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Numerical Analysis of Dah Lake Water, Ballia, Uttar Pradesh, India

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Abstract

Water is very important for extant the life of all living person and animals. The current manuscript is associated to Dah lake water. Lake water is polluted by undesirable things. This research deals with the dissolution of Physico-chemical parameters of Dah lake water such as potential of Hydrogen (pH), Turbidity (TD), Electric Conductivity (EC), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Total Alkalinity (TA), Chloride (CL), Total Hardness (TH), Calcium (Ca) and Magnesium (Mg). After analysis it is concluded that the Dah lake water is not condign for drinking purposes because some attributes are not satisfying the desirable limits prescribed by WHO. The attributes are numerically interpreted using Cluster Analysis, Correlation matrix, factor Analysis and Data matrix which shows that lake water is unfit for drinking purposes. Hence discreet quantification should be encouraged so that the lake water will be fit for drinking purposes and survival of animals.

Key words: Dah Lake,

1. Introduction

Water is the very useful for survival of life[2][3][4]. Without water nobody can be survived. To maintain the ecosystem water is very essential. The health of lakes and their biological diversity are directly related to health. Dah Lake water is devalued through the unsought liveliness of human and animals. Thus the lake water is confiscating dissonant for drinking.The main point is to identify the attributes quality whether they are under limits of WHO or not. If suitable precaution is refined then the lake water will be suitable for drinking and domestic purposes.

2. Materials and Methods

2.1 Study Area

Dah Lake is ox-bow lake in Ballia. During rainy season, it overflows though a scanty negligible lake but becomes confluent with several large low lying areas and also establishes continuity with the river Ghaghara. The Lake receives water through two streamlets via Bhedia nala and Nara.

2.2 Collection of Specimen:

Specimens were brought from selected points in volatile carafe to ignore surrounding climate as per usual practice.

2.3 Investigation of Samples:

The attributes are examined for different attributes such as as potential of Hydrogen (pH), Turbidity (TD), Electric Conductivity (EC), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Total Alkalinity (TA), Chloride (CL), Total Hardness (TH), Calcium (Ca) and Magnesium (Mg) as per the standard methods (APHA, 1998)[7][8]. The experimental of values of the attributes of water quality characterization are shown in table 2 and WHO standard of the attributes are shown in Table 1. The attributes of the Dah lakes are graphically presented in Fig 1, Fig 2 and Fig 3. In Fig 1 scattered plots are represented. In Fig 2 Box plots are represented and in Fig 3 Pie graphs are represented.

Table 1: Standard value of attributes.

Attributes	Standard value according to WHO
pH	6.5–8.5
Turbidity (TD)	1-5 (NTU)
Electric Conductivity (EC)	300 (µmhos/cm)
Biochemical Oxygen Demand (BOD)	6 (mgL^{-1})
Chemical Oxygen Demand (COD)	10 (mgL^{-1})
Dissolved Oxygen (DO)	6-8 (mgL^{-1})
Total Alkalinity (TA)	80-120 (mgL^{-1})
Chloride (CL)	200-300 (mgL^{-1})
Total Hardness (TH)	80-100 (mgL^{-1})
Calcium (Ca)	20-30 (mgL^{-1})
Magnesium (Mg)	10 (mgL^{-1})

WHO–World Health Organization

Table 2: Water Quality at of Dah Lake water

Name of Station	pH	TD (NTU)	EC µmhos /cm	COD (mgL^{-1})	BOD (mgL^{-1})	DO (mgL^{-1})	TA (mgL^{-1})	Cl (mgL^{-1})	TH (mgL^{-1})	Ca (mgL^{-1})	Mg (mgL^{-1})
S1	7.95	8.42	38.22	4.34	2.0	7.98	202	164	98	74.4	18.9
S2	7.48	7.67	35.32	3.96	1.86	7.68	188	124	88	67.8	19.0
S3	7.72	7.56	28.42	3.78	1.89	6.92	179	146	69	56.2	17.5
S4	7.89	8.22	22.46	3.67	1.67	6.89	182	134	76	66.9	14.6
S5	7.42	7.45	32.42	3.86	1.78	7.82	192	156	87	77.2	18.2
S6	7.82	6.96	28.50	3.56	1.56	6.66	176	132	95	62.6	13.5

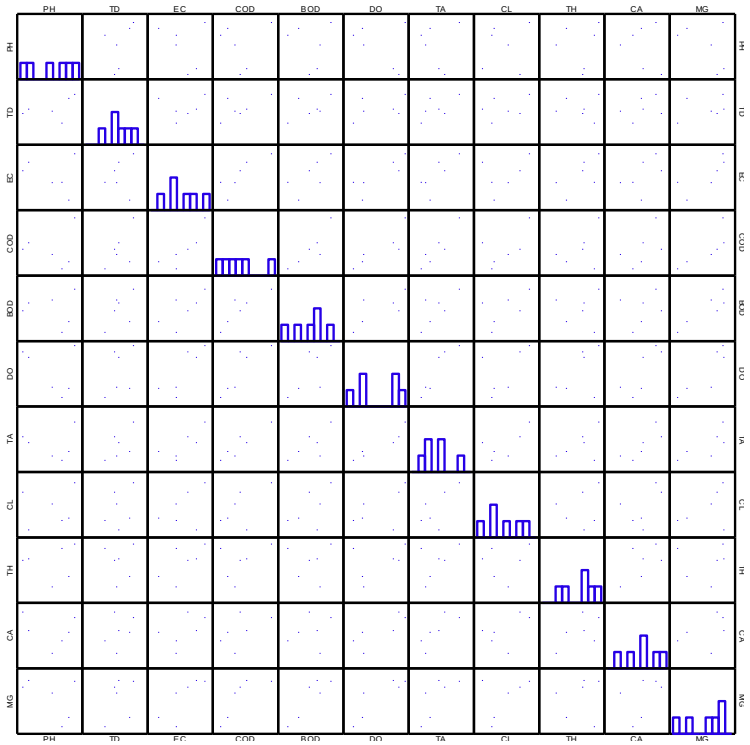

Figure 1: Scatter Plot Matrix

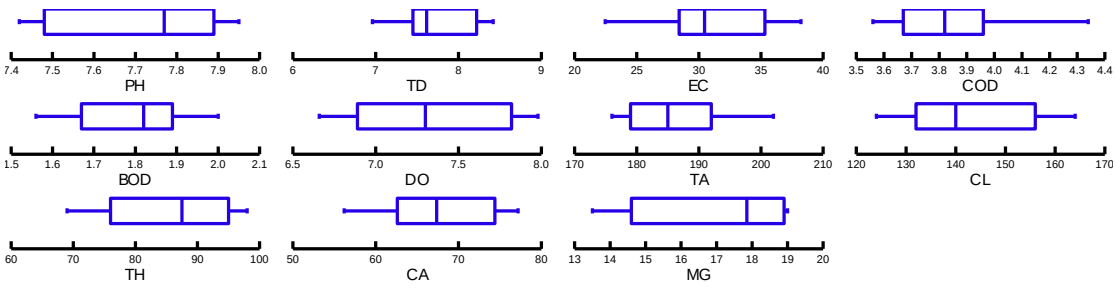

Figure 2: Box Plots

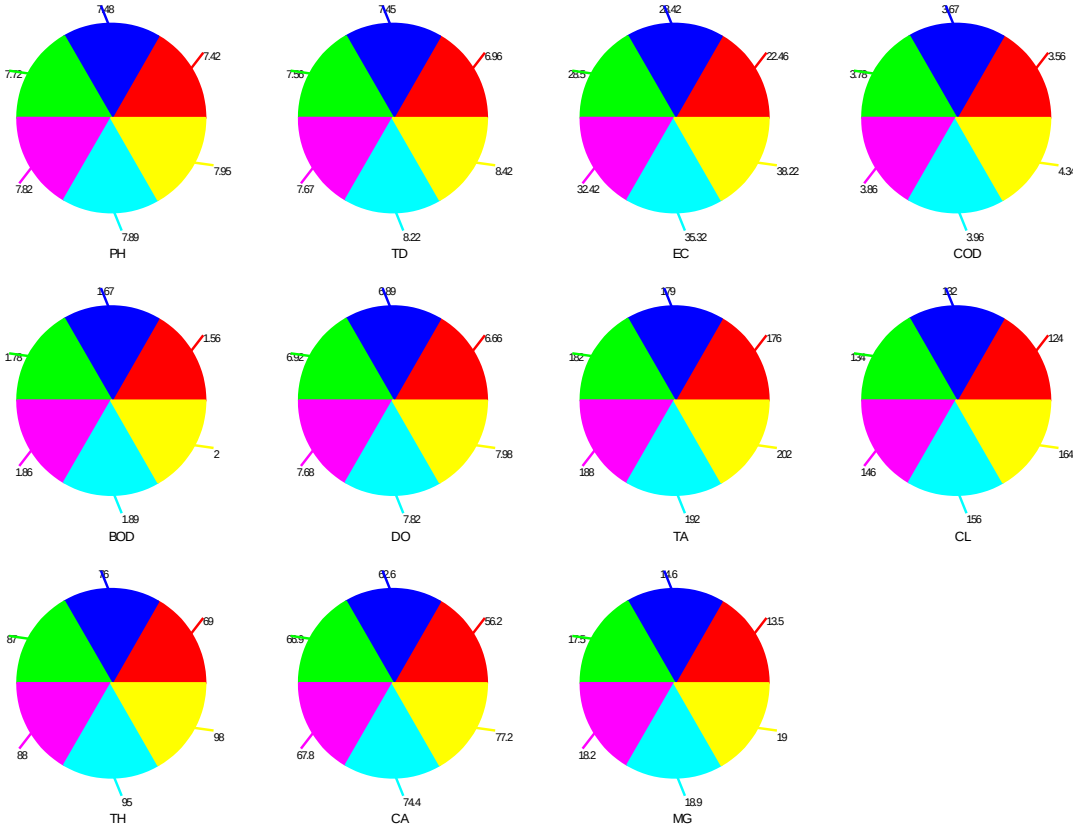

Figure 3: Pie Graphs

3 Results and Discussion:

Disparateness of numerous attributes such as potential of Hydrogen (pH), Turbidity (TD), Electric Conductivity (EC), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Total Alkalinity (TA), Chloride (CL), Total Hardness (TH), Calcium (Ca) and Magnesium (Mg) impregnation along the Dah Lake water are listed in Table 3. Some attributes are not satisfying the standard limit prescribed by WHO. Thus the results clearly mentioned that water is not suitable for drinking purposes. Using IBM SPSS 21 software Cluster analysis is applied and a Dendogram is shown in Fig 4 and Component plot is shown in Fig 5. There are two topographically consistent clusters are created. Propound result clears that the results are not similar in cluster 2 and cluster 1.Component plot shows that maximum loading in third component. That is dissimilarity in loading also. Factor analysis is also performed using Systat 13 software and data matrix is shown in Fig 6 and corresponding loading plot is shown in Fig 7. This also enables us that the attributes are different in nature. Correlation matrix also performed using Microsoft Excel 7 software which shows the relationship between the attributes and it cleared that some attributes are negatively correlated and some attributes are positively correlated. Overall from the above discussion it is clear that Dah Lake is not suitable for drinking purposes. So suitable precaution is needed.

Table 3: Correlation Matrix

	PH	*TD*	*EC*	*COD*	*BOD*	*DO*	*TA*	*CL*	*TH*	*CA*	*MG*
PH	1										
TD	0.4511344	1									
EC	-0.2449528	0.1662337	1								
COD	0.0809301	0.6557244	0.8424037	1							
BOD	-0.0504377	0.5791009	0.7034235	0.8826215	1						
DO	-0.3618281	0.4385993	0.8416726	0.8614312	0.7174251	1					
TA	-0.0248034	0.6353586	0.7788214	0.9316495	0.7231858	0.9375171	1				
CL	0.1693676	0.3788289	0.42605	0.6171757	0.5620834	0.5403642	0.681357	1			
TH	0.0954596	-0.0375073	0.6491447	0.430007	0.0101898	0.4560555	0.5115702	0.1943584	1		
CA	-0.2369575	0.3638816	0.5161961	0.5569395	0.2366161	0.8092897	0.8154736	0.4934544	0.5802037	1	
MG	-0.4552166	0.3670839	0.7901734	0.8082377	0.899862	0.866382	0.7397896	0.4399459	0.0912764	0.4276012	1

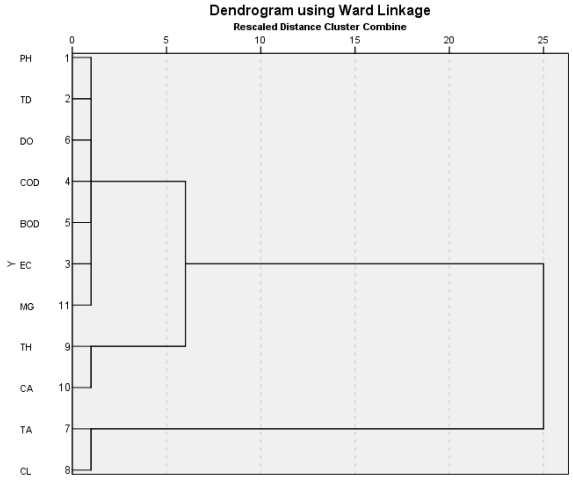

Figure 4: Dendrogram using Ward Linkage

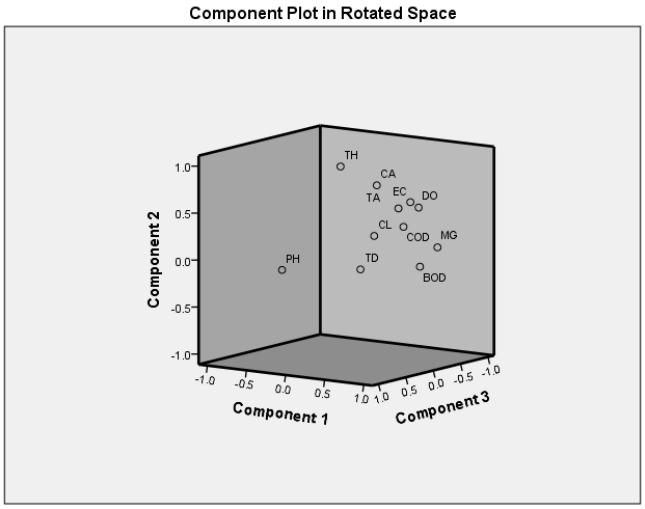

Figure 5: Component Plot

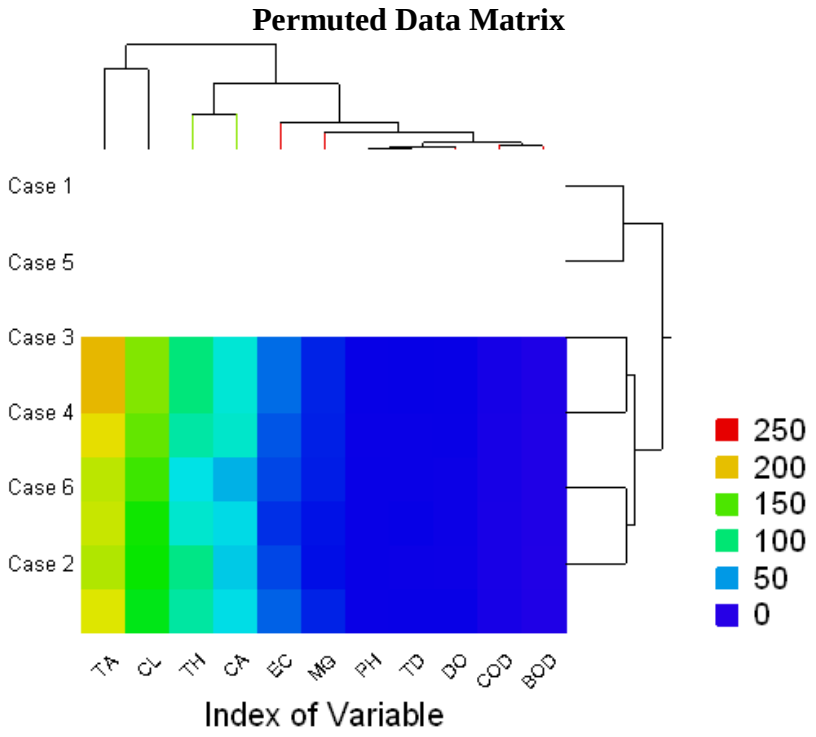

Figure 6: Data Matrix Plot

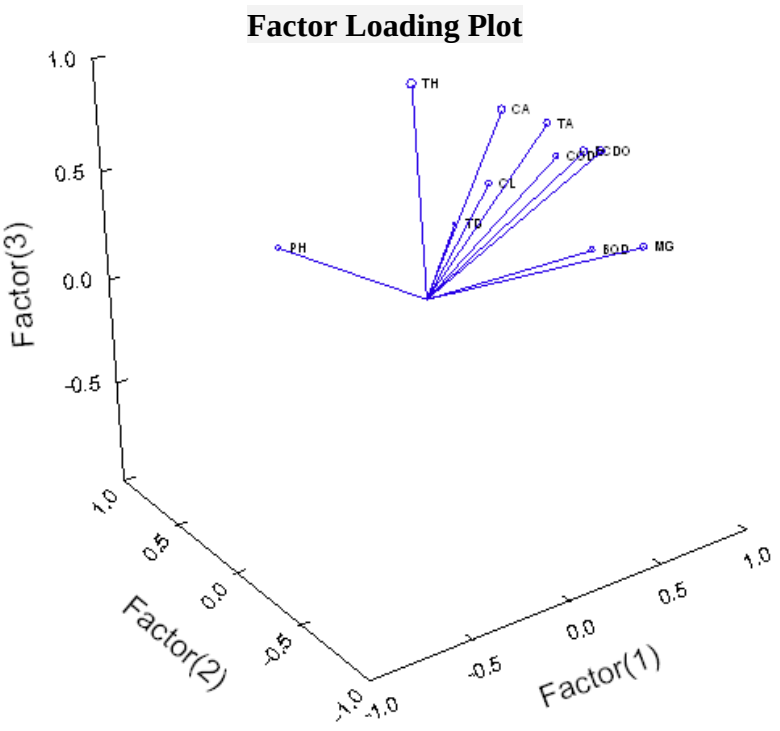

Figure 7: Factor Loading Plot

Conclusion

It is concluded that the water of Dah Lake is unfit for drinking purposes. So suitable steps should be required so that it will be perfect for drinking and domestic purposes.

Conflict of interest:

There is no conflict of interest regarding this research paper.

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