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Hydrochemical study of water from Budaki Medium Irrigation Tank, Shirpur, Dist. Dhule (Maharashtra)

***Agale M. C. and [#]Patel N. G.**

**Deptt. of Zoology, R.C. Patel Arts, Commerce and Science, Shirpur, Dist. Dhule (M.S.)*
[#]P.G. & Research Centre, Deptt. of Zoology, Pratap College, Amalner, Dist. Jalgaon (M.S.)

ABSTRACT

Nobody has done assessment of water quality of Budaki M.I. tank even though it is utilized for pisciculture, irrigation and domestic purposes. It is an urgent need to assess the quality of water. The Physico-chemical parameters of Budaki M.I. tank were studied during Jan. to Dec. 2010, from four different sites. The results revealed that there was a significant seasonal variation in same physico-chemical parameters. The Water temperature ranges from 19°C to 29°C, Total Solids 146 to 211mg/l ,Total Dissolved Solids 118 to 170 mg/l, PH 7.1 to 8.3 mg/l, Hardness 118 to 219 mg/l, Nitrates 0.22 to 0.48 mg/l, Phosphate 3.1 to 9.1 mg/l, Calcium 7 to 35 mg/l, Magnesium 6 to 28 mg/l. Above values are within the acceptable limits of drinking water ,hence the water is potable and suitable for various purposes.

Key words: Budaki M.I. Tank, Physico-chemical Parameters, Water quality, Water Pollution

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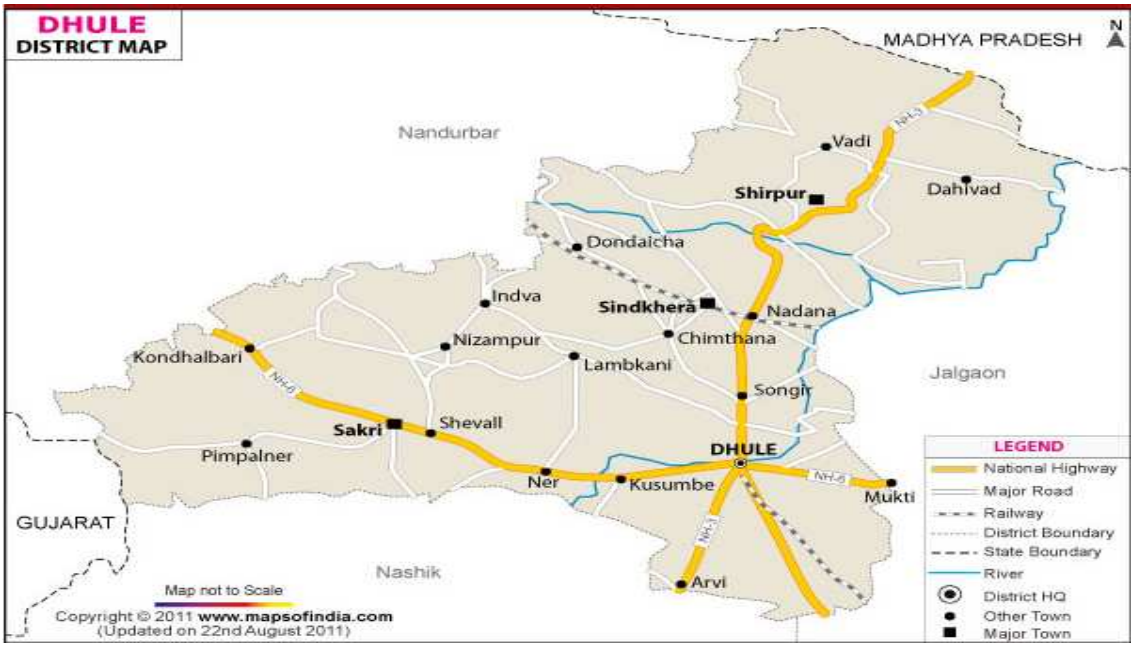
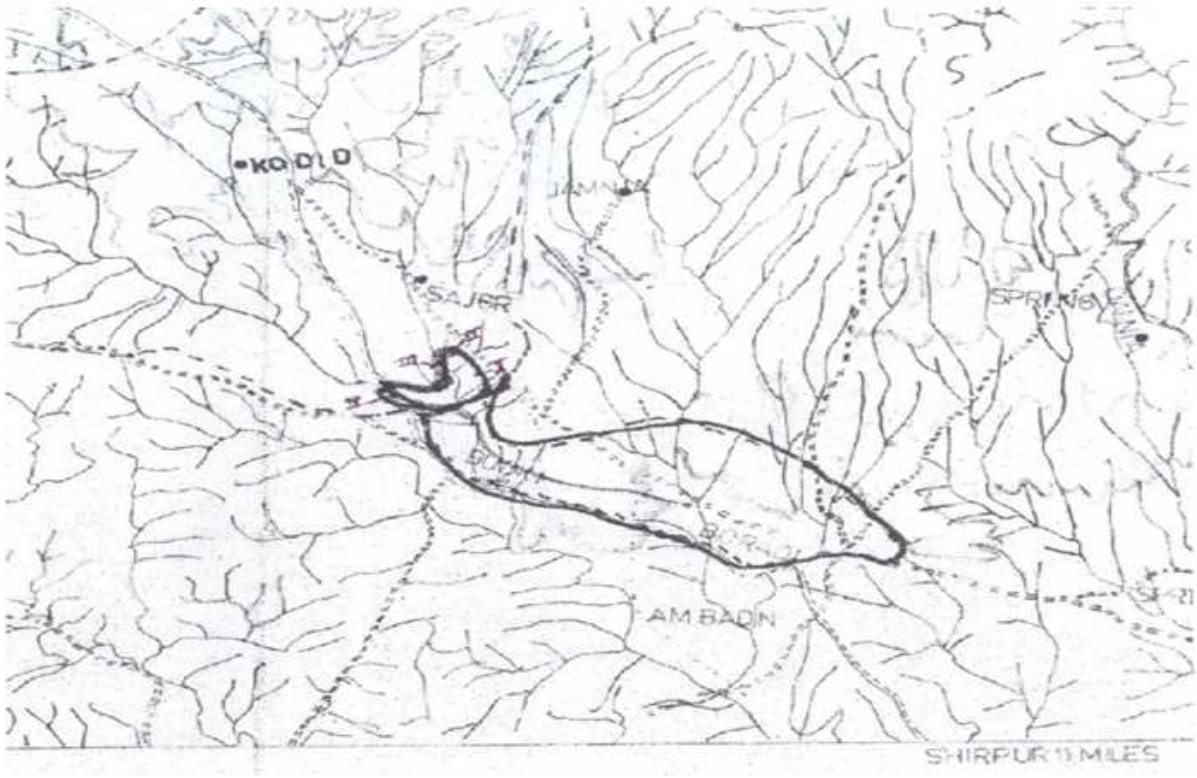
INTRODUCTION

Water is very important life supporting material. We depend on water for domestic needs, irrigation, sanitation and disposal of wastes. Normally water in nature is never pure in chemical sense. In Water natural impurities are in very low amounts, but due to industrial growth and urbanization many unwanted substances are introduced in water and it are polluted. Polluted water is turbid, bad smelling, unpleasant and unfit for drinking and other purposes. It may cause many diseases and is harmful to human being. Lakes, dams, rivers are important source of fresh water. The quality of water is described by its physical, chemical and microbial characteristics. But, if some correlations were possible among these parameters, then significant ones would be fairly useful to indicate the quality of water [21]. Many researchers have done studies on physicochemical and biological characteristics of river dam and Lake Water [19, 22, and 25].

Study area

The Ambad nallah is a medium size irrigation tank, constructed on the junction of Ambad and Sossniya nallah near village Budaki at a distance of about 1 km to the north of village Budaki taluka Shirpur, Dist- Dhule (M.S.). It was constructed in 1977; it is situated at 21˚-32́-00 latitude and 74°-52′-30 longitudes and higher at 326 above MSL in the North Maharashtra. Its North-South linear width is 7.75 m while East-West length is 1500 m. The Catchments area of the project is 38.85 Sq. Km. The water from the tank is perennial and is utilized for irrigation and drinking purpose as well as for pisciculture. The water from this dam is also utilized by the tribal for domestic purpose, cattle, and some amount is utilized for agriculture. A large number of major and minor carps are bred by tribal peoples.





MATERIALS AND METHODS

Water sampled from Budaki M.I. tank were collected from four sampling stations in the morning hours on a monthly basis for the period of one year from Jan. to Dec.2010 in clean polyethylene bottles and immediately transported to the laboratory for the estimation of various physico-chemical properties viz. temperature, pH and dissolved oxygen were recorded at site where as the other parameters like nitrates, chlorides, magnesium, potassium,

phosphate, hardness were estimated in the laboratory by using standard method for the estimation of water given by [9,12] .

RESULTS AND DISCUSSION

The result of water quality status is depicted in table. In the present study water temperature ranged between 19˚C and 29˚C. [11] Reported during the summer month of the year and surface water gain heat mainly by absorption of solar radiation and conduction from the atmosphere. The maximum temperature recorded in may 33˚ C and lowest in Jan 21 ˚ C .In the study pH value ranged from 7 .00 to 7.9 it was minimum 7 in the month of January, August and maximum 7.9 during may 2010. The chloride contents varied from 125 to 230 mg/l. The maximum value was recorded in April while minimum was recorded in August. [24] Attributed high chloride value due to increased organic matter. The phosphate values ranged between 0.4 to 2.5 mg/l. The maximum nitrate was observed as 48 mg/l and minimum as 22 mg/l. The sulphate fluctuated between the 6 to 25 mg/l. The similar trend was observed by [27].

Dissolved Oxygen play an important role in aquatic ecosystem. It is regulated by rate of dissolution of photosynthesis and community respiration. The lowest level of DO in summer is due to decreased oxygen holding capacity of water at high temperature [8]. Oxygen is lost to atmosphere during summer, Increase in DO in monsoon is due to low temperature and high aeration along with photosynthetic activity [14]. There is inverse relationship between temperature and dissolved oxygen. Carbon dioxide ranges between 1.1 mg/l to 4.1 mg/l. Temperature has direct relationship with pH and CO .CO obtained from conversion of carbonates to bicarbonates with rise in pH supported by [1,7].

During the period of research at BMIT water study, the total solids in water was increased at in monsoon period and minimum during in winter season, it was slightly decreased in summer . However, comparatively higher levels during summer may be due to concentration due to evaporation. Similar conditions are also observed [23]. The higher concentration of TDS increases water in summer170 mg/L. while it was lower concentration in winter 118 mg/L. The high amount of TDS increased turbidity which in turn decreases the light penetration in water.

Nitrogen is essential for the synthesis of proteins; hence it is a limiting factor along with phosphorous controlling growth of phytoplankton in natural waters [2]. Nitrate values ranging from 0.22 mg/l to 0.48 mg/l. our results in accordance with [3]. Chloride content varied from 72mg/l (maximum) in April and 32 mg/l (Minimum) in Drcember. Our results are in agreement with earlier water quality studies by [16]. Sulphate ranges between 3.1 to 9.1 mg/l and the same trend was observed by [26]. The phosphate values ranged between 0.11 to 0.82 mg/l. The maximum nitrate was observed as 0.48 mg/l in June and minimum as 0.22 mg/l.January. The sulphate fluctuated between the 6 to 25 mg/l. The similar trend was observed by [15]. The phosphate values range between 0.4 to 2.5mg/l. Our results are in agreement with [20]. Total hardness ranges between102mg/l to 180 mg/l and similar range of total hardness was reported by [13] in Rishi lake.

The main source of Ca and Mg is leaching of rocks and exoskeleton of arthropods as well as shells of mollusks [5]. Calcium is an important element influencing flora of ecosystem, which plays potential role in metabolism and growth. The range was varied from 7to 35mg/l. The maximum concentration of 35 mg/l was recorded in March and minimum of 7mg/l in July. The level of magnesium varied between 6 to 28 mg/l; at higher concentration it increases total hardness of water in accordance with [5]. Almost all parameters during the present study meet the water quality norms as per [10]. Now it is clear that, the tank is not polluted by human anthropogenic activities and agricultural runoff from surrounding areas Hence, it is suitable for human consumption without prior treatment. Moreover, tank is used for irrigation and domestic purposes in that area. As water is not contaminated, it is potable.

Table 1. Physico-chemical Status of Budaki Medium Irrigation Tank, during Jan to Dec 2010

Sr. No	Parameters	Jan	Feb	March	April	May	June	Jully	Aug	Sept.	Oct.	Nov.	Dec.
1	AT	23	24	30	34	35	32	29	28	27	26	25	22
2	WT	19	22	26	28	29	26	25	24	23	24	22	19
3	Trans.	117	92	86	90	90	80	60	62	92	98	114	120
	WC	70	70	65	62	45	60	80	90	95	90	85	85
4	TDS	130	148	156	168	170	167	146	150	134	128	118	120
5	TSS	22	30	38	40	41	59	61	55	51	39	28	23
6	TS	152	178	194	208	211	216	207	205	185	167	146	143
7	pH	7.7	7.2	8.1	8.3	7.8	7.4	7.1	7.2	7.3	8.1	7.9	8.1
9	DO	7.9	4.1	4.2	4.4	3.3	3.6	5.6	5.7	6.1	6.8	7.2	8.1
10	CO_2	2.7	3.3	3.9	3.8	4.1	3.9	3.1	2.8	3.1	2.8	1.1	2.1
11	Nitrates	0.22	0.3	0.25	0.45	0.35	0.48	0.35	0.40	0.30	0.25	0.30	0.28
12	Chlorides	38	47	60	63	72	55	53	49	50	43	42	32
13	Sulphates	0.11	0.32	0.42	0.49	0.63	0.61	0.82	0.73	0.52	0.3	0.25	0.18
14	Phosphates	3.4	4.2	5.1	5.9	6.2	6.1	8.2	9.1	8.8	6.3	4.5	3.1
15	TH	133	135	172	196	219	128	122	118	127	160	142	145
16	Magnesium	9	12	14	25	28	15	8	6	7	15	20	15
17	Calcium	10	20	35	20	30	9	7	10	15	25	10	20

All parameters are expressed in mg/lit except pH and water temperature.

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