



RESEARCH ARTICLE

ECO-PHYSIOLOGICAL STUDIES ON THREE LAKES OF KHAMMAM RURAL, TELANGANA, INDIA

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ABSTRACT

This paper deals with the study of eco-physiological parameters of three lakes presented in khammam rural, Telangana, India. For this purpose both physico-chemical and biological parameters were analysed for a period of one year from April 2013 to March 2014. According to APHA standard methods the results of analysis point out the fact that all the parameters are under permissible limits. The result indicates that all the lakes are good and can be used for domestic and irrigation purpose.

INTRODUCTION

The water is one of the most important compounds of the ecosystem. Living things exist on the earth because of this is only planet that has the existence of water. It is necessary for the survival of all living things be it plant or animal life. It is the most abundant commodities in nature (Swati Shrivastava, and Kanungo, 2013). Nowadays naturally existing dynamic equilibrium of water bodies like rivers, lakes and estuaries are affected by the human activities (Tamiru, 2004; Mahananda et al., 2010; Mehari and Mulu, 2013). In present scenario urban lakes are under direct threat of qualitative and quantitative degradation by means of pollution from both fixed-point and non-point sources. There are numerous sources of pollutants that could deteriorate the quality of water resources (Tamiru, 2004). Factors that are directly or indirectly polluting the lake ecosystems includes population growth, unplanned growth of city area, urbanization, agricultural land expansion and lack of awareness among the local residents. All such activities and pollution causing factors are decreasing the utility of water day by day (Tank and Chippa, 2013). Accessible man maid urban lakes and all other natural wetlands have gained the thrust of conservation in recent years due to their important functions in different hydrological processes. To take decisions and formulate policies concerning conservation, management and sustainable use of lakes and water resources, accurate spatial

inventory is required (Finlayson and Davidson, 1999). Thus, sequential and continuous interpretation of physical, chemical and biological status of water quality and characterisation of the pollution sources along with quantitative contribution of significant pollution causing parameters is important for demeanour pollution control management of urban lakes (Zhou et al., 2011). This will generate baseline data of water resources to evaluate the rate of change in water quality over a period of time.

Study area

Khammam District is a district in Telangana, India. It had a population of 2,565,412 of which 19.81% were urban as of 2001 census. Khammam town is the district headquarters. In our investigation we have taken lakes which are as follows....

Lake-1: MuthagudamCheruvu

Name of Source: MuthagudamCheruvu, Khammam  
Location: Lat: 16<sup>0</sup>-24'-5" long: 76<sup>0</sup> - 32'-25"  
Major Basin: Krishna  
Sub-Basin: Muneeru

Lake-2: YedulapuramCheruvu

Name of Source: YedulapuramCheruvu, Khammam  
Location: Lat: 16<sup>0</sup>-24'-5" long: 76<sup>0</sup> - 32'-25"  
Major Basin: Krishna  
Sub-Basin: Muneeru

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**Lake-3: PollepalliCheruvu**

Name of Source: Pollepallicheruvu, Khammam

Location: Lat: 16°-24'-5" long: 76° - 32'-25"

Major Basin: Krishna

Sub-Basin: Muneeru

period of 1 year from April 2013 to March 2014. The samples were analyzed on the same day for different physico-chemical factors following the standard methods (APHA, 1995). One liter of the sample was kept in sedimentation columns after adding 4% Formaldehyde solution for the frequency measurements of different species of algae at each station, the drop method (Pearsall *et al.*, 1946).

**MATERIALS AND METHODS**

The water samples from the surface were collected from the three sampling stations every month in polythene cans for a

**RESULTS**

The results are represented in tabular format

**Physico-Chemical parameters at Lake-1: MuthagudamCheruvu**

	13-Apr	13-May	13-Jun	13-Jul	13-Aug	13-Sep	13-Oct	13-Nov	13-Dec	14-Jan	14-Feb	14-Mar
Temp	27	29	26	24	25	24	24	23	22	22	21	24
pH	8.3	8.4	8.3	8.3	8.2	8.3	8.2	8.3	8.3	8.4	8.3	8.2
CO <sub>3</sub> -2	20	14	16	18	14	16	24	42	38	32	30	28
HCO <sub>3</sub> -	268	249	248	154	168	148	268	280	145	168	169	158
Cl	26.2	29.4	31.1	20.1	19.5	18.9	17.2	21.2	21.6	21.5	22.4	28.1
DO	7.9	7.5	8.2	8.6	8.4	8.4	8.6	8.3	9.6	9.8	10.4	9.2
BOD	4.8	5.2	4.6	4.6	4.8	4.6	3.8	3.7	4.5	4.3	3.8	3.6
COD	135	146	58	150	60	32	65	28	140	284	200	125
OM	4.5	4.6	3.5	2.6	2.1	2.1	1.5	2.9	2.8	4.7	2.1	1.9
T.H	105	112	105	81	76	84	73	100	134	154	142	154
Ca <sup>++</sup>	39	41	42	39	18	15	21	32	35	31	30	34
Mg <sup>++</sup>	29.4	29.2	26.9	15.6	9.5	19.8	21.5	31.2	31.6	31.5	32.1	32.2
SO <sub>4</sub> -2	0.7	0.7	0.4	0.2	0.3	0.5	0.4	0.4	0.5	0.4	0.5	0.4
PO <sub>4</sub> -3	0.1	0.4	0.1	0.7	0.3	0.9	0.8	0.6	0.5	0.2	0.3	0.1
NO <sub>3</sub> -	0.8	0.8	0.1	0.8	0.4	0.1	0.9	0.4	0.6	0.5	0.6	0.8
NO <sub>2</sub> -	0.5	0.7	0.1	0.2	0.8	0.1	0.5	0.1	0.6	0.4	0.4	0.5
T.S	435	568	354	400	406	587	452	524	310	476	462	462
D.S	259	354	168	180	226	362	298	286	189	268	205	368
S.S	141	241	132	100	286	185	256	210	224	302	235	295
Na <sup>+</sup>	18.6	20.6	15.6	11.2	11.6	10.2	11.3	11.6	17.2	14.3	14.6	14.1
K <sup>+</sup>	3.1	3.4	5.2	4.5	4.2	3.1	2.6	2.5	2.3	3.4	2.2	2.6

CO<sub>3</sub>-:Carbonates, HCO<sub>3</sub>-:Bicarbonates, Cl:chlorides, DO:DisolveOxygen, BOD:BiologicalOxygendemond, COD:ChemicalOxygendemond, O.M.:Organic matter, T.H.:TotalHardness, CA+2:Calcium, MG+2; Magnesium, SO<sub>4</sub>-2:Sulphates, PO<sub>4</sub>-3:phaspatates, NO<sub>3</sub>-2:Nitrates, NO<sub>2</sub>-:Nitrite, TS:TotalSolids, D.S:DlssolveSolids, S.S.:SuspendedSolids, Na+:Sodium, K+:Potassium

**Physico-Chemical parameters at Lake-2: YedulapuramCheruvu**

	13-Apr	13-May	13-Jun	13-Jul	13-Aug	13-Sep	13-Oct	13-Nov	13-Dec	14-Jan	14-Feb	14-Mar
Temp	27	29	27	27	25	24	25	23	22	21	22	24
pH	8.1	8.3	8.2	8.2	8.1	8.2	8.3	8.2	8.3	8.2	8.3	8.4
CO <sub>3</sub> -2	24	26	18	16	20	22	24	26	28	32	30	28
HCO <sub>3</sub> -	176	200	225	254	264	205	214	189	168	187	197	200
Cl	28.4	31.2	19.8	17.1	18.6	17.6	19.4	21.5	26.5	25.4	28.8	29.7
DO	8.4	8.3	8.1	8.2	7.9	7.6	8.1	9.5	9.6	11.2	11	9.5
BOD	4.5	4.1	4.2	5.1	4.8	4.2	3.8	4.6	4.6	3.5	3.6	4.2
COD	32	154	221	154	50	23	26	154	282	200	122	154
OM	2.7	3.4	2.5	2.5	1.5	1.5	1.8	1.5	3.1	3.5	3.6	4.5
T.H	95	100	102	82	76	83	91	121	124	131	135	122
Ca <sup>++</sup>	41	42	43	19	18	21	19	31	28	29	40	41
Mg <sup>++</sup>	22.2	24.1	21.3	9.2	8.6	15.6	14.5	15.6	34.2	36.1	31.9	35.1
SO <sub>4</sub> -2	0.5	0.2	0.3	0.4	0.5	0.5	0.6	0.4	0.4	0.5	0.5	0.5
PO <sub>4</sub> -3	0.1	0.1	0.1	0.6	0.8	0.6	0.7	0.8	0.8	0.8	0.1	0.1
NO <sub>3</sub> -	0.3	0.6	0.3	0.8	0.6	0.8	0.5	1.7	0.6	0.8	0.9	0.6
NO <sub>2</sub> -	0.6	0.8	0.1	0.9	0.4	0.1	0.6	0.5	0.4	0.5	0.5	0.6
T.S	453	476	365	400	420	495	435	562	324	468	465	486
D.S	300	257	306	305	298	265	235	316	135	359	298	205
S.S	261	102	154	215	241	253	165	148	124	152	200	155
Na <sup>+</sup>	17.9	20.1	10.2	9.2	10.2	10.9	12.8	15.6	19.1	18.6	18.4	18.6
K <sup>+</sup>	2.1	2.9	6.5	4.6	4.2	6.5	4.3	5.4	2.3	2.1	2.6	2.8

CO<sub>3</sub>-:Carbonates, HCO<sub>3</sub>-:Bicarbonates, Cl:chlorides, DO:DisolveOxygen, BOD:BiologicalOxygendemond, COD:ChemicalOxygendemond, O.M.:Organic matter, T.H.:TotalHardness, CA+2:Calcium, MG+2;Magnesium, SO<sub>4</sub>-2:Sulphates, PO<sub>4</sub>-3:phaspatates, NO<sub>3</sub>-2:Nitrates, NO<sub>2</sub>-:Nitrite, TS:TotalSolids, D.S:DlssolveSolids, S.S.:SuspendedSolids, Na+:Sodium, K+:Potassium

## Physico-Chemical parameters at Lake-3: PollepalliCheruvu

	13-Apr	13-May	13-Jun	13-Jul	13-Aug	13-Sep	13-Oct	13-Nov	13-Dec	14-Jan	14-Feb	14-Mar
Temp	25	29	27	25	24	25	23	22	21	22	23	26
pH	8.3	8.2	8.3	8.1	8.3	8.2	8.3	8.2	8.1	8.1	8.1	8.1
CO <sub>3</sub> -2	18	16	24	22	18	20	24	36	48	36	26	20
HCO <sub>3</sub> -	275	260	286	98	106	208	225	240	264	256	268	272
Cl	29.1	31.2	20.1	18	17.2	19.6	18.2	18.7	21.5	22.6	22.5	21.5
DO	9.1	7.8	7.6	8.4	8.2	8.4	7.9	8.6	9.1	11.0	10.5	9.5
BOD	5.1	4.4	4.6	4.9	4.2	3.9	4.6	0.6	3.2	3.4	3.4	4.2
COD	32	165	206	187	52	36	32	35	156	296	215	152
OM	4.9	4.8	4.3	1.9	1.5	1.6	1.2	1.4	3.4	3.5	3.2	4.2
T.H	90	108	98	82	79	81	124	164	145	120	100	98
Ca <sup>++</sup>	36	43	36	19	18	17	19	26	29	24	31	40
Mg <sup>++</sup>	22.4	21.9	9.6	10.6	16.5	19.5	19.8	24.5	26.2	31.8	32.1	29.5
SO <sub>4</sub> -2	0.5	0.6	0.4	0.1	0.2	0.1	0.1	0.2	0.4	0.4	0.2	0.4
PO <sub>4</sub> -3	0.1	0.1	0.5	0.5	0.1	0.7	0.6	0.9	0.8	0.1	0.1	0.1
NO <sub>3</sub> -	0.8	0.1	0.2	0.1	0.6	0.5	0.4	0.1	1.0	0.4	0.2	0.4
NO <sub>2</sub> -	0.7	0.1	0.8	0.1	0.4	0.1	0.5	0.6	0.3	0.5	0.5	0.1
T.S	426	565	325	421	421	459	486	562	321	469	465	469
D.S	264	326	294	356	254	326	295	254	154	141	198	294
S.S	125	254	168	198	221	254	206	106	69	89	102	121
Na <sup>+</sup>	26.9	20.6	9.5	11.2	12.5	10.2	12.1	10.2	11.2	11.2	10.5	11.6
K <sup>+</sup>	3.4	3.2	2.9	2.5	2.6	2.6	2.6	2.8	2.4	2.3	2.5	2.2

CO<sub>3</sub>-Carbonates, HCO<sub>3</sub>-Bicarbonates, Cl:chlorides, DO:DisolveOxygen, BOD:BiologicalOxygendemond, COD:ChemicalOxygendemond, O.M.:Organic matter, T.H.:TotalHardness, CA+2:Calcium, MG+2:Magnessium, SO<sub>4</sub>-2:Sulphates, PO<sub>4</sub>-3:phaspates, NO<sub>3</sub>-2:Nitrates, NO<sub>2</sub>-:Nitrite, TS:TotalSolids, D.S:DissolveSolids, S.S.:SuspendedSolids, Na<sup>+</sup>:Sodium, K<sup>+</sup>:Potassium

## Distribution of phytoplanktonsat Lake-1: MuthagudamCheruvu

	Summer	Rainy	Winter	Average
Cyanophyceae	29.11	72.85	47.78	49.8
Chlorophyceae	52.71	23.07	38.99	38.2
Bacillariophyceae	12.9	3.6	8.05	8.18
Euglenophyceae	5.38	1.52	5.15	4

## Distribution of phytoplanktonsat Lake-2: YedulapuramCheruvu

	Summer	Rainy	Winter	Average
Cyanophyceae	29.11	72.85	47.78	49.8
Chlorophyceae	52.71	23.07	38.99	38.2
Bacillariophyceae	12.9	3.6	8.05	8.18
Euglenophyceae	5.38	1.52	5.15	4

## Distribution of phytoplanktonsat Lake-3: PollepalliCheruvu

	Summer	Rainy	Winter	Average
Cyanophyceae	31.05	69.25	45.05	48.45
Chlorophyceae	51.25	24.03	36.35	37.21
Bacillariophyceae	13.05	4.7	9.65	9.13
Euglenophyceae	4.65	2.02	8.95	5.2

## DISCUSSION AND CONCLUSION

The result of this analysis, point out the fact that all the parameters are under permissible limits. The result indicates that all the lakes are good and can be used for domestic and irrigation purpose.

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