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Study on Water Quality of Kaveri River near Bhavani, Tamil Nadu, India

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Abstract:

The present study is enfolded on the tenacity of Physico-Chemical Parameters such as Chloride (Cl), Total solids (TS), Total Suspended Solids (TSS), pH (pH), Electric Conductivity (EC), Total Dissolved Solids (TDS), Total Hardness (TH), Phosphet (P), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Sulphate (S) of water samples from various sampling points near Bhavana.
Upsurge of impurity absorption demonstrate the upsurge of desecration load due to domestic sewage and industrial waste and anthropogenic exercises and freed of wastes into river. Statistical analysis like Pearson Correlation matrix and Factor loadings were implemented to the data set to know the relationship among the studied parameters.

Key words: Kaveri River, Bhavani, WHO.

Introduction:

Water is one of the most plausible and pivotal wealth on earth [1,2,5,6,8,9]. Water exiguity is accumulating worldwide and burden on the actual water resources is increasing due to thriving exaction of diverse category such as domiciliary, agronomy etc. Lakes are one of the relevant water resources used for irrigation, drinking, fisheries and flood control prospect[6,13].
A correlation matrix is simply a table which exhibits the correlation coefficients for different variables. The matrix represents the correlation between all the possible pairs of values in a table. It is a vivid tool to summarize a large dataset and to identify and visualize patterns in the given data. A correlation matrix contains of rows and

columns that show the variables. Each cell in a table contains the correlation coefficient.
Cluster Analysis is the method to find similar groups of objects in order to form clusters. It is an unsupervised machine learning-based algorithm that acts on unlabelled data. A group of data points would incorporate together to form a cluster in which all the objects would belong to the same group

Study Area:
Bhavani is located at 11.45°N 77.68°E. It has an average elevation of 193 metres (633 feet). It lies at the confluence of the rivers Kaveri, the largest river in Tamil Nadu and Bhavani, the second largest river in Tamil Nadu, with the invisible mystic Sarasvati River. Hence this place is known as the Triveni Sangam of South.

Sample collection:
Water samples were collected from four sampling stations namely Bhavani, Komarpalayam, Lakshmi Nagar and Pallipalayam. Samples were collected in sterile glass bottles to avoid unforeseeable changes in characteristic as per standard procedure American Public Health Association (APHA, 1998).

Investigation of Samples:
The collected samples were analyzed for different physico-chemical parameters such as Chloride(Cl), Total solids(TS), Total Suspended Solids(TSS), pH(pH), Electric Conductivity(EC), Total Dissolved Solids (TDS), Total Hardness(TH), Phosphet(P), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand(COD) and Sulphate (S) as per the standard methods (APHA, 1998)[10,11].

Results and discussion:
The diversification of various attributes such as Chloride(Cl), Total solids(TS), Total Suspended Solids(TSS), pH(pH), Electric Conductivity(EC), Total Dissolved Solids (TDS), Total Hardness(TH), Phosphet(P), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand(COD) and Sulphate (S) concentrations at the diverse locations along the Kaveri river water are listed in Table 1 and shown in Fig. 1. Agglomeration Schedule has adapted using IBM SPSS 21 software and tabulated in Table 3. Cluster analysis has performed by IBM SPSS 21 software and a Dendogram is shown in Fig 2. There are two statistically significant clusters are formed. Present study reveals that there is a difference in the physico-chemical properties of cluster 2 and cluster 1. Correlation matrix has performed within the studied attributes using Microsoft Excel 7 software and tabulated in Table 2 for determining the relationship between the physico-chemical variables.[16] The analysis yielded positive correlations occurred between some attributes and negative correlations occurred between some attributes.

Table 1. Water Quality at different locations of Kaveri River (Laboratory Analysis)

Name of Area	Cl (mg/L)	TS (mg/L)	TSS (mg/L)	pH	EC (mS/cm)	TDS (mg/L)	TH (mg/L)
Bhavani	260	1488	630	7.68	694	904	220
Komarpalayam	240	1460	558	7.54	704	908	180
Lakshmi Nagar	220	1500	530	7.36	674	1006	170
Pallipalayam	300	1520	670	7.84	894	1002	260

Name of Area	P (mg/L)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	S (mg/L)
Bhavani	5.06	5.08	24	266	28.56
Komarpalayam	5.36	5.42	22	288	36.42
Lakshmi Nagar	5.44	5.56	25	268	32.56
Pallipalayam	6.00	5.44	35	308	58.44

Table 2. Pearson Correlation Matrix for the Samples

	Cl	*TS*	*TSS*	*pH*	*EC*	*TDS*	*TH*	*P*	*DO*	*BOD*	*COD*	*S*
Cl	1											
TS	0.5601798	1										
TSS	0.9673553	0.5417042	1									
pH	0.9796957	0.416438	0.9784372	1								
EC	0.9098849	0.6641805	0.7862251	0.8167372	1							
TDS	0.1344228	0.8053019	0.0149988	-0.0639936	0.4545756	1						
TH	0.9846821	0.6461167	0.9859233	0.9624209	0.8683677	0.1731729	1					
P	0.6093377	0.6691323	0.4152256	0.4505322	0.8828539	0.7419807	0.5545648	1				
DO	-0.2698272	0.1959375	-0.4808241	-0.4362826	0.1539099	0.7258267	-0.3321877	0.5970893	1			
BOD	0.8241407	0.8702057	0.726546	0.6948765	0.9450534	0.6715986	0.8310712	0.8886976	0.2257196	1		
COD	0.7385202	0.3293282	0.5455295	0.6590959	0.899964	0.3115231	0.6277142	0.8676573	0.3358755	0.7440286	1	
S	0.7941155	0.6140117	0.6230777	0.6760444	0.9727702	0.5460983	0.729782	0.9580175	0.3675703	0.9145997	0.9471911	1

Table 3. Agglomeration Schedule for the Samples

Agglomeration Schedule						
Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	8	9	.166	0	0	2
2	4	8	13.092	0	1	5
3	10	12	430.750	0	0	5
4	1	11	2784.750	0	0	6
5	4	10	6486.160	2	3	9
6	1	7	17364.160	4	0	9
7	3	5	65526.160	0	0	8
8	3	6	296798.827	7	0	10
9	1	4	702874.298	6	5	11
10	2	3	2294868.631	0	8	11
11	1	2	9882935.042	9	10	0

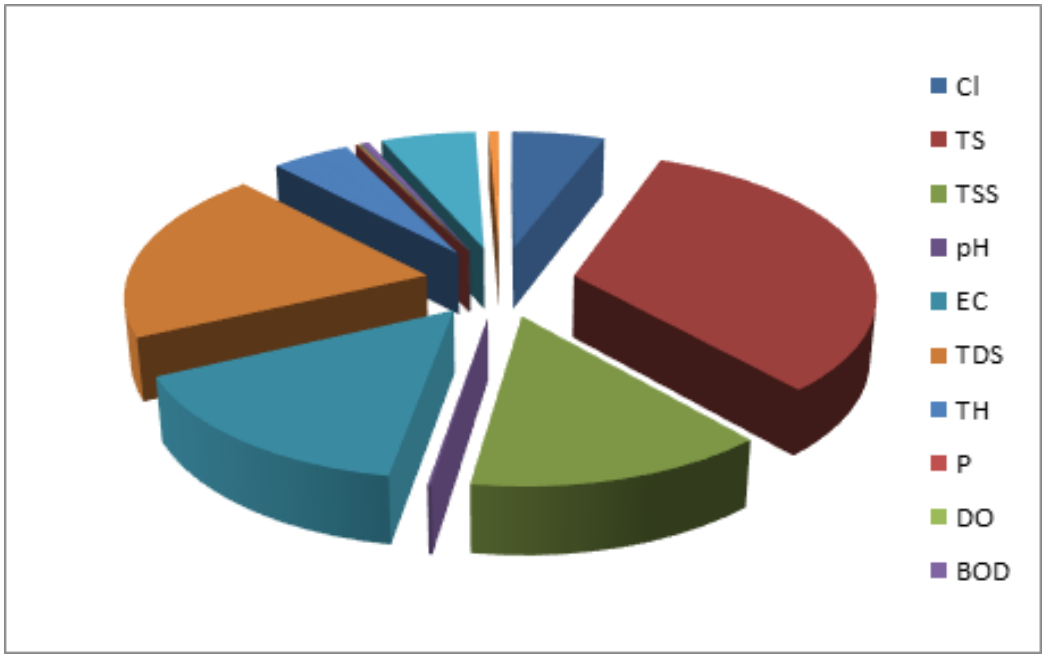

Figure 1: Graphical representation of Samples

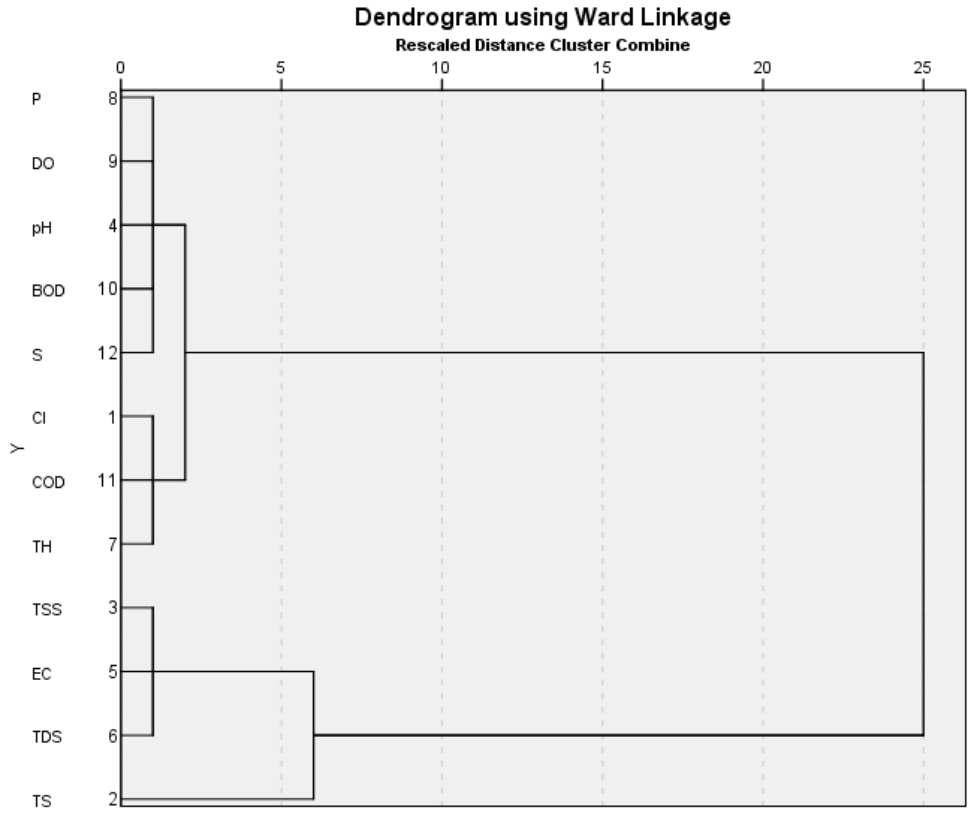

Figure 2: Dendrogram using Ward Linkage

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