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Water Quality of Ponds in Venganoor Town in Trivandrum District, Kerala, India

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Abstract

The present investigation assesses the water uniqueness of four ponds in the region of Venganoor town in Trivandrum district of Kerala, India where ponds have been conventionally used for harvesting rainwater for drinking and irrigation purposes. Ponds exist in this area is in most of the state of utter neglect and abandonment. Agricultural and urbanization activities take place all round the year in this city of ponds influencing the water quality. The physico-chemical characteristics like temperature, pH, transparency, turbidity, DO, nitrate, and total iron content are discussed in this paper over a period of one year. Water temperature broadly varied from 25.5 to 33^{0}C. Transparency fluctuated between 0.5 to 1.5m, the lowest in monsoon and the highest in pre-monsoon season with likewise turbidity between nil to 15NTU. Dissolved oxygen varied from 3.0 to 10mg/l. Nitrate concentration ranged from 3.1 to 9.6mg/l the highest in pre-monsoon seasons. The results indicate that there was much deterioration in water quality of these ponds. It is possibly due to bank erosion and surface run off.

Keywords
Ponds, Water Quality, Pollution, Pre-Monsoon

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INTRODUCTION

Ponds can be defined as the smallest shallow bodies of standing water in which extensive plant and organisms are distributed. The quality of water is very important for many freshwater ecosystems, because any change in water has a direct impact on species composition abundance stability and productivity of aquatic organisms. (Das, 2002 and Radhika et al., 2004). Many of the water bodies' in sound India are quite smaller in dimension. The geographic situation and the influence of climatic conditions play a major role in deciding the ecological status of water bodies (Harikrishnan and Abdul Azis, 2000; Padmavathyet al., 2003). Characteristics of water bodies influence the quality of water individually and in combination with various pollutants, thereby influencing the biota therein (Srivasta et al., 2003; Smitha et al., 2007. Under the specific background, current study is carried out for one-year 2011 in four ponds around Trivandrum District. The main objectives of the study are to

analyze the water samples for physicochemical parameters and primary productivity.

MATERIALS AND METHODS

The study was conducted across Venganoor town in Trivandrum district, Kerala, India (Fig 1). Monthly samples were collected in pre-cleaned plastic and glass bottles. Physicochemical parameters such as water temperature, transparency, pH, conductivity, turbidity, total suspend solids, total dissolved salt, total alkalinity, total Hardness, Ca hardness, Do, BOD, nitrite nitrogen, nitrate Nitrogen, phosphate, sulphate, and total iron and primary productivity were carried out by the standard methods (APHA 1995).

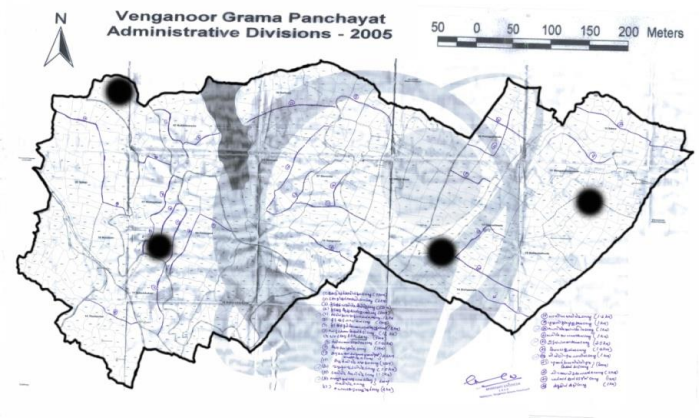

Fig: 1 Location Map Showing Sampling Stations

RESULT AND DISCUSSION

The Temperature value varied to 33°C. Atmospheric temperature is one of the most important ecological factors which control the behavior of the aquatic system and distribution. In this investigation study, temperature was lower than air temperature. The light penetration depends on transparency of water which affects the primary productivity of the system (Sharma, 2004). While P^H fluctuated from 6.9 to 7.8 which are considered as the optimum. The turbidity values ranged from 5.0 to 10 NTU. Total dissolved salt values were ranged between 20 to49.3mg/l. The maximum value was attributed to run off water being in Marthanadam Kulam pond during pre-monsoon period. Total alkalinity in four ponds fluctuated between 20 to 47mg/l. Excessive alkalinity may cause eye irritation in human and chlorosis in plants. Total hardness varied from 19 to 90 mg/l. Low value may be due to dilution of pond water and higher values due to high rate of evaporation of water and addition of calcium and magnesium salt from the pollutants. Mohananda and Behera (2010) stated the addition of sewage, detergents and large-scale human use might be the cause of elevation of hardness in pond water. Ca hardness varied from 8.9 to 21.8mg/l fell below the acceptance limits (BIS, 1998). The level of dissolved oxygen acts as an indicator of the oxygen status of the water body. The presences of dissolved oxygen in water may be due to direct diffusion of oxygen from the atmosphere and by the phosynthetic activity. Dissolved oxygen varied from 3.0 to 1.0mg/l respectively from Marthandam Kulam. BOD values fluctuated between 0.41 to1.78mg/l pre-monsoon periods is indicative of the extent of pollutionSulphate values were fluctuated between 0.31 to 0.78mg/l and found within the limit. Excess of sulphate imparts taste to water and has laxative effect causingadverse effect on the human health. Phosphate contents were 2.65mg/l (Sarkaru Kulam during pre-monsoon period) which may be due to absorption and desorption of phosphorous and buffering sediments under prevailing environmental conditions (Sengupha and Upadyaya, 1987). Nitrate an important limiting factor in fresh water varied from 3.1 to 9.6mg/l, the higher values may be due to the influx of nitrogen rich flood water. Nitrite Nitrogen in natural water occurs in lower concentration than Nitrate, it covers between 0.19 to 0.5mg/l. The maximum iron content (34.7mg/l) was reported in Muttakkad Kulam and minimum (10.3mg/l) in Marthanadam Kulam. Most of the samples have iron higher desirable limit (0/3mg/l) for drinking purpose. Trivedy and Goel (1984) reported that iron has got litter concerns as a health hazard but it is still considered as a nuisance in extensive quantities.Primary productivity fluctuated from 120 to 84(mg/cm3/day) which is reflective of the distribution of Physicochemical characteristics of water bodies.

CONCLUSION

Agricultural and urbanization activities take place all round the year in this city of ponds influencing the water quality. The physico-chemical characteristics like temperature, pH, transparency, turbidity, DO, nitrate, and total iron content are discussed in this paper over a period of one year. Water temperature broadly varied from 25.5 to 33^{0}C. Transparency fluctuated between 0.5 to 1.5m, the lowest in monsoon and the highest in pre-monsoon season with likewise turbidity between nil to 15NTU. Dissolved oxygen varied from 3.0 to 10mg/l. Nitrate concentration ranged from 3.1 to 9.6mg/l the highest in pre-monsoon seasons.

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Table 1. Physicochemical parameters of pond waters during pre-monsoon period

Parameters	Ponds			
	Marthandam Kulam	Muttakkad Kulam	Koliyoor Sarkaru Kulam	Puthu Kulam
Water Temperature (^{0}C)	33	30	30.5	32.5
Transparency (m)	1.5	1	1.4	0.75
pH	7.7	7.8	7.4	6.9
Conductivity	61	53	71	67
Turbidity (NTU)	5	5	5	10
Total Suspended Solids (mg/l)	5.2	6.8	7.27	5.25
Total Dissolved Solids (mg/l)	26.4	38.2	49.3	35.4
Total hardness (mg/l)	20	16	18	16
Nitrite Nitrogen (mg/l)	0.46	0.47	0.36	0.48
BOD (mg/l)	0.98	0.68	1.4	1.2
DO (mg/l)	10 .7	9.5.	8. 6	4.6
Ca hardness (mg/l)	9.4	10.6	13.8	9.9
Total alkalinity (mg/l)	22	39	28	24
Phosphate (mg/l)	1.27	1.94	1.68	2.78
Sulphate (mg/l)	0.43	0.58	0.79	1.11
Total Iron (mg/l)	22.2	16.2	13.6 3	15.4

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