LAKE 2014: ***Conference on Conservation and Sustainable Management of Wetland Ecosystems in Western Ghats***
Date: 13^{th} -15^{th} November 2014
Symposium Web: http://ces.iisc.ernet.in/energy

LIMNO-CHEMISTRYOF SOME LENTIC WATERBODIES OF KARWAR- UTTARA KANNADA DISTRICT, KARNATAKA.

[1]VASANTHKUMAR.B [2]VIJAYKUMAR.K.SEDMKAR.E.B[3].
Associate Professor, Department of Studies in Zoology,
Government Arts & Science College, KARWAR-581301(UTTARA KANNADA)
[2]Professor of Zoology, Dept of Studies in Zoology,
Gulbarga University, Gulbarga-585 106
[3]Department of Botany, G.H.College, HAVERI.
Corresponding author e-mail: bagalwad@rediffmail.com, Mob. :9448573105

ABSTRACT

Investigations of limnological parameters help in determining the suitability of water for irrigation and drinking purposes. The specific status of limno-chemistry in some selected water bodies in and around Karwar, Uttara Kannada. The pond /tanks/dam selected for the area is pond no.1 Mudageri is 640sq.m and pond no.2 Hotegali 740 sq.m. These water bodies are situated form Karwar town at a distance of 32km two wards north side have been studied for the period of one year. (October, 2012 to September, 2013). The water remained moderately alkaline (pH 7.2), while electrical conductivity 74), TDS (124.1 mg/l), turbidity (3.5 NTU), alkalinity (206.16 mg/l). Average dissolved oxygen levels were at 5.85 mg/l, while average nitrate and phosphate levels were 0.65 mg/l and 1.27 mg/l respectively. On the basis water quality parameters in general water bodies of Karwar was found to be eutrophic.
Key words: Hydrochemistry, Lentic water body, meteorology, Karwar.

INTRODUCTION:

Water is an essential natural resource and an absolute necessity for sustaining life water is not only the most important essential constituent of all animals , plant & other organisms but it is also pivotal for the survivability of the mankind in the biosphere. It is the life blood of the environment and human beings solely depend upon the availability of water for living and livelihood and in its natural state it is a' saviour of life'. To day, by ignoring these facts, man is indiscriminately polluting complex situation.

Physico – chemical characteristics of lentic water body like ponds, leks, dams have been carried out through out the world. By a number of workers (Atkins 1926) , Ayyappan (1985), Hutchinson (1957). But most of these studies are restricted to well known locations or sites and some times repeatedly. No attention as even been paid to such a lentic ecosystems located in distant and remote areas which are always part of routing domestic life in developing countries like Indian. The present investigation is an effort to study to such a ponds / tanks / dams at Mudageri and Hotegali tanks in and around karwar

MATERIALS & METHODS

STUDY AREA : The Mudageri tanks selected for the study has an area of 640sq m and situated 14^{0}-53^{1}-52.27n. latitude & 74-07^{1}-55.06" E. longitude. These water bodies are situated from karwar town at a distance of 18 & 32 km respectively towards north side (fig-1) have been studied for the period of one year (October – 2012 to September – 2013)

METHODOLOGY

In the present study, water samples were collected on monthly basis from Mudageri pond and Hotegali pond. Surface water samples were collected using clean BOD bottles for the study of various physicochemical parameter. All collections and observations were made between 08.30 to 10.30 am throughout the period of study. Physico-chemical parameters like Air & water temperature, pH, dissolved oxygen, T.D.S, salinity, conductivity, turbidity, colorimetric were recorded at the sampling site using systronics water analyzer (Model 371). Phosphate, Nitrate, Nitrite, silicate were analyzed in the laboratory titrimetric method as per standard methods for examination of water (APHA AWWA. 1985, APHA 2000).

RESULTS & DISCUSSION:

The air temperature showed variation during the study period or among the seasons. The atmospheric temperature varied between 28ºC to 35ºC. A lowest temperature was recorded during November-December (28ºC) and highest during May month (35ºC) in the Mudageri tank (Table 1) and in Hotgali tank, lowest temperature was recorded during December-January (29.0º C) and highest (33º C) during May month (Table 2). The water temperature did not show any drastic variation either during the study period or among the seasons. In Mudageri tank lowest temperature was recorded during January (26.0º C) and highest (33º C) during May month (Table 1). A lowest temperature was recorded during August-September (25ºC) and highest during May month (31ºC) in the Hotegali tank (Table 2). In the present study it was observed that Mudageri tank shows more dissolved oxygen in the month of July 6.4 mg/l and minimum 5.1 mg/l in the month of October (Table 1). Similarly in Hotegali tank highest dissolved oxygen was recorded during August-September (6.8mg/l) and lowest during May month (4.8mg/l) (Table 2). The high dissolved oxygen may be attributed to the phytoplanktonic photosynthetic activity and in addition temperature and high salinity similar observations were made by various workers on dissolved oxygen productivity and attributed to the water temperature, phytoplankton and degree of pollution (Ganapathi, 1960, Gosh et al., 1974, George et al., 1986). Range of the hydrogen ion concentration in Mudageri and Hotegali tank are presented in table 1 and 2. pH was low during July month (6.9) and high in the month of Dec (7.8) in the Mudageri tank. In Hotegali tank low during month of July (6.5) and high during May (8.4) In the present study higher concentration of pH was observed during summer and South West monsoon season could be attributed to enhanced rate of evaporation coupled with human interference are partly to enhanced photosynthetic activity. Maximum pH during summer season also observed by David et. al, (1974), Ayyappan and Gupta (1980), Vijaykumar (1991). They also related the high pH with photosynthetic activity and more conductive for net production.tds values ranged from 64.9 to 124.1 mg/l, the minimum was recorded in august (72 mg/l) and maximum in may (112 mg/l) at Mudageri pond (table 1) in Hotegali pond tds (total dissolved solids) values ranged from 62.3 to 119.2 mg/l (table 2). the minimum value may be due to the stagnant condition of the water body. the values are within permissible limits of 1500 mg/l (bis, 1993). high values of tds and sulphates in drinking water are generally not harmful to human beings but high concentration of these may affect persons, who suffering from kidney and heart diseases (gupta et al., 2004).Turbidity measures the suspended and inorganic matter in the water. The values fluctuated between 3.2 to 45.5 NTU (Table 1). In the Mudageri tank minimum value was recorded in January (3.2 NTU) and maximum in June (45.5 NTU). Minimum turbidity recorded 4.2 NTU in October and maximum in 21.5 NTU (Table 2). The variations of turbidity depend on the inflow of rain water carrying suspended particles (Nafeesa Begum et al., 2006). In natural water bodies, turbidity may import a brown color to water (George, 1997).

Nutrients:

Phosphate phosphorus :

In the present investigation it was observed that the minimum phosphate was in the month of June (0.56 µg at/l) and maximum in the month of March (1.8 µg at/l) (Table 1) while in Hotegali tank minimum phosphate was in the month of June (0.65 µg at/l) and maximum in the month of July (1.8 µg at/l) (Table 2) high phosphate in the pond favours for productivity of phytoplankton. According to Welch (1952) Hutchinson (1957) and Horne (1978) studies main source of phosphate is sewage. Ganapathi (1960) in tropical water, phosphates are always present in sufficient quantity. In present study the frequent occurrence of cyanophycean blooms in the pond attributes to high content of phosphates.

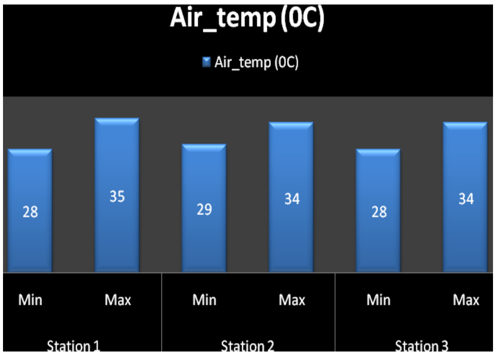
Nitrate: In present work the nitrate content of Mudageri tank varies from a minimum of 1.0 µg at/l (August) and maximum of 2.11 µg at/l l (June) (Table 1). Similarly nitrate content of Hotegali tank varies from a minimum of 1.0 µg at/l (August) and maximum of 3.2 µg at/l (May) (Table 2). The high content of nitrate in this tank can be attributed to sewage inflow. And also other polluting agents observed similar observation was made by of Venktateshwarlu (1969) have shown that organic pollution increase the nitrogen content of natural water bodies. Munwar (1970) indicated an inverse relation between nitrates and phosphate. Role of nitrate and phosphorus ratio information of blue green algal blooms has been studies by Jayangoudar (1964), Zafar (1967). According to them high nitrate and low phosphate favors the formation of cyanophyccae bloom.

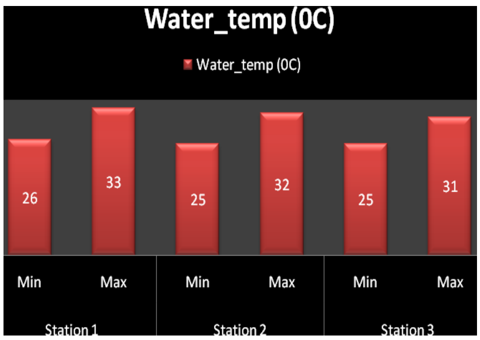
Nitrite: In present work the nitrite content of Mudageri tank varies from a minimum of 0.40 µg at/l (August) and maximum of 0.98 µg at/l l (March) (Table **1**). Similarly nitrite content of Hotegali tank varies from a minimum of 0.41 µg at/l (August) and maximum of 0.95 µg at/l (Jan & December) (Table 2).

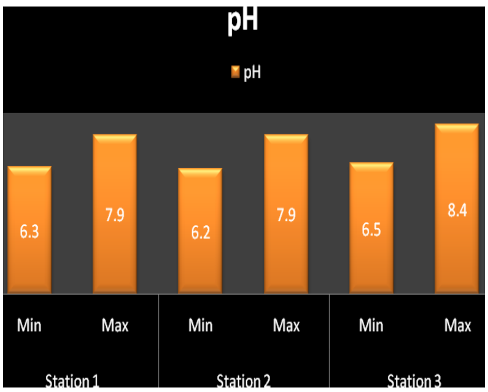
Silicate: In the present work it was observed in the Mudageri tank shows maximum silicate in the month of June (79.8 µg at/l) and minimum in the month of August (20.14 µg at/l) (Table 1). Silicate was observed in the Hotegali tank shows maximum in the month of August (79.2 µg at/l) and minimum in the month of october (21.0 µg at/l) (Table 2). Munwar (1970) based on the work on fresh water ponds found direct correlation of silicates with temperature. However, in the present investigation it was not correlated. Atkin (1926) is opinion that increase in silicates is due to increases in pH.

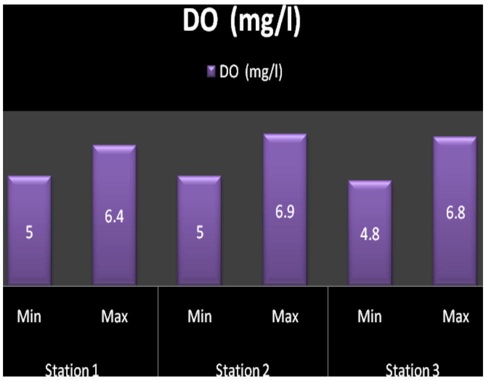
Table 1. Showing range of hydrological parameters in the Mudageri tank

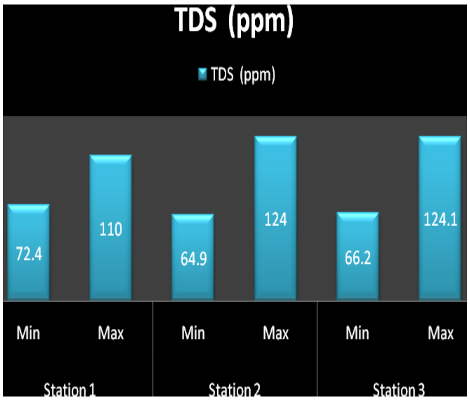
Parameters	**Station 1**		**Station 2**		**Station 3**	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**
Air_temp (^{0}C)	28	35	29	34	28	34
Water_temp (^{0}C)	26	33	25	32	25	31
pH	6.3	7.9	6.2	7.9	6.5	8.4
DO (mg/l)	5	6.4	5	6.9	4.8	6.8
TDS (ppm)	72.4	110	64.9	124	66.2	124.1
Conductivity (uS)	65	105.2	68	157	74	99.3
Turbidity (NTU)	3.2	21.05	3.5	45.7	4.2	45.2
Phosphate (µg at/l)	0.56	1.9	0.56	1.8	0.65	1.99
Nitrate (µg at/l)	1	2.8	1	2.2	1	3.2
Nitrite (µg at/l)	0.4	0.98	0.4	0.98	0.41	0.99
Silicate (µg at/l)	20.14	79.8	20.14	79.8	21	691

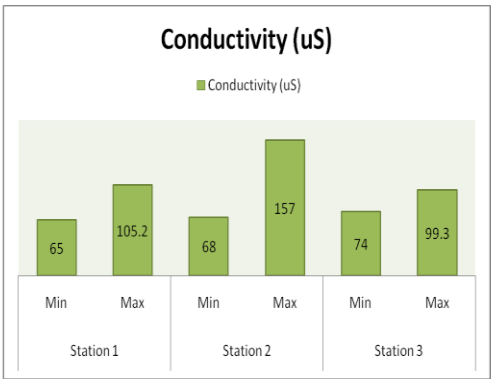


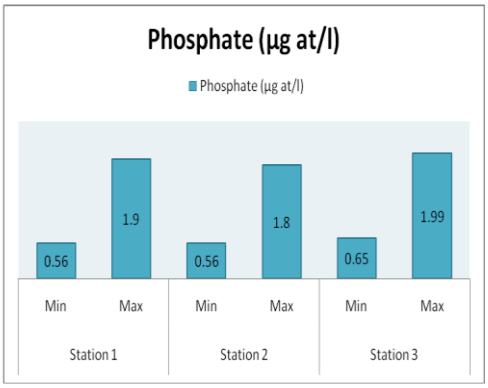


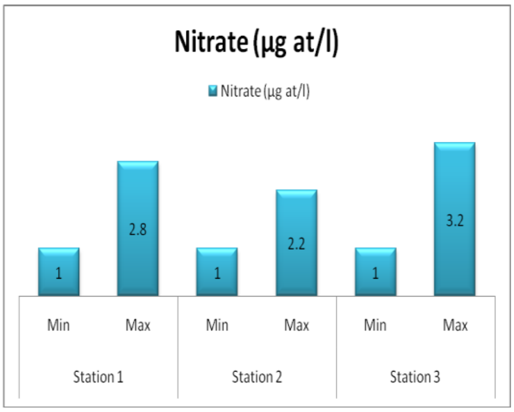

pH
pH
6.3
7.9
6.2
7.9
6.5
8.4
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3

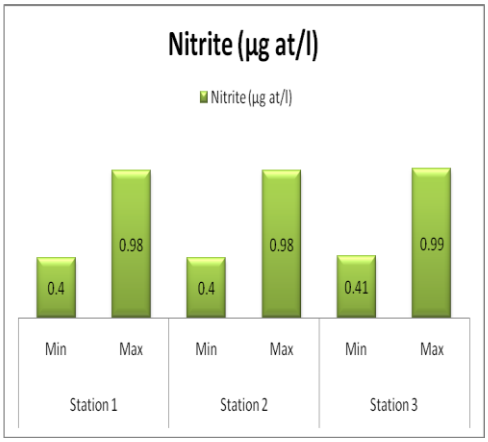

DO (mg/l)
DO (mg/l)
5
6.4
5
6.9
4.8
6.8
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3

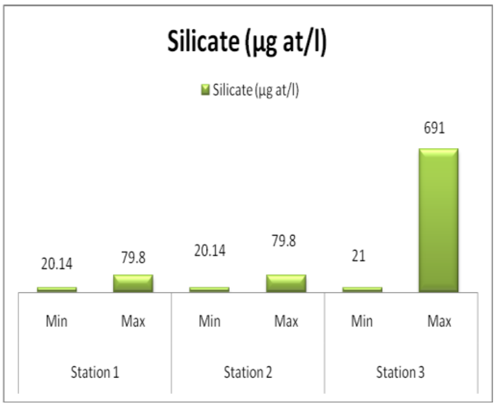

TDS (ppm)
TDS (ppm)
72.4
110
64.9
124
66.2
124.1
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3


Conductivity (uS)
Conductivity (uS)
65
105.2
68
157
74
99.3
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3


Phosphate (µg at/l)
Phosphate (µg at/l)
0.56
1.9
0.56
1.8
0.65
1.99
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3


Nitrate (µg at/l)
Nitrate (µg at/l)
1
2.8
1
2.2
1
3.2
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3


Nitrite (µg at/l)
Nitrite (µg at/l)
0.4
0.98
0.4
0.98
0.41
0.99
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3


Silicate (µg at/l)
Silicate (µg at/l)
20.14
79.8
20.14
79.8
21
691
Min
Max
Min
Max
Min
Max
Station 1
Station 2
Station 3

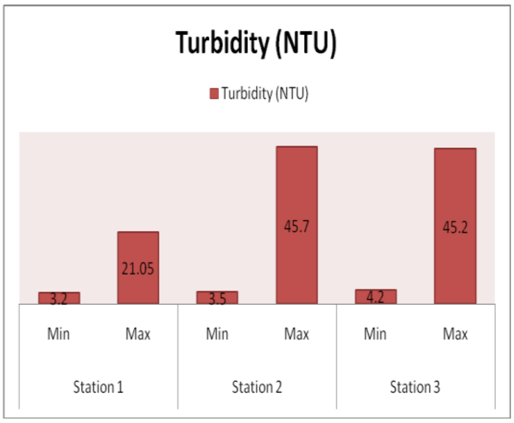
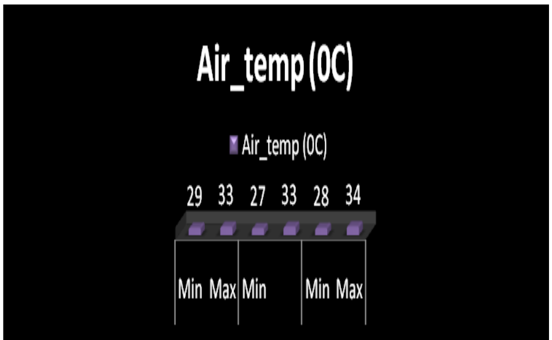
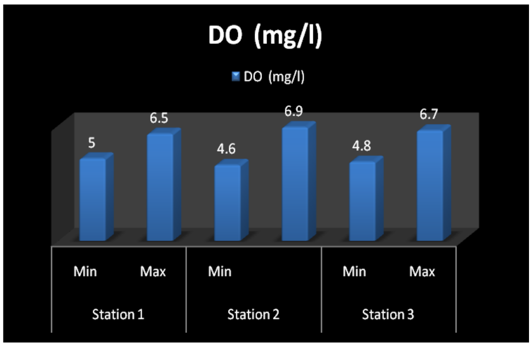
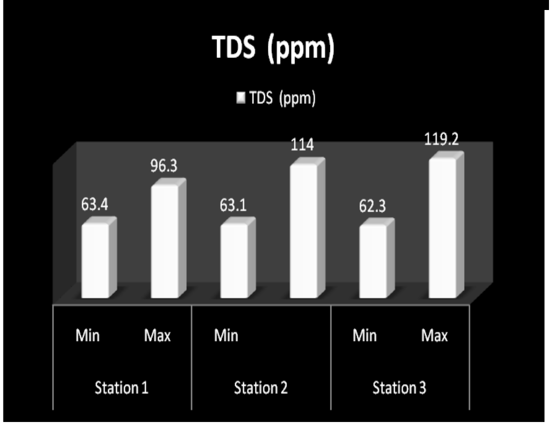


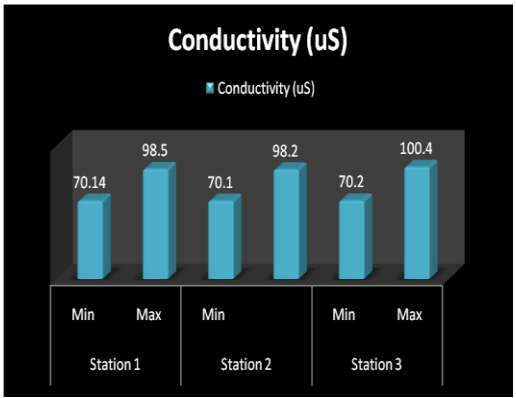
Table 2. Showing range of hydrological parameters in the Hotegali tank

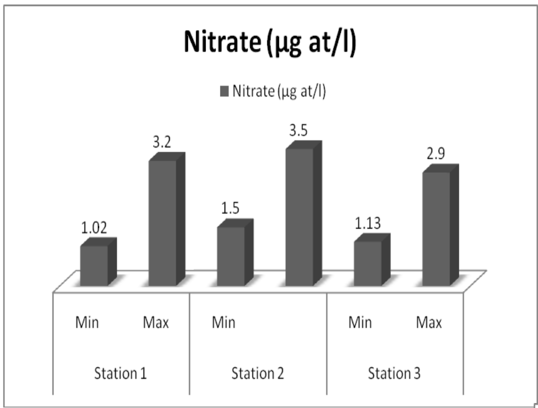
Parameters	Station 1		Station 2		Station 3	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**
Air_temp (^{0}C)	29	33	27	33	28	34
Water_temp (^{0}C)	27	30	26	32	26	32
pH	6.5	8.3	6.2	8.3	6.3	8.4
DO (mg/l)	5	6.5	4.6	6.9	4.8	6.7
TDS (ppm)	63.4	96.3	63.1	114	62.3	119.2
Conductivity (uS)	70.14	98.5	70.1	98.2	70.2	100.4
Turbidity (NTU)	4.1	607	4.2	49.1	5.1	56.8
Phosphate (µg at/l)	0.59	1.95	0.7	2.01	0.69	1.9
Nitrate (µg at/l)	1.02	3.2	1.5	3.5	1.13	2.9
Nitrite (µg at/l)	0.23	0.98	0.38	0.99	0.39	0.98
Silicate (µg at/l)	20.4	80.1	23	80.4	19.8	71.4

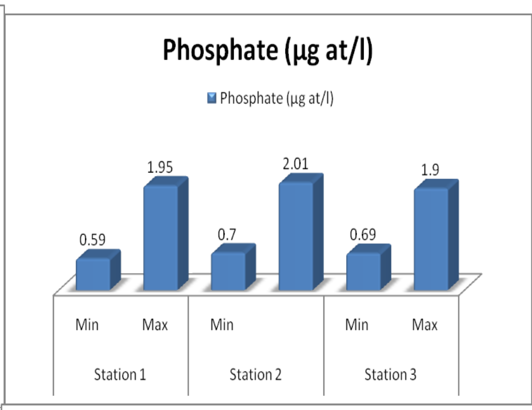


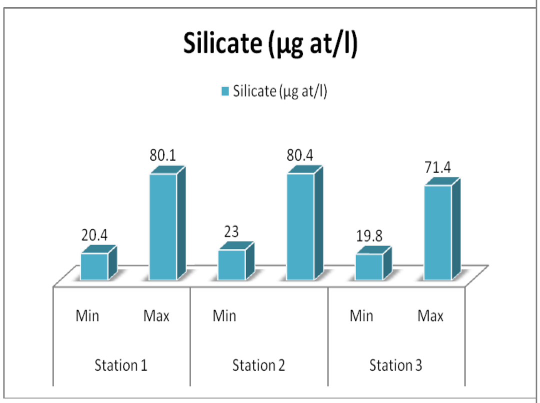


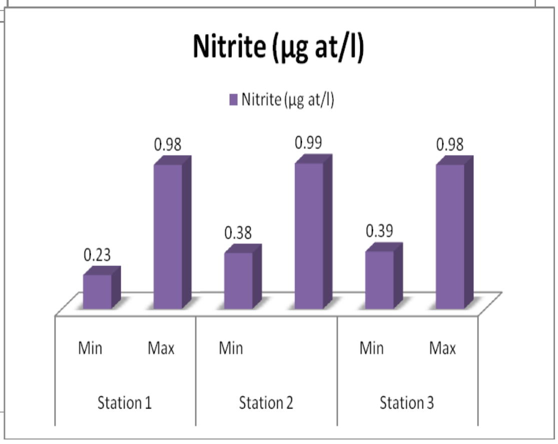


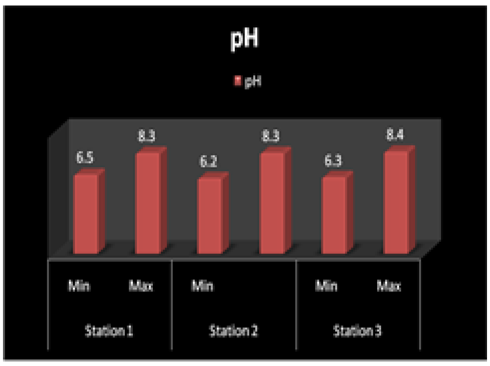


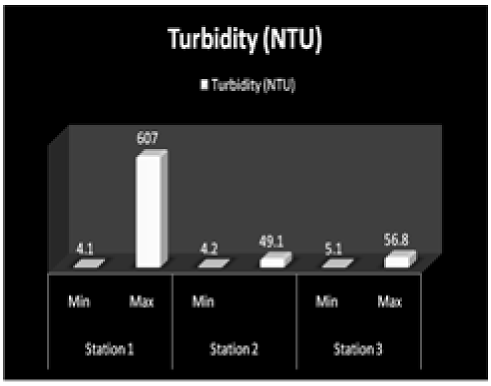

Nitrate (µg at/l)
Nitrate (µg at/l)
1.02
3.2
1.5
3.5
1.13
2.9
Min
Max
Min
Min
Max
Station 1
Station 2
Station 3

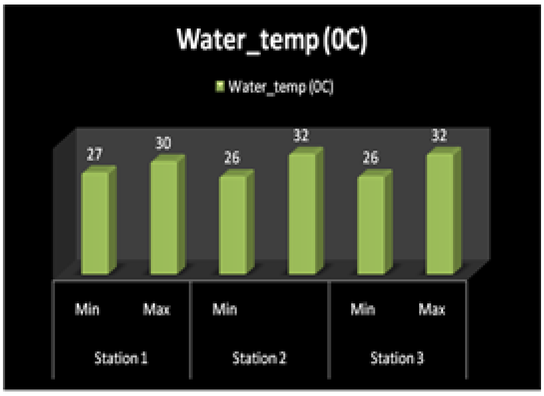

Phosphate (µg at/l)
Phosphate (µg at/l)
0.59
1.95
0.7
2.01
0.69
1.9
Min
Max
Min
Min
Max
Station 1
Station 2
Station 3


Silicate (µg at/l)
Silicate (µg at/l)
20.4
80.1
23
80.4
19.8
71.4
Min
Max
Min
Min
Max
Station 1
Station 2
Station 3


Nitrite (µg at/l)
Nitrite (µg at/l)
0.23
0.98
0.38
0.99
0.39
0.98
Min
Max
Min
Min
Max
Station 1
Station 2
Station 3


pH
pH
6.5
8.3
6.2
8.3
6.3
8.4
Min
Max
Min
Min
Max
Station 1
Station 2
Station 3


Turbidity (NTU)
Turbidity (NTU)
4.1
607
4.2
49.1
5.1
56.8
Min
Max
Min
Min
Max
Station 1
Station 2
Station 3



CONCLUSION:

The study revealed that there were variations in certain physico-chemical properties of Mudageri and Hotegali pond in Karwar, Uttara Kannada district of Karnataka state due to the surface run-off and other excessive human activities. All the physico-chemical characteristics were found within permissible limits as suggested by Zafer (1964) and Khan & Siddiqui (1971). Therefore, the present investigation based on scientific methodology clearly shows that the said study tank water can be easily used for drinking, agricultural purpose and aquaculture purpose.

ACKNOWLEDGEMENTS:

The authors are grateful to University Grants Commission, New Delhi for granting the Major Research Project and thankful to the Principal, Govt. Arts & Science College, Karwar for providing laboratory facilities.

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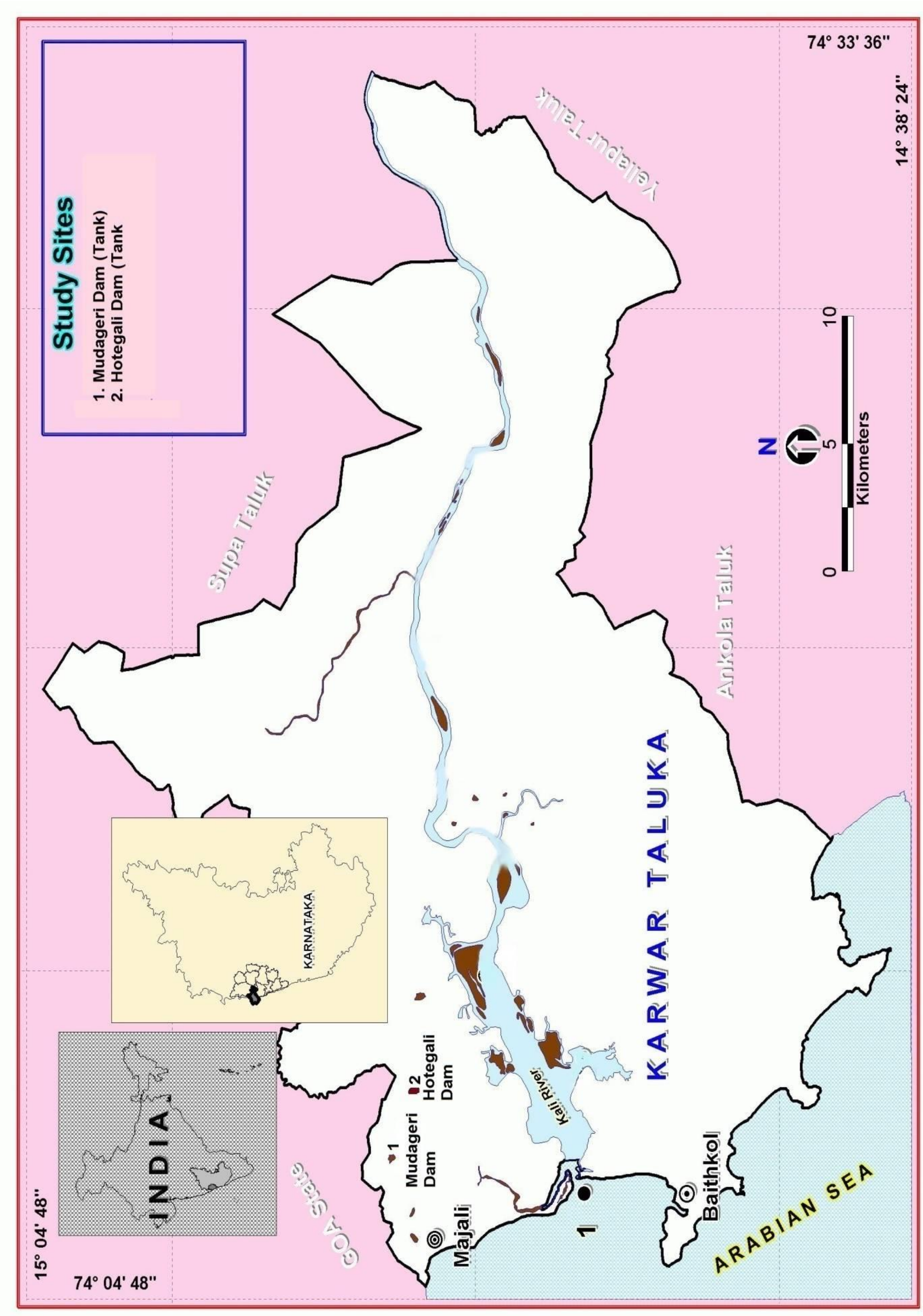

Map of Kali River Showing the position of Study Sites

Condition of station Mudageri Dam in Summer

Condition of station Mudageri Dam in Monsoon