Advances in Bioresearch
Adv. Biores., Vol 14 (5) September 2023: 405-407
©2023 Society of Education, India
Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.14.5.405407

Advances in Bioresearch

SHORT COMMUNICATION

Laps Time for Rise and Fall in Groundwater Level and Groundwater Fluctuation Studies in SUS Basin of Solapur District, Maharashtra, India

RAUT M.N., KADAM V. N.
Baburo Patil College of Arts and Science Angar
Email: adityaraut266@gmail.com

ABSTRACT
Hydrogeological investigations provide information for planning, delineation, evaluation, exploitation and management of groundwater resources. The main input, rainfall, plays an important role in fluctuation of water table. Depending upon the hydrogeological characters of the subsurface the rate of recharge after the rainfall event decides the groundwater levels and there is always a time gap, which is defined as laps time to attain the maximum water level and subsequently there is a time gap for attaining lowest water level which is also a function of Geology and differences in the heads provide the flow of water from higher potential to lower potential. This flow of water brings down the water levels increasing the gap between the surface and the water table which is designated as the vadose zone. The dynamic resource in the groundwater reservoir is governed by the vadose zone, through which water level fluctuates. Thicker the Vadose zone more is the space available for groundwater accumulation. Further the aquifer parameters transmissivity and storage coefficient are important parameters to decide the groundwater potential in an area and helpful in determining the capacity of aquifer to store water and the ease with which water can flow through permeable zones. Also this helps in delineating areas feasible and non-feasible for artificial recharge. Therefore this study has been done in the Sus basin, a tributary of Bhima River, the main feeder of Krishna River. The basin covers parts of Pandharpur, Mohol and Madha talukas of Solapur.
Keywords: *Groundwater, Fluctuation ,Basaltic Terrain.*

Received 16.07.2023 Revised 18.09.2023 Accepted 25.10.2023

How to cite this article:
Raut M.N., Kadam V. N. Laps Time for Rise And Fall In Groundwater Level And Groundwater Fluctuation Studies In Sus Basin Of Solapur District, Maharashtra, India. Adv. Biores. Vol 14 [5] September. 2023. 405-407.

Modern hydrology depends upon information of groundwater flow system. The flow system may be shallow, intermediate and deep. Precipitation and evapotranspiration depends up on several changes, influences shallow flow system. The deep systems are formed because of deep infiltration of water under favorable geological set up such as sedimentary basins and multiple aquifer systems, formed in the Deccan basalts with alternating permeable and impermeable formations. Their flow system is likely to have relatively more stable configuration in time than shallow systems [1]. Intermediate flow systems are neither shallow nor deep. The flow system may get interconnected mainly because of fracturing. Hubbert [2] showed from fundamental principal of physics that water moves from areas of higher energy potential to areas of lower energy potential. Toth [3] formally defined a groundwater flow system and defined its anatomical features. The notion of the groundwater flow system has become standard frame work of analysis of hydrology, following Toths contribution. In consolidated formations a fracturing system normally consists of two or more sets of tectonic fractures which together form one hydraulic system, when interconnected [4].

Groundwater level fluctuation studies:-

Groundwater level studies play an important role in understanding the thickness of vodoze zone, which is the possible container for water storage. The water levels are dynamic as the levels increase after addition of water by way of infiltration and percolation after the rainfall event. The porous material of the earth and its porosity and permeability makes the container a better store house. Groundwater levels compared with the rainfall helps in understanding the laps time for rise in the water level and laps time for fall in the water level and hence reflects on infiltration capacity and rate of infiltration of any formation, this data can further be used for the selection of site for artificial recharge [5].

In the present study groundwater levels in the 40 observation wells have been monitored and water levels were recorded monthly for 30 months. For this purpose, wells were selected from different formations such as weathered, massive, vesicular / zeoilitic basalt and jointed and fractured basalt, rainfall and water level fluctuation.

The water levels in the wells constructed in weathered formations at Babulgoan, Asti, Kandali and Yavti. The water level fluctuation in all the wells shows a similar pattern. The maximum water level rise by 17.76m at Khandali and the minimum rise 10.1m at Babulgoan. From the figure it is observed that the lapse time for rise in the water level after the maximum rain fall events and laps time for maximum fall in water level is known for Babulgoan, Asti, Khandali and Yavti. This lapse time reflects on the thickness of vadose zone utilized for the storage of water and also gives an idea about the thickness of vadose zone which can be utilized for artificial recharge of groundwater in the present study area. Lapse time and thickness of vadose zones are shown in table no.1.

Water levels in the wells representing vesicular and zeolitic formation fig. 2 are taken from Tungat, Narayanchincholi, Ishwarvatar, and Degoan. The water levels, after peak of rain fall, in these wells shows maximum rise of 14.64m around Ishwarvatar and minimum rise near Narayanchicoli (10.12m) the lapse time and vadose zone for the area in such formation are given in table no. 2.

The fig. 3 shows water level fluctuation with respect to rain fall in the wells which are constructed in compact and massive basalt with few joints and fractures at Aran, Modnimb, Shetphal, Konheri and Siddhewadi. The water level fluctuations in each well shows similar pattern. The maximum water level rise is of 20.02m at Shetphal and the minimum rise at Siddhewadi (12.19m). The lapse time for rise after maximum rainfall event and lapse time for maximum fall in water level in massive basalt of Aran, Modnimb, Shetphal, and Konheri and thicknesses of vadose zone around this area are shown in table no. 3.

Fig. 4 shows the water level fluctuation in fractured and jointed basalt at Padsali, Solankarwadi, Rople, Papri and Telagwadi. The maximum rise after rainfall is 23.16m and minimum rise 15.67m, the lapse time and vadose zone are given in table no. 4.

this has been observed from March 2009 to 2011. The wells in the weathered formation around Babulgoan, Papri, Khandali and Asti have similar fluctuation pattern. The maximum water level rise is observed at Khandali (17.76m) and the minimum rise in the well at Babulgoan (10.1m). The wells in the hard basalts at Aran, Modnimb, Siddhewadi and Konheri show maximum water level rise of (20.02m) at Shetphal and the minimum rise at Siddhewadi (12.19m). The wells having vesicular / zeolitic formation around Tungat, Narayanchincholi, Ishwarvathar and Degoan show maximum rise (14.64m) in water level around Ishwarvathar and minimum rise at Narayanchincholi (10.12m). The wells constructed in jointed / fractured basalt at Padsali, Soankawadi, Rople and Telangwadi

Water level fluctuation for 30 mon show maximum water level rise (23.16m) and minimum water level rise (15.16m).

A study has been made to know laps time for maximum rise in water levels after rain fall peaks, in the wells constructed in the weathered, vesicular / zeolitic, fractured / jointed, massive basalts. It comes to 2 months for weathered and vesicular / zeolitic basalts and 3 months for fractured / jointed and massive basalts. The laps time for fall in water level for weathered and vesicular / zeolitic basalt it is 3 months and that for fractured and jointed and massive basalts, it is 2 months. Therefore, it will be appropriate to state that the weathered and zeolitic basalts take less time to recuperate and water will stay for more time for discharge.

TABLE NO. 1: Lapse Time For Rise and Fall in Groundwater Levels in Sus Basin Weathered Basalt, And Thickness Of Vodase Zone

Villages	Pre Monsoon Vadose zone thickness in meters	Post monsoon vadose zone thickness in meters	Lapse time in months required for Groundwater level rise after rainfall peak	Lapse time in months required for Groundwater level fall	Difference in meters between maximum rise and fall of Groundwater level
Babulgoan	11.01	0.91	2	3	10.1
Asti	15.84	1.21	2	3	14.63
Khandali	18.67	0.91	2	3	17.76
Yavti	19.76	4.21	2	3	15.55

TABLE NO. 2:: Lapse Time For Rise And Fall in Groundwater Levels in Sus Basin, Vesicular / Zeolitic Basalt, and Thickness Of Vadose Zone

Villages	Pre Monsoon Vadose zone thickness	Post monsoon vadose zone thickness	Lapse time in months required for Groundwater level rise after rainfall peak	Lapse time in months required for Groundwater level fall	Difference in meters between maximum rise and fall of Groundwater level
Aran	19.14	1.2	3	2	17.64
Modnimb	16.25	2.43	3	2	13.72
Setphal	23.67	3.65	3	2	20.02
Konheri	14.88	2.43	3	2	12.45
Siddhewadi	15.84	3.65	3	2	12.19

TABLE NO. 3: Lapse Time for Rise and Fall in Groundwater Level In Sus Basin, Massive Basalt and Thickness of Vodase Zone

Villages	Pre Monsoon Vadose zone thickness in meters	Post monsoon vadose zone thickness in meters	Lapse time in months required for Groundwater level rise after rainfall peak	Lapse time in months required for Groundwater level fall	Difference in meters between maximum rise and fall of Groundwater level
Naryanchicholi	11.64	1.52	2	3	10.12
Tungat	12.44	1.52	2	3	10.92
Ishwarvatar	15.55	0.92	2	3	14.64
Degoan	14.64	2.13	2	3	12.55
Yeswantnagar	14.68	2.43	2	3	12.25

TABLE NO. 4: LAPSE TIME FOR RISE AND FALL IN GROUNDWATER LEVEL IN SUS BASIN, FRACTURED AND JOINTED BASALT, AND THICNESS OF VADOSE ZONE

Villages	Pre Monsoon Vadose zone thickness	Post monsoon vadose zone thickness	Lapse time in months required for Groundwater level rise after rainfall peak	Lapse time in months required for Groundwater level fall	Difference in meters between maximum rise and fall of Groundwater level
Telagwadi	23.16	3.9	3	2	19.26
Papri	11.67	2.74	3	2	8.93
Rople	12.14	4.04	3	2	8.2
Solankarwadi	18.67	3.39	3	2	15.28
Padsali	23.37	3.65	3	2	17.72

REFERENCES

1. Narshimahan (2008) .Groundwater in the Peninsular Indian Shield: A framework for Rational Assessment. Golden jubilee volume Gelolgical Society of India pp 3 to 16.
2. Hubber, P.R., (1990) The Times of crustal extension and the eruption of continental flood basalts; Nature, Vol.345, pp.246 to 249, doi; 10.1038/345246 a0.
3. Toth J. (1963) A Theoretical Analysis of Groundwater Flow in Small Drainage Basin, Jour. Geophy. V. 68, pp. 4795-4813.
4. Radhakrishna, B.P.(2004) Neogene uplift and geomorphic rejuvenation of the Indian peninsula: Current Science, Vol. 364 pp. 787 to 793.
5. Narayanpethkar, A.B., Zambre, M. K., and Mallick, K., (2009) Geophysical studies for groundwater in Adial Basin around Solapur, Maharashtra. Proc.of sem. Association of exploration of geophysist pp. 255 to 261.