STUDIES ON PHYSICO–CHEMICAL PARANETERS IN SAI RESERVOIR, LATUR DIST, MAHARASHTRA

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Water of good quality is required for living organism. Water is one of the abduntly available substance in nature, which man has exploited more than any other resources for the sustenance of life. The quality of water is described by it's physical, chemical and microbial characterstics. The reservoir serve as a rich source of water to 73^0 – 27^0-00 east longitude. The water of Sai reservoir is used for irrigation, drinking and other domestic purpose. It is necessary that the quality of drinking water should be checked at regular time intervals because due to use of contaminated drinking water the population suffers from a variety of water borne disease. Many researches have done studies on physico-chemical characterstics of dam, reservoir and river water. Busula *et. al.,* (1967), Trivedy and Goel (1990), Joshi and Bisht, (1993) sunita *et. al.,* (2004), khangembam and Gupta (2006) Mule and Patil (2006). However no work has been carried out on water quality of Sai reservoir that is why present study was planned.

MATERIALS AND METHODS-The water sample were collected from Sai reservoir from four selected spots viz site – I, II, III, IV for a period of twelve months during the year June 2005 May 2006. The selected sampling site is denoted by S_1, S_2, S_3 and S_4 respectively. The physical parameters such as temperature of air and water was recorded by using mercury thermometer. The transprancy was measured by using seechi disc. The pH of water was determined by using Hanna pH meter. The chemical parameters of water such as dissolved oxygen, free carbon dioxide, total alkalinity (Bicarbonates), total hardness, calcium, magnesium, chlorides, nitrates, phosphates and total dissolved solids *etc.* were determined by standard methods described by American Public Health Association (APHA, 1980),Trivedy *et. al.*(1998) and Kodarkar *et. al* (1998). The tests particularly dissolved oxygen and free carbon dioxide were performed at the sampling sites.

RESULTS AND DISCUSSION-The variation in physico–chemical parameters of Sai reservoir water after monthly observation at (S_1, S_2, S_3 and S_4) during the period of June 2005 to May 2006 were diplected in table no. 1 & 2. The comparison of physico-chemical parameter with suggested surface standards by WHO are represented in the table no. 3.

ATMOSPHERIC TEMPERATURE-The atmospheric temperature of water were found to be in the range between 24.2 to 39.4^0C. It was minimum during November and maximum in the month of May. It was higher in March, April, May, June and lower during November, December and January similar observation of temperature fluctuation recorded by Sathe, *et. al.,* (2001) from ped reservoir, Sangli.

WATER TEMPERATURE-The temperature of water is one of the importance physical parameter which directly influence some chemical reaction in aquatic ecosystem. The water temperature were found to be in the range between 25.1^0C to 36.8^0C. The minimum water temperature recorded in the winter season and maximum in the summer months. The similar trend were observed by Kumbhar (2006) recorded the water temperature ranged between 28.62^0C to 29.77^0C in Ujani reservoir, Solapur District.

WATER TRANSPRANCY-Water transprancy depends the suspended organic and inorganic matter as well as microorganism present in water bodies. In the present study it ranged from 33.2 to 37.8 cm. The water transprancy values were maximum in winter season and minimum to rainy season. The maximum values in winter months and low in rainy season reported by Kumar, (1995). Datta *et. al.,* (1987) observed high transprancy during winter and sharp decreased from summer to monsoon.

pH

In the present study the pH ranged was recorded 7.1 to 8.7. The pH value gradually increases from mid winter to late summer and then decreases in monsoon. The increase and decrease of pH during summer and monsoon reasons respectively have also been

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reported from a number of lakes Misra and Yeragi (2003) recorded the pH range between 7.04 to 8.43 in Tansa river of Thane. Jayabhaye, *et. al.,*(2008) reported the pH values ranged from 7.4 to 8.5. The values are within the permissible limit prescribed by WHO.

DISSOLVED OXYGEN-It is one of the most important parameter in water is of great limnological significance as it regulates many metabolic processes of aquatic organism. The dissolved oxygen almost all plants and animals need for respiration. Dissolved oxygen values ranged from 4.9 to 7.8 mg/ liter. The minimum dissolved oxygen was recorded during summer and maximum during monsoon. Similar observation were made by Ahamed and Krishnamarthy (1990) have recorded maximum dissolved oxygen in summer and minimum in monsoon. Similar trend in dissolved oxygen values have also reported by Gaur and Khan (1995), Mishra and Yadav (1978) and Deshmukh and Ambore (2006).

TOTAL ALKALINITY AND BICARBONATE ALKALINITY-Alkalinity is a measure of quantity of compounds that shift the pH to the alkaline side of nentrality or it is measure of the capacity of water the neutralize acids. In the present investigation the total alkalinity ranged from 151 to 189 mg/ liter and Bicarbonte alkalinity, ranged from 121.20 to 152 mg/ liter. The total alkalinity and Bicarbonte alkalinity found minimum in monsoon and maximum in summer during the study. Similar observation were made by Nair (2000). Singh (1990) , Mane and Madlapure (2002) reported the highly productive water body has alkalinity over 100 mg/ liter.

TOTAL HARDNESS, CALCIUM, MAGNESIUM- The total hardness ranged form 102.1 to 119.4 mg/ liter. The calcium levels varied from 17.92 to 23.41 mg/ liter. The magnesium levels ranged from 14.31 to 17.81 mg/ liter. The total hardness, calcium and magnesium maximum values was during summer season. The total hardness was in the range from 83.8 to 178 mg/ liter at Harsul dam (Wagh , 1998). The calcium was dominating in over magnesium. The calcium content varied between 12.49 to 31.3 mg/ liter from Kunjwani Pond, Jammu (Kumar 1997) the values are within the permissible limit prescribed by (WHO).

CHLORIDE -Chlorides are usually present in low concentrations in natural water and play metabolically active role in photolysis of water and photophosphorylation. The chloride was recorded in the range of 35.14 to 40.21 mg/ liter. Maximum chloride value was observed in summer season and minimum in winter season. Similar finding was observed by Kodarkar and Chandrasekhar (1995), Mahajan (1996).

NITRATES-In the present investigation the nitrate values ranged from 0.042 to 0.072 mg/ liter. The minimum nitrate were recorded during winter season and maximum during summer season. The drinking water standard for human being are set at adult 10 mg/ liter (Raghvendran, 1992). The result obtained during the investigation are co-releated with the findings of Trivedy (1998), Adoni *et. al.,* (1985).

PHOSPHATE -The phosphate is one of the most important major nutrients that are required to living organism. Although needed in small amounts. It is one of the more common phytoplankton growth limiting elements. In the present investigation the phosphate is ranged from 0.101 to 0.179 mg/ liter. Minimum values were recorded during winter season and maximum during summer and monsoon. The same trend was observed by Kaur *et. al.,* (1995) and Jain and seetapathi (1996).

TOTAL DISSOLVED SOLIDS-Total dissolved solids means the amount of particles that are dissolved in water. The WHO standard is 1000 mg/ liter. The total dissolved solids ranged from 232.21 to 390.76 mg/ liter. The seasonal variation reveals that total dissolved solids values were minimum during summer season(May). Similar results were also reported by Narain and Chauhan (2002), Paka and Rao (1997).

CONCLUSION-The physico–chemical characterstics of Sai reservoir consider that, light changes have been observed during the study period. The important parameters like, dissolved oxygen, total Alkalinity, Bicarbonate alkalinity, total hardness, TDS. Chloride, phosphate, nitrate values remain below, in the range of WHO standard. The reservoir water to use for drinking purpose before proper treatment.

Table no.1 : Monthly variation of physicochemical parameters of Sai reservoir at four sampling sites during the year June 2005 to May 2006.

Months	Atmospheric temperature				Water temperature				Transparency				PH			
Spot	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4
June 2005	36.4	36.2	36.3	36.2	37.1	36.2ss	36.2	36.9	35.1	35.4	34.2	34.4	8.1	8.0	8.1	7.6
Jul.	31.2	31.3	31.2	31.4	30.4	30.2	31.4	31.2	36.1	33.2	36.2	34.2	7.8	7.4	7.3	7.2
Aug.	30.4	30.2	30.2	30.4	31.2	30.2	31.1	30.1	33.2	33.9	34.2	36.2	7.4	7.2	7.3	7.2
Sep.	31.2	31.3	31.2	31.6	30.2	31.2	30.2	32.4	34.1	36.1	35.1	35.2	7.8	7.4	7.3	7.6
Oct.	30.4	30.2	30.1	30.2	29.1	29.1	29.6	30.2	37.2	38.1	36.5	36.5	7.7	7.2	7.4	7.6
Nov.	24.2	24.2	24.8	24.6	25.1	25.2	26.2	27.8	38.1	38.4	36.2	37.2	7.8	7.6	7.2	7.2
Dec.	25.0	25.2	25.9	25.9	26.1	26.9	25.4	26.8	35.2	35.8	36.7	36.8	7.1	7.3	7.8	7.3
Jan. 2006	26.2	26.8	26.7	26.2	27.1	27.4	27.5	27.0	36.2	36.7	38.1	37.2	7.2	7.2	7.6	7.7
Feb.	29.4	30.2	31.2	31.3	27.4	27.8	26.9	27.4	37.2	36.3	36.2	37.8	7.2	7.6	7.2	7.8
March.	34.4	35.2	35.1	34.6	29.2	30.1	31.2	31.2	34.2	36.2	36.4	35.8	8.0	8.1	8.2	8.7
Apr.	37.2	36.9	36.8	36.9	33.9	35.1	36.1	36.1	36.2	36.4	35.1	36.2	8.2	8.4	8.6	8.7
May.	39.4	39.1	39.0	39.0	38.1	36.1	36.8	36.2	35.5	35.1	36.2	36.8	8.1	8.6	8.9	8.0

Months	**Dissolved oxygen**				**Total alkalinity**				**Bicarbonate alkalinity**				**Total hardness**			
Spot	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4
June2005	5.6	5.4	5.1	5.1	184	186	187	189	132.64	128.42	121.20	139.41	118.3	113.4	114.5	115.4
Jul.	5.9	5.8	5.0	4.9	167	161	158	152	131.42	136.02	131.49	134.36	119.4	114.5	115.1	115.0
Aug.	6.9	6.8	6.9	6.0	152	154	151	150	130.98	132.42	130.00	126.39	118.9	116.2	114.0	116.7
Sep.	7.1	7.2	7.4	6.8	158	157	154	156	131.31	130.94	128.12	130.40	109.2	110.8	111.4	113.9
Oct.	7.2	7.2	7.2	7.0	158	152	151	158	132.41	134.21	130.21	129.42	103.4	105.2	104.4	110.4
Nov.	7.3	7.4	7.0	7.4	157	154	155	156	139.24	136.36	129.42	134.69	106.3	104.3	105.4	109.4
Dec.	7.8	7.7	7.2	7.3	152	156	158	158	143.14	139.40	141.40	136.72	105.4	103.1	103.1	106.7
Jan. 2006	7.1	7.2	7.1	7.4	164	162	169	168	140.21	142.01	142.98	146.62	107.3	106.4	106.6	107.6
Feb.	7.0	6.9	6.9	6.9	169	168	162	174	144.42	142.42	144.21	148.79	109.4	110.6	108.5	106.3
March.	6.0	5.8	5.7	5.3	178	172	174	177	146.12	143.12	146.12	150.62	111.4	112.8	110.4	109.4
Apr.	5.2	5.6	5.2	5.0	180	181	179	183	148.42	144.42	141.21	151.42	113.4	114.4	112.8	110.0
May.	5.1	5.2	5.2	5.1	179	184	183	189	149.05	151.07	150.18	152.92	114.4	113.8	113.2	112.0

Table no. 1 : Monthly variation of physicochemical parameters of Sai reservoir at four sampling site during the year June 2005 to May 2006.

Months	**Calcium**				**Magnesium**				**Chloride**				**Nitrate**			
Spot	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4
June2005	22.86	22.42	22.43	23.41	17.28	16.26	16.21	15.32	42.82	41.48	40.42	38.12	.069	.054	.056	.049
Jul.	20.41	21.25	19.89	22.24	17.81	17.21	16.85	15.84	43.16	40.21	41.31	39.16	.059	.053	.053	.042
Aug.	20.01	20.12	19.12	21.84	16.21	16.42	16.62	16.21	42.21	40.36	42.01	40.21	.051	.049	.051	.043
Sep.	19.04	19.20	19.02	21.81	18.12	15.92	14.34	15.89	39.36	38.31	41.42	38.14	.048	.043	.049	.041
Oct.	16.41	18.41	18.42	20.42	15.36	15.12	15.22	15.71	38.12	38.12	39.61	36.12	.051	.046	.048	.043
Nov.	17.92	17.21	18.12	20.86	15.14	15.36	15.31	15.23	37.26	38.02	38.41	35.14	.063	.053	.052	.041
Dec.	16.41	16.21	16.72	20.23	14.31	14.89	15.12	15.02	36.12	37.00	36.24	36.01	.064	.059	.056	.043
Jan.2006	18.34	17.46	18.88	20.72	15.44	15.81	14.82	14.98	36.02	36.26	36.11	35.82	.061	.056	.051	.046
Feb.	18.84	17.89	18.94	21.12	15.68	15.92	14.98	14.92	36.89	36.48	37.24	36.12	.072	.068	.063	.049
March.	18.02	17.42	18.04	20.04	14.21	14.68	15.01	14.91	37.72	37.42	37.89	36.94	.071	.062	.061	.050
Apr.	19.04	18.81	18.12	19.84	16.14	16.18	15.68	15.81	46.42	47.98	46.12	36.98	.072	.068	.067	.049
May.	19.18	18.85	18.90	19.94	16.68	16.92	15.92	16.31	89.62	38.62	36.82	37.14	.051	.039	.061	.042

	Phosphate				**TDS**			
Spot	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4
June 2005	0.168	0.157	0.142	0.149	312.12	321.36	314.26	329.16
Jul.	0.179	0.162	0.149	0.157	301.62	313.32	268.16	316.27
Aug.	0.171	0.151	0.146	0.159	291.36	283.46	274.27	297.16
Sep.	0.153	0.141	0.139	0.152	268.64	271.36	269.36	278.26
Oct.	0.139	0.128	0.123	0.132	261.43	261.16	242.69	261.29
Nov.	0.102	0.112	0.109	0.121	243.24	236.12	232.21	239.66
Dec.	0.193	0.101	0.102	0.107	259.17	267.16	243.19	284.32
Jan. 2006	0.101	0.103	0.112	0.112	287.16	291.26	298.21	333.24
Feb.	0.118	0.121	0.110	0.123	304.71	312.69	331.17	349.16
March.	0.132	0.136	0.124	0.136	323.72	316.36	339.62	358.19
Apr.	0.142	0.148	0.136	0.142	356.16	336.31	372.70	373.16
May.	0.149	0.142	0.143	0.151	373.33	389.16	390.76	393.26

Table No :- 3 Comparison of physico- chemical parameters with suggested surface standard by WHO.

Sr. No.	Physico-chemical Parameters	General permissible Limit	Desirable standard by WHO	Range in Sai reservair
1.	Temperature	Narrative	———	Acceptable
2.	PH	6.0 to 8.25	6.5 to 8.5	Accepatable 7.27 to 8.47
3.	Dissolved oxygen (mg/l)	74.0	74.0	5.16 to7.50
4.	Total Alkalinity (mg/l)	30 to 500	30	151.7 to186.5
5.	Total Hardness (mg/l)	400 to 500	300	104.6 to 116.4
6.	Calcium (mg/l)	75 to 200	75	17.86 to 22.78
7.	Magnesium (mg/l)	30 to 50	30	14.70 to 17.17
8.	Chlorides (mg/l)	25 to 250	250	36.05 to 41.19
9.	Nitrates (mg/l)	10 to 100	25	0.045 to 0.064
10	Phosphates (mg/l)	25 to 50	———	0.107 to 0.161
11.	TDS (mg/l)	550 to 1500	5000	237.55 to 386.62

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