

**PHYSICO-CHEMICAL PARAMETERS OF TWO QUARRY LAKES, NEAR THANE CITY,  
MAHARASHTRA**

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**Key words :** Quarry lakes, Water quality parameters.

**Abstract :**

*Study of physico-chemical parameters of water was carried out for two quarry lakes, near Yeoor Hill area of Sanjay Gandhi National Park, Thane for a period 12 months, from July 1999 to June 2000. Both the lakes showed alkaline pH and moderate values for total hardness. Do ranged from 2.7 mg/l to 10 mg/l in lake I, and from 3.2 mg/l to 13.4 mg/l in Lake II, exhibiting lowest values in summer. Total hardness values were moderate in both the lakes. Chlorides were higher in lake II ranging from 40 mg/l to 137 mg/l. Silicates were high, where as phosphate concentration was more pronounced in lake II.*

**Introduction :**

Yeoor Hill Forest area of Sanjay Gandhi National Park, near Thane City showed high stone quarrying activity over past few years. As a consequence, a number of large depressions were formed. Forest Department with the help of local NGOs, converted some of these quarry depression, into lakes by creating earthen bundhs. Similarly overflowing hill streams were diverted, so as to collect large amount of rainwater in these lakes. These lakes act as reservoirs of water for wildlife, the water is also used for nearby plantation by NGOs. Some of these lakes retain water for the entire year while few get dried due to heavy evaporation of water. Two of these quarry lakes were selected for this study. Though they are greatly influenced by effect of evaporation, they do not have any problem of pollution by domestic sewage or solid waste disposal, except for a small number of idols are immersed in Lake I during Ganesh and Navaratri Festivals.

**Materials and Methods :**

The study was conducted from July 1999 to June 2000. Sampling was carried out in early morning

hours, fortnightly, and water samples were analysed for important physico-chemical parameters (APHA, 1981; Trivedi and Goel, 1984). Average monthly values were calculated.

**Results and Discussion :**

Air and water temperature in both the lakes were in the same range, the locations being quite near to each other. Lowest water temperature was observed in January 2000, while highest water temperature was recorded in May 2000.

Extent of light penetration provides information about the load of detritus, suspended material and planktonic organisms. It was always much higher in Lake I. Lower light penetration in Lake II can be attributed to phytoplankton bloom, observed in almost all the collections. The hicks algal matt, and reduced water mass were responsible for the lowest transparency values in month of May 2000. Though both the lakes showed minima of transparency in same month, the value was 4 times higher in Lake I.

pH was always alkaline in both the lakes, on an average slightly higher in lake II. Maximum values were recorded in summer.

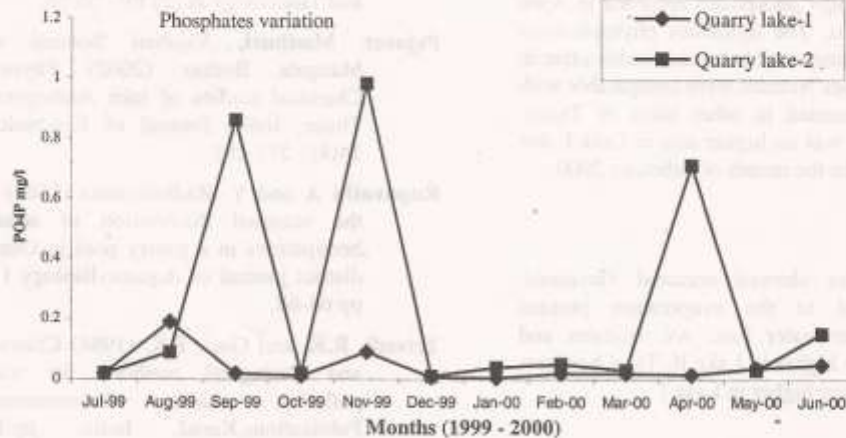
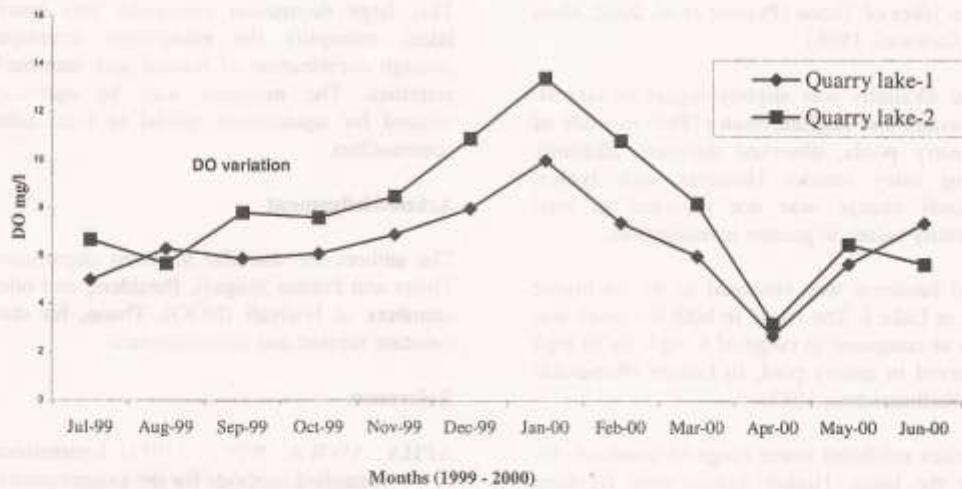
Table 1. Physicochemical parameters of water in Quarry Lake -1

Months 1999	Temp. Air	Temp. Water	LP cm	pH	DO	Chlo-rides	Free CO <sub>2</sub>	Total Alka-linity	Hard-ness	SiO <sub>3</sub> -Si	PO <sub>4</sub> -P	NO <sub>3</sub> -N
July	25	26	108	7.94	5	84	1.1	150	84	6.6	0.02	0.02
Aug	28	28	112	8.11	6.3	66	0.5	153	79	16.5	0.19	0.08
Sep	27	27	110	8.12	5.9	64	1.1	130	95	21.4	0.02	0.08
Oct	22.75	24.25	110	8.31	6.1	64	0.76	145	112	52.3	0.01	0.14
Nov	22.5	24	86	8.72	6.9	71	0.52	120	158	60.23	0.09	0.1
Dec	22	21.75	99	7.36	8	66	0.01	117	176	53.6	0.007	0.092
Jan 2000	21.25	19.5	103.5	8.1	10	79	0.52	150	202	27.34	0.004	0.07
Feb	30.5	28	83.5	7.92	7.4	84	0	135	161	33.7	0.02	2.13
Mar	27.5	26.75	85	9.1	6	88	1.1	143	198	48	0.02	0.15
Apr	25	27.5	74	8.8	2.7	95	1.1	170	230	49	0.015	0.12
May	32.5	31.5	70.5	8.1	5.7	87	0	150	201	21.3	0.037	0.03
Jun	31	30.25	80	7.47	7.4	95	0	133	153	34.23	0.048	0.37

Table 2. Physico chemical parameters of water Quarry Lake- 2

Months 1999	Temp. Air	Temp. Water	LP cm	pH	DO	Chlo-rides	Free CO <sub>2</sub>	Total Alka-linity	Hard-ness	SiO <sub>3</sub> -Si	PO <sub>4</sub> -P	NO <sub>3</sub> -N
July	25	26	34	8.14	6.7	48	1.1	165	132	11.55	0.02	0.08
Aug	28	27.75	64	8.32	5.7	70	0.5	184	94	17.12	0.09	0.1
Sep	27	27	45	8.41	7.8	70	0.11	165	85	20.12	0.86	0.1
Oct	22.75	24	62	8.52	7.6	75	0.5	165	109	57.2	0.02	0.17
Nov	22.5	23	55	8.21	8.5	66	0.5	167	153	81	0.98	0.1
Dec	22	21	50	8.15	10.9	58	0	195	151	61.75	0.01	0.17
Jan 2000	21.5	19	34	8.52	13.4	90	0.5	165	151	57.35	0.04	0.11
Feb	30.25	28	32	8.35	10.8	101	0	167	126	91	0.05	0.13
Mar	27.25	26.75	34	9.7	8.2	100	0	135	109	117.5	0.03	0.037
Apr	25	27.5	35	9.12	3.2	137	0.97	170	110	114	0.71	0.13
May	32.5	31.5	20	7.82	6.5	127	0	153	132	58	0.03	0.05
Jun	30.5	30.5	42	7.47	5.7	121	0	145	122	20.1	0.15	0.37

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Dissolved oxygen, showed similar trend in both the lakes (Graph 1) and exhibited winter maxima, which was in accordance with Kumar, 1993). Lowest values were recorded in the month of April 2000. Free CO<sub>2</sub> was higher in Lake I. It was observed to be nil, in almost 50% samples of Lake II, indicating its enhanced uptake by phytoplankton.

Chlorides showed seasonal variation in both the lakes with higher average values in lake II. Lower chloride range was specifically observed during rainy season suggesting the dilution effect. The higher range recorded in summer months denote the effect of higher temperature and rapid reduction in water mass. It is noteworthy that in absence of any sewage load, the chloride range is comparable with other

urban lakes of Thane (Pejaver *et al.*, 2002, Mani and Gaikwad, 1998)

Total alkalinity was slightly higher in lake II. Rupavathi and Radhakrishan (1983) in study of a quarry pools, observed decrease alkalinity during rainy season. However such typical seasonal change was not recorded in total alkalinity values in present investigation.

Total hardness was observed to be on higher side in Lake I. The range in both the lakes was high as compared to range of 8 mg/l to 76 mg/l observed in quarry pool, in Guntur (Rupavathi and Radhakrishna, 1983).

Silicates exhibited lower range in monsoon, for both the lakes. Higher values were recorded during March & April 2000, especially in Lake II. Seasonal variations in phosphates were observed to be of different nature in Lake I & Lake II. Average Phosphates were on higher side in lake II. It can be attributed to exceptionally high phosphates recorded in April 2000 in lake II. The dynamics phytoplankton bloom may be responsible for this sudden rise in phosphate values Nitrates were comparable with the ranges recorded in other lakes of Thane. Average value was on higher side in Lake I, due to sudden rise in the month of February 2000.

#### Conclusion :

Both the lakes showed seasonal variations, mostly related to the evaporation process causing greater water loss. Av. silicates and Phosphates are higher in Lake II. Total hardness and Nitrates were higher in Lake I.

This large depression converted into quarry lakes, exemplify the ecosystems developed through combination of natural and man-made activities. The nutrients may be optimally utilized for aquaculture, useful to local tribal communities.

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