A MULTIPLE CORRELATION BETWEEN GEOMORPHIC FACTORS AND GROUND WATER IN BURAI BASIN

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Droughts and floods are the serious hazards in India. Maharashtra State not free from that. Morever it is severally affected by droughts. Therefore water conservation is a consequential remedy to mitigate these hazards. Geomorphologosts, tackle this problem more precisely than other concern disciplin. As per the geomorphologists water conservation means"To prevent water from exodus loss." At the out set geomorphologists explict water potentials. Strategically he concerns to surface and ground water at different scale. Recently Maharashtra Government urge the water conservation programme in drainage basin in order to develope groud water resources in the state and arrested geomorphologists attention. The present paper focus gemorphologists role in water conservation at micro-scale.

Location of Study Area -The Burai basin is located in the extreme North Western part of Maharashrta. It is one of the most important tributary of river Tapi. It extents in between 21^0 N to 21^0 25' N latitude-and 74^0 E to 74^0 50' E longitude. It Comprises Dhule, Sakri, and Shindkheda talukas and covers 1,114 sq. kms. catchment area. It rises in Sakri Tahasil and joins to river Tapi at Akadse village after traveling over 87 km. (Fig. No.1)

Gemorphic Controls of Ground Water :-The prime source of the ground water infiltration consequent upon the rainfall in the drainage basin. However it can be developed by arresting runoff i.e. the altimate source in Burai basin. The infiltration is controlled by several factors, cover a wide field of many disciplies like geology, geomorphology, climatology, meterology, lithology, pedology, Hydrology, Agricultuer, Engineering etc. However to the geomorphologists point of view relief, slope, drainage, dissection, weathering are the major factors. Some of them are active factors and other passive. Besides this, they are mutually interrelated. The combination of these geomorphic factors with water table develops. In this regard the correlationshipe between these geomorphic factors and water table also have been attempted as discussed below.

Correlation between Ground water and Various Gemorphic Factors :-The numerical collation amongst the various gemorphic factors and water table have been attempted based on the correlation coefficient and regression analysis. Both have analysed separately as follows. The correlation analysis have presented in a matrix as given in Table No.1 The correlation coefficient also have been tested at vaious significant levels and standard errors estimated as shown in Table No.2 The correlation coefficients amongst various gemorphic controls of ground water are consistently significant in between 0.5-0.1 significant level.

Correlation Matrix Between Geomorphic Factors and Ground Water

Table No.1 A noteworthy feature is that all the geomorphic parameters except weathering depth significantly correlated with water table and attempts -ve correlation coefficients. Weathering depth reveals positive and highest value 'R' amongst the all parameters (0.85). This is due to the fact that the water table is inversely proportional to absolute relief (ABR), relative relief (RR), dissection Index (DI), Slope, drainage density (DD), drainage frequency (DF)where as directly proportional to that weathering depth (WD). The correlation matrix also reveals fact that correlation amongst the geomorphic parameters such as absoulte relief and remaining geomorphic parameters are significantly high and +ve. Where as the correlation coefficient between the various geomorphic parameters and water table are significantly high but negative logically it is evident that various geomorphic factor are directly interrelated to each other and ultimately inversely related to the ground water except the weathering depth. Which is directly related to the water table. Hence there is a need of under standing multiple correlationship.

Multiple Correlation :- All the gemorphic parameters and water table have been inter-correlated to each other and the correlation coefficients have

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been estimated between them as shown in the multiple correlation Table No.1. The correlation coefficients also has been represented by density shading in order to better visual undertanding. Fig. No. 3. The correlation table No.2 reveals the fact that significantly very high correlation coefficient lies proximity to the diagonal line. Where as the values of "R" decreases towards the margins and become -ve except the extreme ends which depict significantly very high +ve correlation coefficient (0.85). From the multiple correlation it is evident that, weathering depth is inversely related to the various geomorphic control like's a absolute relief, relative relief, dissection index, slope, drainge density, drainage frequency. Ultimatly the weathering depth is directly related to the water table which can be better understood by multiple regression equation.

Multiple Regression Equation :-In order to under stand numerical the relationship amongst the various geomorphic controls of the ground water following multiple regression equation have been worked out for Burai basin.

$$Y = 8244.18 - 19.55x - 4.24x - 0.267x_3$$
[t = -1.07] [t = 0.7755] [t = 0.7144]
(SE = 0.041) (SE = 0.044) (SE = 0.445)
$$-4.03x_4 - 0.16x_5 - 0.398x_6 + 0.785x_7$$
[t = 1.0014] [t = 0.53] [t = 0.8882] [t = 4.03]
(SE = 0.04146) (SE = 0.046) (SE = 0.4274) (0.013)

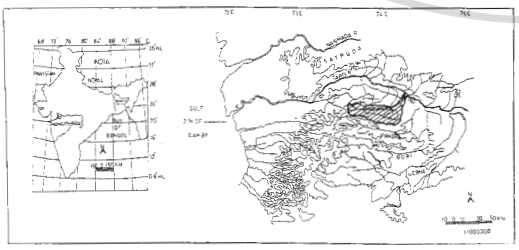
The regression equation is a good fit one since the power of independent variable on the dependent varibles are 90.8 percent. It menas that only 9.2% varibles are controlled by other factors. The regression coefficeint are all negative. Where as +ve that of weathering depth v/s water table. The fact apperehends that all the geomorphic controls except the weathring depth, inversely affected on the water table. Since higher attitude, relief, steep slope, higher dissection index, drainage frequency and drainage density are the dynamic factors of land surface stability and adversely affected on the weathering depth. On the other hand weathering depth is based oin the stability of the surface. The deep weathering fronts itself is an indication of stability of the land surface such deep weathering profiles are acting as an aquifers to an indication of the stability of the land surface in a crystalline rock formanation like a Deccan basalt in the Burai basin. Which is impervious in nature and acts as an aquitard. The water impervious in nature and acts as an aquitard. The water acumulate over this aquitard through the weathered mass in which water table have been maintained. Thus weathering depth and water table are directly related to each other.

The significantly higher value of power (90.8%) of independent variable i.e. various gemorphic controls on the dependent variable and the water table itself indicates that the water table of Burai basin is ultimatly passively controlled by geomorphic factor.

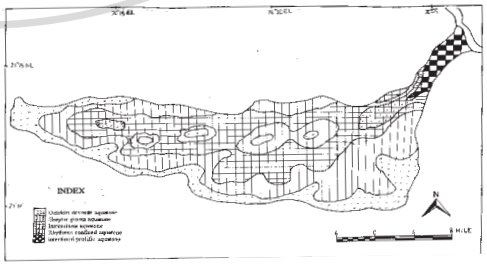
The "F" test also have been estimated which is greater than the table value at 0.5- 0.1% significant level itself indicates higher significance of overall regression analysis.

Conclusion :- From the foregoing statistical analysis it has been understanding that the various geomorphic factor can also be used in the ground woter studies in a river basin. On the basis the geomorphic control can be used in delineation of vious aquatones (zones) of ground water. The mainly five zones in Burai basin (Fig. No.2). Infiltration conseque upon rainfall is the only source of ground water in the basin. A negligible area bears good quality and prolific ground water in the basin. The extensive prolific area at mouth have a poor quality saline ground water. The gemorphic controls provide wide potentiality for the development of ground water in Burai basin.

LOCATION OF STUDY AREA
(BURAI BASIN) Fig No. 1



GROUND WATER AQUATONES
(BURAI BASIN) Fig No.2

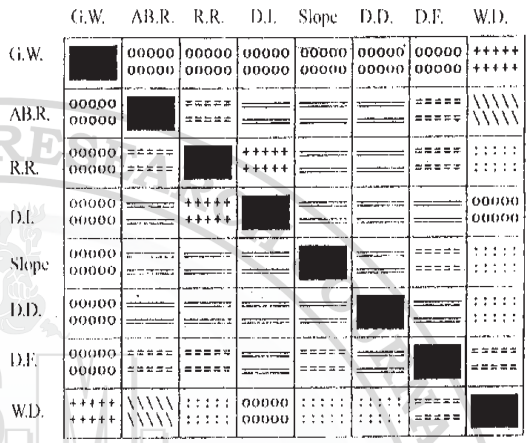


Correlation Matrix Between Geomorphic Factors and Ground Water

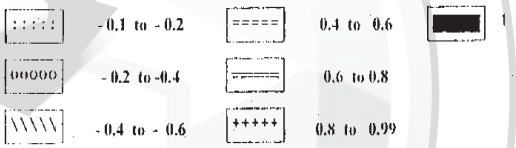
Table No.1

	GW	A.B.R.	R.R.	D.I.	Slope	D.D.	D.F.	W.D.
G.W.	*	-0.396	-0.298	-0.28	-0.37	-0.21	-0.34	0.85
AB.R.	-0.396	*	0.58	0.75	0.69	0.73	0.56	-0.57
R.R.	-0.298	0.58	*	0.82	0.78	0.71	0.52	-0.16
D.I.	-0.28	0.75	0.82	*	0.76	0.62	0.68	- 0.39
Slope	-0.37	0.69	0.78	0.76	*	0.75	0.54	- 0.19
D.D.	-0.21	0.73	0.71	0.62	0.75	*	0.57	- 0.18
D.F.	-0.34	0.56	0.52	0.68	0.54	0.57	*	- 0.31
W.D.	0.85	-0.57	-0.16	-0.39	- 0.19	- 0.18	- 0.31	*

INTERCORRELATION BETWEEN GEOMORPHIC AND GROUND WATER VARIABLES (BURAI BASIN)



LEVEL OF CORRELATION



Correlation Matrix Between Geomorphic Factors and Ground Water

Table No.2

	AB.R.	R.R.	D.I.	Slope	D.D.	D.F.	W.D.
R	-0.396	-0.298	-0.2768	-0.374	-0.21	-0.3372	-0.83
Significant level	0.5-0.1 Significant	0.5-0.1 Significant	< 0.5 Insignificant	0.5 - 0.1 Significant	< 0.5 Insignificant	0.5-0.1 Significant	0.5-0.1 Significant
S.E.	0.041	0.044	0.0445	0.04146	0.046	0.04274	0.013

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