GROUNDWATER STUDIES OF ASLOD STREAM WATERSHED, TALUKA SHAHADA, DISTRICT NANDURBAR, M.S.

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Abstract

The groundwater is the second largest available fresh water resource on the planet earth. It forms a very important component of hydrological cycle because bio species are dependent and make use of this resource during the dry season. The watershed formed by Aslod stream & its associated streams, is of fourth order watershed. The watershed formed by Aslod stream & its associated streams, is of fourth order watershed. The 115 number of wells have monitored from October to May from 1998 to 2000-2001 in post monsoon and premonsoon season. The amount of water available annually in the watershed by rains is estimated to be 2387.9ham. The groundwater flow direction towards north to north-west direction and west direction in different years. It show the presence of permeable aquifer. The non monsoon fluctuation values of 1998-99 range between 0.5m& 3.8m.,1999-2000 in between 2m. & 4.8m., 2000-2001 in between 0.5m & 2.4m.& 2001 in between 0m. & 1.0m. The average specific yield calculated is 0.025.

Index Terms: Aquifer, Flow, Fluctuation , Specific yield

I. INTRODUCTION

The groundwater is the second largest available fresh water resource on the planet earth. It forms a very important component of hydrological cycle because bio species are dependent and make use of this resource during the dry season. In arid climatic zones, the pumped out water is the only available resource for domestic & agricultural use.

II. PROCEDURE FOR PAPER SUBMISSION

A. Review Stage

Location

The Aslod stream watershed is located 14km. east of Shahada which is a taluka place in Nandurbar district, Maharashtra. The study area extents between longitudes 74^0 37' 12" East and Latitudes 21^0 33' 5" North & is included in the Survey of India toposheet no.46K/10.The Aslod stream forms a small tributary to Gomai river. It encloses 3649 ha land within its watershed boundaries.

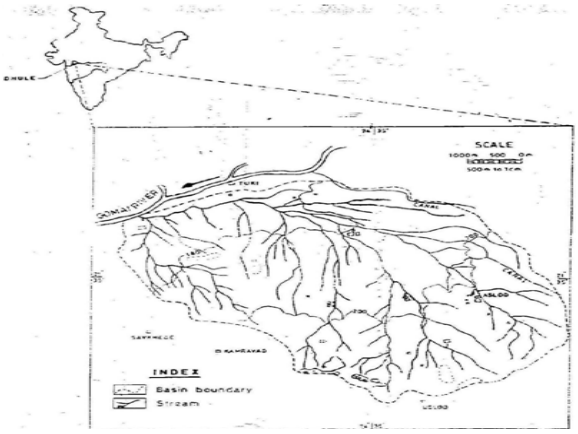

Figure-1.1. Location Map of Aslod Stream Watershed

Climate

The average annual rainfall computed arithmetically from 25 years data is 654.4mm. The temperature fluctuates from 46.5^0 C in summer to 10^0 C in the winter.

Drainage

The watershed formed by Aslod stream & its associated streams, is of fourth order watershed. All major & minor stream join together to form a drainage network which presents dendritic pattern.

Soil

The soils derived from trap rocks are characteristically dark in colour The deep grey soil known as ' Regur' covers almost entire watershed area.

Physiography

The Aslod stream watershed is underlain by trap rocks & presents as undulating topography with maximum elevation of 237m. at the southern perimeter of the basin near village Ujalod. The lowest elevation of 162m. RL is observed at the confluence point of Aslod stream & Gomai river. The slope percentage ranges between 0.4% to 1.2%. The drainage density value obtained 2.88km/km^2 indicates the coarse texture of drainage permeable subsurface, resistant rock formations & low relief in the area.

GEOLOGY

The area is underlain by trap rocks & is almost entirely covered with thick layer of black cotton soil. The outcrops of trap rocks are scanty in the area. Three main types of trap rocks are namely Amygdaloidal basalt, Massive basalt & Giant Phenocryst basalt(GPB).

Availability of surface Water

The area falls under tropical, semi arid climate region receives an average annual rainfall of 654.4mm. The amount of water available annually in the watershed by rains is estimated to be 2387.9ham. The maximum surface water available for resource management is 14% of total rainfall in area- i.e. 334.3ham. The watershed is drained by 4th order stream named as Aslod stream. There are no surface water bodies like ponds, tanks etc. are present in the area.

GROUNDWATER STRUCTURE

The groundwater Structures present in the area are dug wells, dug cum bore wells and bore wells. More than 450 dug wells, dug cum bore wells present in the area. These wells are mostly constructed in the agricultural fields for the use of irrigation. There are more than 300 bore wells which are again located mostly in the fields and are used in agriculture. The dug wells as well as bore wells constructed for supply of drinking water to the rural population are very few. Each village has on average 2 dug wells & 1 bore well supply of water domestic use.

In order to study the occurrence, flow direction and potential storage of ground water in the watershed area, the 115 dug wells selected as observation wells. The criteria for selection of observation wells were: deeper depth, sound construction, continuous use & without vertical bore. The 83 wells are square shaped and 32 wells are circular in shape. This indicates that the upper layer of trap rock is highly jointed and perhaps the advantage of joint planes is taken in the construction of wells part where ever the weathered basalt layer in uncollapsable, the wells are unlined.

Well Inventory

The 115 number of wells have monitored from October to May from 1998 to 2000-2001 in post monsoon and premonsoon season. Figure no.-1.2 show water table contour map which show groundwater flow direction towards north to north-west direction. Figure 1.3 show Water table contour map of pre monsoon 1999-2000 which sow groundwater trough due to more pumping. Figure 1.3Watertable contour map of post monsoon 2000-2001 which show groundwater flow direction towards north-west to west direction.

Groundwater Fluctuations

The monsoon fluctuations have been calculated considering 5 months out of which 4 have been monsoon months June, July, August & September & one post monsoon month October. The fast dissipating water table gains sufficient time in the month of October to stabilize water level in the area. The non monsoon fluctuations have been calculated from the level difference formed during 5 months time period1st Jan. to 1 June in dry season. This fluctuation represent with drawl of ground water for beneficial purpose. The non monsoon fluctuation values of 1998-99 range between 0.5m& 3.8m.,1999-2000 in between 2m. & 4.8m., 2000-2001 in between 0.5m& 2.4m.& 2001 in between 0m. & 1.0m. Similarly, the monsoon fluctuations are found ranging from 6.0 to 9.0m for 1998-99, from 0.5m.to 2.5m for 1999-2000 and from 0.1 to 1.4m. for 2000-2001.The specific yield has been calculated 0.021 for 1998-99;0.030 for 1999-2000 & 0.024 for 2000-2001.

Figure 3.1 Post monsoon water table contour map 1998-99

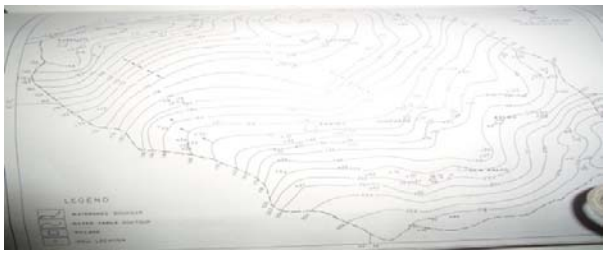

Figure 3.2 Premonsoon Water Table Contour Map 1998-99

Figure 3.3 Post monsoon water table contour map 1999-2000

Table.1.1 -1st Jan.,1st June & 1st November SWL (As read from hydrographs) of ten selected dug wells

	1998		1999				2000			2001	
DW NO. RL (m)	1st Jan	1st June	1st Nov.	1st Jan	1st June	1st Nov.	1st Jan	1st June	1st Nov.	1st Jan	1st June
010; (174.0)	166.8	163.0	169.0	165.0	162.5	165.0	162.5	162.0	162.8	163.4	163.0
012 (170.0)	163.0	160.0	166.5	163.8	159.0	161.0	158.6	157.5	158.0	157.5	156.5
13 (170.0)	160.2	159.5	166.0	162.5	160.5	161.0	157.5	156.0	156.3	156.0	155.6
016 (189.0)	179.5	178.0	186.8	183.8	180.0	181.0	179.4	177.5	178.2	178.0	177.4
22 (196.0)	187.5	186.0	193.0	190.0	187.5	188.4	187.0	186.0	186.6	185.2	185.2
29 (205.0)	196.5	196.0	201.8	198.2	196.0	197.0	195.0	194.0	195.4	194.5	194.5
31 (200.0)	191.0	188.0	197.0	194.0	191.0	192.5	191.6	190.0	190.1	189.0	188.5
41 (181.0)	172.0	170.0	177.8	175.5	172.5	174.0	172.4	170.0	170.7	170.2	169.5
42(180.0)	173.5	171.0	177.0	174.5	172.0	172.5	170.8	169.0	170.0	169.2	169.0
59 (207.0)	201.0	197.5	204.4	201.5	199.0	199.8	199.5	198.2	199.5	199.2	198.5

Figure 3.4 Watertable contour map of Pre monsoon 1999-2000

Figure 3.5 Watertable contour map of post monsoon 2000-2001

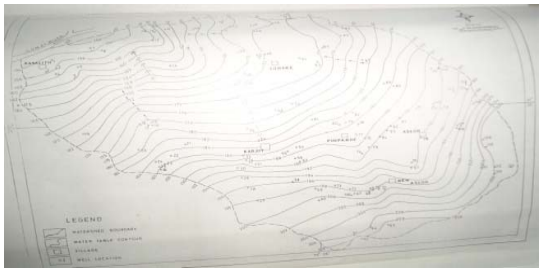

Figure 3.6 Watertable contour map of pre monsoon 2000-2001

Table.1.2 Monsoon & Nonmonsoon fluctuations of (Calculated on the basis of SWL on the hydrograph) 10 selected dugwells

Dw No.	1998		1999	2000			2001	
	Non-mons.	Mons.	Non-mons.	Mons.	Non-mons.	Mons.	Non-mons.	Mons.
13	3.8	6.0	2.5	2.5	0.5	0.8	0.4	-
15	3.0	6.5	4.8	2.0	1.1	0.5	1.0	-
16	0.7	6.5	2.0	0.5	1.5	0.3	0.4	-
21	1.5	8.8	3.8	1.0	1.9	0.7	0.6	-
28	1.5	7.0	2.5	0.9	1.0	1.9	0.7	-
35	0.5	5.8	2.8	1.0	1.0	1.4	0.0	-
37	3.0	9.0	3.0	1.5	1.6	0.1	0.5	-
47	2.0	7.8	3.0	1.5	2.4	0.7	0.7	-
48	2.5	6.0	2.5	0.5	1.8	1.0	0.2	-
65	3.5	6.9	2.5	0.8	1.2	1.3	0.7	-
Average	2.2	7.03	2.94	1.22	1.4	0.74	0.52	-

CONCLUSION

The groundwater flow direction towards north to north-west direction and west direction in different years. It show the presence of permeable aquifer. The non monsoon fluctuation values of 1998-99 range between 0.5m& 3.8m.,1999-2000 in between 2m. & 4.8m., 2000-2001 in between 0.5m & 2.4m.& 2001 in between 0m. & 1.0m. Similarly, the monsoon fluctuations are found ranging from 6.0 to 9.0m for 1998-99, from 0.5m.to 2.5m for 1999-2000 and from 0.1 to 1.4m. for 2000-2001.The average specific yield calculated is 0.025.

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