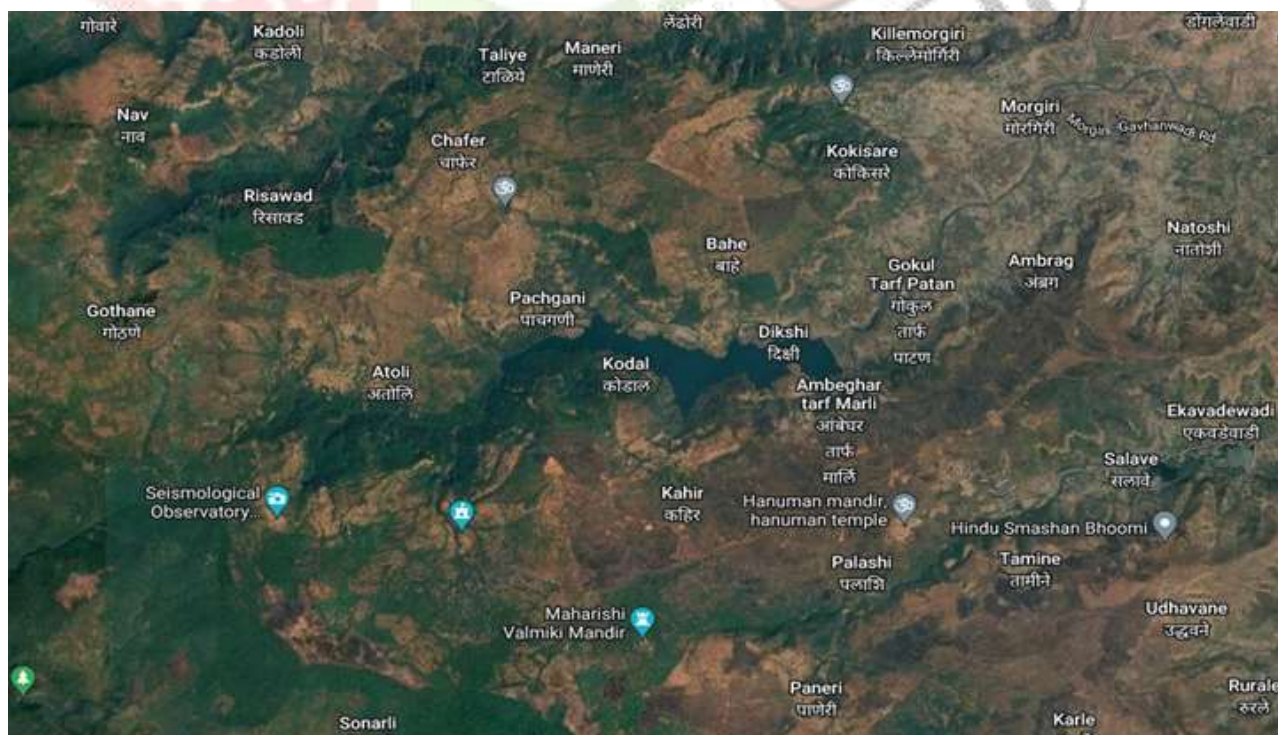
Morana Medium Irrigation Project is constructed on Morna River in the Krishna basin of Patan tehsil in Satara district of Maharashtra. The Morana Medium Irrigation Project is 590 m long earth dam with the maximum height of 47.02 m. Morna irrigation project irrigates 4229 hectares of land in 31 villages of Patan tehsil of Satara district. The Morna irrigation project has an irrigation potential of about 5424 hectares by canal systems.

Morana Gureghar dam is located in Patan tehsil. It is about 13 km away from Patan and 82 km away from Satara of Maharashtra state. This dam is built on Morana River. The location of dam lies between 17.2912585°N and 73.8337765°E. It is Earth fill dam. The climatic conditions of the dam and study area were hot in summer and cool in winter. From the catchment area of the dam water is stored from June to September. It is also source of drinking water supply to nearer villages and wild animal also as it is located within Koyana wildlife sanctuary. So it is need analyze water quality of Morna Gureghar dam

Materials and methods

The physic-Chemical parameters of Morna Gureghar reservoir were studied once in every month at definite interval for period of one year i.e. Jan to Dec 2021. Three sampling sites of the reservoir were selected for the study. The inlet point; outlet point and near about center of the dam that is third site selected for study. The water samples were collected in glass container. The selected sampling sites were visited monthly for the investigation of the various physicochemical parameters. The study was completed in the year 2021 (January- December). The water temperature was recorded at the fixed time and fixed sites of the dam by using a mercury thermometer. The pH of water was determined by pH meter (Hanna Model Champ). The chemical parameters of water such as dissolved oxygen, free carbon dioxide, chlorides were determined by standard methods as described by American Public Health Association (APHA 1980), Trivedy et. al. (1998) and Kodarkar et. al. (1998).

Fig.1. Map of Morna Gureghar dam study area, Tehsil- Patan District- Satara, M.S. (India).



Results and discussion

The monthly variations of physicochemical parameters are given in table no. 1.

Atmospheric Temperature:

The atmospheric temperature of Morna Gureghar dam ranged from 24.8⁰c in month January to 36.2⁰c in month May during study period. In the present study the Atmospheric temperature ranged from 24.8⁰ to 36.2⁰c at site I, 24.9 to 36.1⁰c at site II and 24.9 to 36.2⁰c at site III. The season wise analysis in the present investigations showed that the average air temperatures in the dam area were maximum during summer, comparatively less during monsoon and less during winter.

Water Temperature:

The water temperature in the present investigation ranged from 22.2⁰c to 33.3⁰c at site I, 22.5 to 33.4⁰c at site II and 22.4 to 33.4⁰c at site III. The season wise analysis in the present investigation showed that the average water temperature in the dam was maximum during summer and minimum during winter and moderate during monsoon seasons. The water temperature was consistently lower than the atmospheric temperature. This is agreement with the findings of Pawar et.al (2009), Shinde et. al.(2010) and Ugale (2011).

Dissolved oxygen

High DO content is an indication of healthy system in a water body (Bilgrami and Datta Munshi, 1979). The amount of dissolved oxygen varies from 4.83 mg/lit to 7.90 mg/lit during study period. The Dissolved oxygen ranged from 4.7 to 8.1 mg/lit. at site I, 4.6 to 7.8 mg/lit at site II and 4.7 to 7.9 mg/lit. at site III during the investigation period. Similar results were reported by Devidas & Kamnath et. al(2006) and Lokhande et. al(2009) The amount of dissolved oxygen in the dam is varied from season to season. The maximum DO was recorded during winter and the lowest concentration in summer reached.

Free CO₂

Trivedy and Pande (2002) reported that the main source of free CO₂ was mainly due to greater decomposition of organic matter and respiration of plants and animals. During the year 2021, the monthly variations of free CO₂ showed minimum value 1.0 mg/lit in May and maximum value 3.9 mg/lit in October. In the present study the free CO₂ ranged from 1.2 to 3.8 mg/lit. at site I, 1.2 to 3.9 mg/lit at site II and 1.0 to 3.9 mg/lit. at site III. The maximum CO₂ is recorded in the winter season in the present investigation. Similar results were observed by Radhika et. al(2004) in Vellaani lake. The seasonal variation of free CO₂ showed the minimum value is recorded in summer season. This observation is agreements with the findings of Kumbhar (2006) and Kapsikar et. al.(2011).

Total Alkalinity

Total Alkalinity found in this dam was above 50 mg/lit. this indicates that photosynthetic activities are somewhat more in this dam. According to Jackson (1961) alkalinity below 50 mg/lit indicates low photosynthetic rate in the reservoir. Total Alkalinity ranged from 127 mg/lit. in the September to 182 mg/lit in the April. Total Alkalinity ranged from 142 to 181 mg/lit. at site I, 143 to 182 mg/lit at site II and 127 to 180 mg/lit. at site III. During summer season the maximum total Alkalinity was recorded and the lowest concentration of alkalinity reached in rainy season. Same range of variations in Total Alkalinity is also observed by Shaikh et. al.(1997), Manjare et. al.(2009), and Shinde et. al. (2010). Higher values of alkalinity observed during summer might be due to the presence of excess of free CO₂, as a result of decomposition process coupled with mixing of sewage and domestic waste.

Total Dissolved Solids:

The Total Dissolved Solids values of Morana Gureghar dam varied from 237.00 mg/lit in November to 397.00 mg/lit.in the May during study period. In the present study the TDS ranged from 251 to 391 mg/lit. at site I, 243 to 380 mg/lit at site II and 237 to 397 mg/lit. at site III. Similar observations were made by Lokhande et. al(2004) while working on Dhanegaon reservoir.

During the summer season the amount of TDS found is much higher. TDS values are more in summer due to evaporation of water.

Total Suspended Solids (TSS):

The Total Suspended Solids of water of Morana Gureghar ranged between 61.00 mg/lit in April to 139 mg/lit in the September during study period. In the present investigation the TSS ranged from 62 to 139 mg/lit. at site I, 62 to 140 mg/lit at site II and 61 to 131 mg/lit. at site III. In the present study the highest TSS values obtained during monsoon, the moderate values of TDS was recorded during winter and lower down at the last of winter. This observation is agreement with the records of Kumbhar A.C. (2006), Bade B.B. (2008).

Total Solids

In the Morna Gureghar dam the total Solids of the dam ranged between 228 mg/lit in the February to 425.00 in the September during the study period. In the present investigation the TS ranged from 281 to 422 mg/lit. at site I, 228 to 425 mg/lit at site II and 258 to 418 mg/lit. at site III. In the present study highest TS values observed during rainy season and minimum values were recorded during winter. This observation is agreement with the records of J. Krishanan (2008), Kumar et. al. (2009) and Gaikwad M.M. (2010).

P^H-(Hydrogen Ion Concentration) -

Most of the biological processes and biochemical reactions are pH dependent. Adarsh Kumar et. al.(2006). In the one year study of Morna Gureghar dam the range of water pH was maximum in the month Of April 7.7 and 7.1 was minimum in the month of March. Khan and Siddiqui (1978) reported that fluctuation in pH values were mainly due to photosynthetic activity of Phytoplankton and other higher aquatic plants.

Chlorides:-

The chlorides are usually present in low concentration in natural waters. If the chloride concentration is more than 205 mg/lit then it is treated as salt water. In the present investigation of Morna Dam the chlorides was recorded in the range of 21.25 to 41.76mg/l. As the content of chlorides is low the water is potable and can be used for irrigation purpose. Maximum values of chlorides were recorded in summer season whereas minimum in the winter season. Thresh et. Al (1949) suggested that the high value of chlorides contents indicates the presence of organic matter. The concentration of chlorides in fresh water is quite low and generally less than of Sulphate and Bi-Carbonates.

Conclusion:-

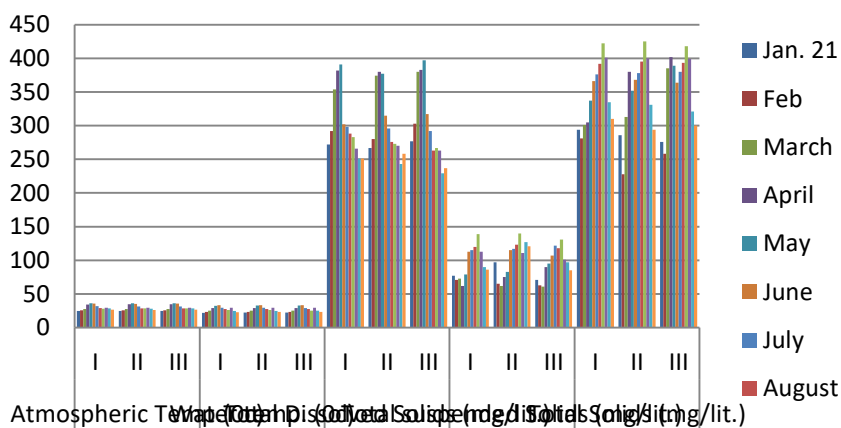
In the present investigation of the Morna Gureghar dam the values of the various 10 physico-chemical parameters were found within the permissible limit as described by WHO and the reservoir water satisfy the requirement for the use of water for fishing, irrigation and drinking purpose.

Month s	Atmospheric Temp.(°c)			Water temp. (°c)			Dissolved oxygen (mg/lit.)			Free CO ₂ (mg/lit.)		
	I	II	III	I	II	III	I	II	II I	I	II	III
Jan. 21	24.8	24.9	24.9	22.2	22.5	22.4	7.8	7.7	7.9	2.7	2.6	2.5
Feb	25.9	25.8	26.0	23.5	23.2	23.3	8.1	7.8	7.5	2.5	2.4	2.2
March	27.9	27.7	27.9	25.4	25.3	25.2	6.3	6.6	6.7	1.9	1.8	2.0
April	34.3	34.6	34.8	29.3	29.2	29.2	6.0	5.8	5.7	1.6	1.5	1.3
May	36.2	36.1	36.2	32.3	32.8	32.9	5.7	5.7	5.5	1.2	1.2	1.0
June	35.7	35.5	35.6	33.3	33.4	33.4	4.7	4.6	4.7	3.2	3.3	3.4
July	31.8	31.3	31.6	29.7	29.5	29.3	5.9	5.8	5.7	2.8	2.7	2.5
August	28.9	28.7	28.8	27.5	27.9	27.7	6.3	6.5	6.4	3.2	3.4	3.3
Sept.	28.3	28.5	28.7	26.2	26.3	25.5	6.5	6.4	6.6	3.4	3.6	3.5
Oct	29.6	29.4	29.7	29.5	29.7	29.8	7.2	7.3	7.4	3.8	3.9	3.9
Nov	28.4	28.3	28.7	24.8	24.9	25.2	7.5	7.3	7.2	3.3	3.5	3.4
Dec-21	26.8	26.2	26.6	23.1	23.2	23.5	7.7	7.7	7.5	3.0	2.7	2.8

Months	Total Alkalinity (mg/lit.)			Total Dissolved Solids (mg/lit.)			Total suspended Solids (mg/lit.)			Total Solids (mg/lit.)		
Sites	I	II	III	I	II	III	I	II	III	I	II	III
Jan. 21	170	165	163	272	267	277	77	97	71	294	286	276
Feb	169	162	167	292	280	303	71	65	63	281	228	258
March	172	175	173	354	374	380	73	62	61	301	313	385
April	178	179	180	382	380	383	62	75	90	305	380	402
May	181	182	177	391	377	397	79	83	95	337	352	389
June	157	151	160	302	315	317	113	115	107	366	368	364
July	151	138	134	298	296	292	115	117	122	376	378	380
August	152	143	127	288	276	263	120	123	118	392	395	393
Sept.	142	155	150	283	273	267	139	140	131	422	425	418
Oct	156	157	160	266	270	263	113	111	101	401	400	399
Nov	160	163	161	251	243	229	90	127	97	335	331	321
Dec-21	164	163	165	251	258	237	86	121	85	310	294	300

Months	p ^H			Chlorides		
Sites	I	II	III	I	II	III
Jan. 21	7.3	7.1	7.2	23.03	22.99	21.25
Feb.	7.3	7.1	7.1	24.98	26.45	25.33
March	7.2	7.2	7.1	30.07	35.44	31.26
April	7.7	7.7	7.6	34.42	35.20	33.26
May	7.6	7.6	7.7	41.76	39.01	38.48
June	7.5	7.6	7.5	38.5	39.4	37.2
July	7.3	7.6	7.5	26.2	26.2	26.4
August	7.1	7.4	7.4	30.28	31.06	32.24
Sept.	7.1	7.4	7.3	32.78	34.24	31.12
Oct.	7.1	7.3	7.3	34.2	34.6	34.4
Nov.	7.2	7.4	7.3	32.14	32.78	31.24
Dec- 21	7.1	7.1	7.1	33.25	33.46	34.56

Biostatistical Analysis of Physical Parameters of Morna Gureghar Reservoir Tq. Patan dist. Satara, Maharashtra



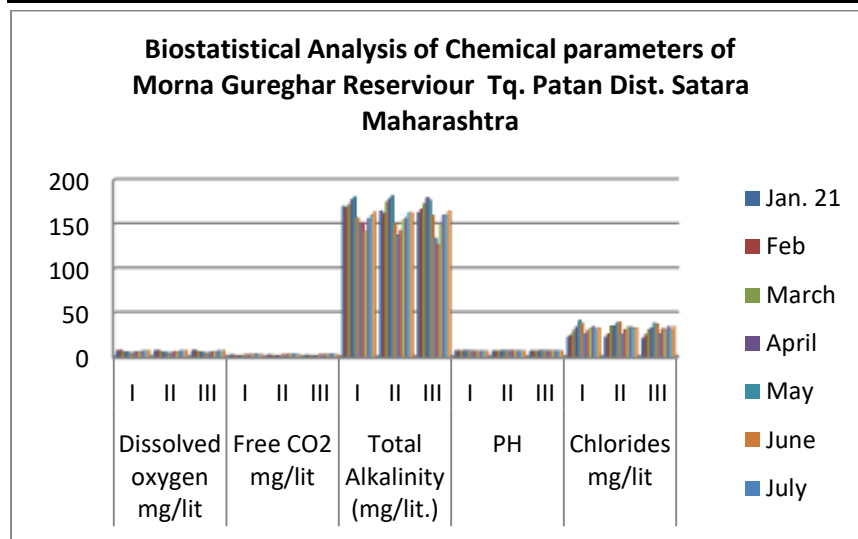


Table No. 1 Physicochemical Parameters of Morana Gureghar dam During January 2021 to December 2021

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