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Correlation Matrix and Regression Equation of Different Water Quality Parameters in Winter Season (*Osamanbad taluka*)

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ABSTRACT

A systematic study of correlations among the water quality parameters has been carried out and regression equations were developed. The parameters studied were P^H, TDS, Conductivity, nitrite, sulphate, phosphate, dissolved oxygen, Hardness, Chlorides, carbon dioxide, MPN, Na, K and COD.

Keywords- regression equations, correlations water quality parameters, osmanabad.

I. INTRODUCTION

The groundwater is clear and colourless but when water seeps down the ground, it dissolves inorganic salts. Thus this water is harmful than the surface water. Generally ground water is free from bacteria and other living organism because they are filtered out while percolating through the sub soil. Most usable groundwater is shallow groundwater that occurs at less than 750 m dept and constitutes the largest freshwater reservoir for humans. The deeper groundwater reservoir from 750 to 4000 m, but a large part of this is saline water with a high concentration of dissolved salts. Ground water pollution causes damage to soil, plants and animals. Polluted groundwater is the cause for the spread of epidemics and chronic diseases in man. It causes typhoid, jaundice, dysentery, diarrhoea, tuberculosis, and hepatitis. Water contaminated by fibres (asbestos) causes fatal diseases like asbestosis and lung cancer. It affects soil fertility by killing bacteria and soil microorganisms. It also affects on plant metabolism severely and disturbs the whole ecosystem.

II. EXPERIMENTAL

The chemicals used for analysis is A. R. grade from S. D. fine chemicals Ltd. Doubly distilled water was used to prepare solutions. The solutions were standardized as per methods given the literature. The methods of analysis were used as described in the literatures. A computer programme was used to calculate co-operation coefficient.

III. METHOD

Find the relationship between two parameters x and y the Karl Pearson's correlation co-efficient r is used and is as follows:

$$r = n \Sigma x y - \Sigma x \Sigma y$$
$$r = [n \Sigma x^2 - (\Sigma x)^2] \; [n \Sigma y^2 - (\Sigma y)^2]$$

Where,
r = correlation coefficient
n = number of data points
x = values of x- variable
y = values of y- variable

To evaluate the straight-line by linear regression, the equation of straight line can be used.

$$y = ax + b$$

Where,
y = dependents variable and
x = independent variable

To obtain the regression line y on x, the slope of the line (a) and the intercept on the y-axis (b) are given by the following equation.

$$a = n \Sigma x y - \Sigma x \Sigma y$$
$$a = n \Sigma x^2 - (\Sigma x)^2$$
$$b = y - ax$$

Where,
x = the mean of all values of x and y is the mean of all values of y

IV. RESULT AND DISCUSSION

The samples from seven main stations were collected in winter seasons. The samples were analysed for physicochemical parameters and the conductance of water was correlated with other parameters. The correlation matrix is shown in Table 1 for Osmanabad taluka in winter season.

Table 1: Correlation matrix of different water quality parameters (Winter)

Parameters	Cond	pH	TDS	Nitrite	Sulphate	Phosphate	DO	Hardness	Chlorides	Carbon dioxide	MPN	Sodium	Potassium
Conductivity	1.0000												
pH	0.1619	1.0000											
TDS	0.2295	0.2224	1.0000										
Nitrite	-0.1608	-0.1631	-0.4646	1.0000									
Sulphate	0.1295	-0.1889	-0.0995	0.3003	1.0000								
Phosphate	-0.4205	0.2356	0.0183	-0.3172	-0.4319	1.0000							
DO	-0.2524	0.0421	0.1745	-0.0764	0.0630	0.2179	1.0000						
Hardness	0.1132	0.2432	0.1023	-0.2050	-0.0101	0.0540	0.1595	1.0000					
Chlorides	0.5062	-0.0867	-0.1348	0.1379	0.2352	-0.3014	-0.2178	0.0937	1.0000				
Carbondioxide	-0.2573	-0.2941	-0.7807	0.5629	0.0967	0.0821	-0.1473	-0.3568	0.1090	1.0000			
MPN	-0.0806	-0.3280	-0.0736	0.1517	0.3179	-0.4618	-0.0510	-0.2736	-0.2112	-0.0003	1.0000		
Sodium	-0.1149	-0.0709	0.0920	-0.2958	-0.0413	0.1594	0.1097	-0.0016	0.1423	-0.1445	-0.1003	1.0000	
Potassium	-0.0149	-0.0947	0.1268	0.0597	0.0109	0.0853	0.4383	0.1297	-0.0087	-0.0760	-0.1522	0.2067	1.0000
COD	-0.0991	-0.1343	-0.0057	0.2597	0.0329	-0.1043	0.0835	-0.0464	-0.1182	0.0106	-0.0456	0.0424	0.0938

We have analysed the data for Osmanabad taluka various strong correlation exist between (conductance & Cl), other positive and good correlation coefficient are observed for (conductance & hardness), (pH & K), (TDS & Na), (TDS & PO_4),(SO_4 & Hardness), (PO_4 & COD), (DO & K), (Hardness & Cl) and (Cl & CO_2). The negative good correlation was observed for (conductance & NO_2), (Hardness & pH), (TDS & NO_2), (TDS & CO_2), (NO_2 & PO_4), (NO_2 & Cl), (PO_4 & CO_2), (PO_4 & K), (DO & Hardness), (Hardness & K) and (CO_2 & COD). The data suggest that ground water of Osmanabad taluka in winter season shows conductance is mostly because of chlorides and negative correlation between (NO_2 & PO_4), (Cl & NO_2) suggest the competition between anions and precipitations of one of the anion.

The linear equations are Based on the above facts we have obtained the regression equations relating the physical parameter with chemical composition of ground water table. The equations are as follows-

K = -7.1209 (pH.) + 0.9986

PO_4 = 0.00036 (TDS) + 0.000062

Cl = 43.59 (Cond.) + 180.8652

Na=135.6227 (TDS) + 37.8942

Hard=116.0021(Cond.) + 70.2569

Cl= -81.9761 (Cond.) + 440.1217

COD =16.6586 (TDS) + 7.4129

REFERENCES

[1] Kulkarni J.R. and Shrivastav V.S. - Indian J. Env. Prot. 21(2) : 146-153 (2001)
[2] Park J.E. and Park K. - Env. And Health B.B. Publisher Jabalpur P-437, (1986)
[3] Singh R.K., Choudhary M.S. - Jr. IWWA (Indian water of work Association)
[4] Keller A.W. - Env. Geology choules E. Merril publishing comp. Ohio P-548 (1979)
[5] Vogel's Text book of quantitative chemical analysis – Jmendham, Dennney R. C. Barnes J. D., Thomas. 6TH Ed. (2000)
[6] Keller A.W. - Env. Geology choules E. Merril publishing comp. Ohio P-548 (1979)
[7] Das Mahooya, Gupta Adak and Purohit K.M. - Indian J. Env. Prot. 21(4) : 295-301 (2001)
[8] Lingeshwar Rao S.V. - Indian J. Env. Protection 22(2) : 170-172 (2002)