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Groundwater study of Bhiwani District

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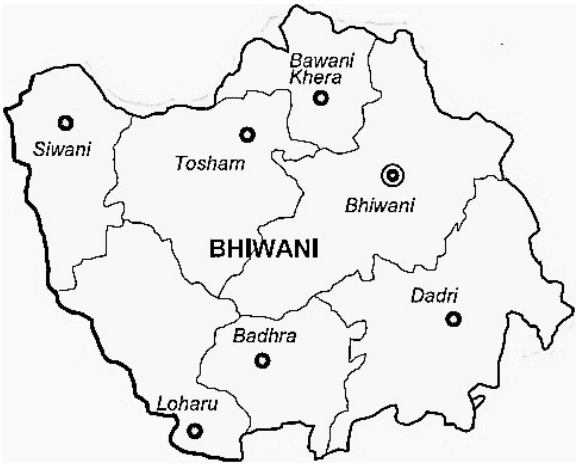
Abstract: Groundwater is the major source fresh water available for various human activities worldwide. In the semiarid region of Indian state of Haryana groundwater is primarily used as a source of water supply for drinking and irrigating the agricultural land. Due to rapid growth of population and the intensive agricultural activity and agriculture based industry dependency on groundwater have increased the by manifold. The majority of the aquifers are suffering from stresses because of over drafting of groundwater beyond their maximum safe yield potential, though some other aquifer are being recharged beyond the rainy season by the irrigation canal. Thus, it is imperative to study the groundwater dynamics of such hydro geological set up. In the present study, an attempt has been made to explore the groundwater dynamics (seasonal and annual) of the Bhiwani district of Haryana. The monthly rainfall data were also collected for the same period and its effect on groundwater level and fluctuation in groundwater level were explored. Results indicate that different degree of fluctuation spatially and seasonally. No strong and definite relationships were observed between ground water level (fluctuation) and rainfall during the study period. It is expected the study may provide some vital clue for proper management of groundwater resource of the region**.**

Keywords: Ground water level, monsoon, seasonal variation, rainfall, Bhiwani,

INTRODUCTION: Bhiwani District lies in South-Western part of Haryana state covering an area of 5140 sq.km. There is no perennial river passing through the district. Physiographic-ally the district consists of flat and level plain interrupted from place to place by clusters of sand dunes, isolated hillocks and rocky ridges. A few isolated rocky ridges elevated sharply from the plain occur in the south central portion or the district. Dohan river is the only ephemeral stream in the area and flows in direct response to precipitation. Bhiwani district ranks 3rd in Haryana with a population of 16,34,445 according to 2011 Census. The male population is 866,672 and female is 767,773. The density of population is 342 per sq.km. The literacy rate in the district is around 75.21%. 80% of the population lives in Rural area and the remaining 20% of the population lives in Urban area. Out of 444 villages 437 are inhabited and 7 are uninhabitated.



RAINFALL & CLIMATE: The climate of Bhiwani district can be classified as tropical steppe, semi-arid and hot which is mainly dry with very hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrates into the district. There are four seasons in a year. The hot weather season starts from mid March to last week of the June followed by the south- west monsoon which lasts upto September. The transition period from September to October forms the post-monsoon season. The winter season starts late in November and remains upto first week of March. The normal annual rainfall of the district is 420 mm which is unevenly distributed over the area 22 days. The south west monsoon, sets in from last week of June and withdraws in end of September, contributed about 85% of annual rainfall. July and August are the wettest months. Rest 15% rainfall is received during non-monsoon period in the wake of western disturbances and thunder storms. Generally rainfall in the district increases from southwest to northeast.

GROUND WATER SCENARIO: The geological formation met within the district are ferruginous chiastolite schist associated argillaceous rocks of Aravalli group, Alwar quartzite of Delhi system, Malani suite of volcanics of lower Vindhyan age, Older alluvial deposits of Quarternary age and Aeolian sands of recent age the out crops are, however, limited to small parts of the district, Older alluvium occurs extensively in the area consisting of inter bedded , lenticular, interfingering deposits of gravel sand ,silt, clay and Kanker mixed in various proportions. The youngest formations are aeolian deposits, which are unconsolidated surface sands covering large area in the western part of the district, these deposits occur as sand dunes at the surface and consist of sands.

GROUND WATER RESOURCES: The block wise ground water resource potential in the district has been assessed as per GEC-97. The stage of ground water development ranges between 17% (block- Bhawani Khera) to 206% (block- Bhadra). The total replenishable ground water resource in the district is 551.38 mcm.

GROUND WATER QUALITY: Chemical quality data of shallow aquifers reveals that ground water is alkaline in nature and significant number of samples have conductivity values more than 3000µS/cm. Concentration of vital chemical constituents such as fluoride and nitrate in about 50 % of the water samples is within permissible limit assigned by BIS 1991. Among trace metals, arsenic and iron are found in excess at Sui (0.02 mg/l) and tosham (10.83 mg/l) against the maximum permissible limit of 0.01 mg/l and 1.0 mg/l respectively. Among anions, bicarbonates dominate in some wells having low to moderate salinity, chloride dominates in wells with high salinity and in remaining no single anion dominates. It means that the water is of mixed anion type. Among cations sodium dominates in more than 50% wells whereas no individual cation dominates in the remaining water samples.

SUITABILTY OF WATER:

Domestic: Based on the concentration of anions and cations in shallow ground water samples, it is found that in some parts of the district the quality of ground water is not suitable for drinking uses, whereas in others it is of permissible quality.

Irrigation: Plot of USSL diagram used for the classification of Irrigation waters indicates that Ground water fall under C2S,C3S1, C3S2, C3S3, C4S1, C4S2 and C4S4 classes. More than 50% ground water are likely to cause medium salinity hazards when used for customary irrigation and the remaining water falling under C3S4, C4S3 and C4S4 classes are likely to cause high to very high salinity as well as sodium hazards when used for irrigation on normal soils. Such water can be used on highly permeable soils on which salt tolerant crops such as wheat, gram and rice are grown.

STATUS OF GROUND WATER DEVELOPMENT: The water supply to the district is mainly based on groundwater through tubewells. The urban population is covered under drinking water supply scheme. The water supply to the villages is met out with the installation of hand pumps by the villagers as spot and convenient source of water. The shallow tubewells in the district range from 20 to 90m. deep, tapping the aquifer from 15m to 90 m. with a discharge of 400 to 900 Ipm. Most of the shallow tube wells are either run by diesel engines or electric motors. There are 32790 motors working in the district. The major part of the district is being irrigated through ground water.

Ground Water Development: The hydrogeological data generated through exploratory test drilling has provided vital information regarding identification of aquifer systems, demarcation of their vertical and lateral extent, delineation of potential aquifer characteristics. These studies also provide information on well design and drilling techniques. A well assembly of 305/203mm dia. Combination, using about 40m to 50m housing length having slot size of 1.19mm would be ideal for the district area. The "V" wire galvanized Screen having 1.O mm slot width may also be used against granular zones, as it has more open area for the entrance of water. The shallow tube wells upto 40m depth should have 203mm single dia.pipe assembly with a suitable screen length. Direct Rotary rig can carry out the drilling in the district area .

Conclusion: Groundwater level and its fluctuation have been studied for Bhiwani district. The study has profound significance as groundwater is major source of drinking as well as irrigation water. Due to increased population accompanied by unprecedented growth in economic activities has been imparted severe negative impact on the groundwater resource of the District in the form of decline on GW quality and quantity. The majority of observation wells across the district suffer varied degree of declination in GWL while some wells found to have increased GWL during the study period. Results also indicate poor relationship between GWL fluctuation and annual average rainfall of the district. However, effect of rainfall on GWL is relatively better understood in the study.

Reference:

- Ahmeduzzaman, M. Kar, S. Asad, A. (2012). A Study on Ground Water Fluctuation at Barind Area, Rajshahi, International Journal of Engineering Research and Applications, Vol. 2(6), pp.14651470.
- H Tabari, J Nikbakht, B Shifteh Some'e (2012). Investigation of groundwater level fluctuations in the north of Iran, Environmental Earth Sciences 66 (1), 231243.
- Thilagavathi, N., Subramani, T., Suresh, M. and Ganapathy, C. (2014).Rainfall variation and groundwater fluctuation in Salem Chalk Hills area, Tamil Nadu, India, International Journal of Application or Innovation in Engineering & Management, Vol 3(1), pp:148161.
- Werner AeschbachHertig and Tom Gleeson (2012).Regional strategies for the accelerating global problem of groundwater depletion, Nature Geoscience, vol 5, pp: 853–861.
- Sukumar.S, Sankar .K (2011) Statistical Study on Pre & Post Monsoon Variation of Groundwater Level in Theni Di strict, Tamil Nadu – India, International journal of environmental science, vol 1(5), pp:798913.
- Jyothikumar, N. (2007) District Groundwater profile of Bhiwani, Central Groundwater Board, MoWR, Govt. of India, Northwestern region, Chandigarh. url: cgwb.gov.in/District_Profile/Haryana/Bhiwani.pdf (Last accessed on 23 Oct, 2015)
- Central Ground Water Board, Groound Water Information System (2015). http://gis2.nic.in/cgwb/Gemsdata.aspx (Last accessed on date: 22/11/2015)

- Raja R.E., Lydia Sharmila, Princy Merlin J. and Chritopher G. (2002)., Physico-chemical analysis of some groundwater samples of Kotputli town Jaipur, Rajasthan., Indian J Environ Prot, 22(2), 137-140.
- Kalshetty B.M., Sheth R.C., Hiremath P.S. and Kalashetti M.B. (2011)., Physicochemical analysis of ground water samples of Jamkhandi town in Bagalkot district, Karnataka state., Int J Chem Sci, 9, 412-420.
- Gorde S.P. and Jadhav M.V. (2013)., Assessment of water quality parameters: A review., Int. Journal of Engineering Research and Applications, 3(6), 2029-2035.
- Devi S. and Premkumar R. (2012)., Physicochemical analysis of groundwater samples near industrial area, Cuddalore District, Tamilnadu, India., International Journal of Chem. Tech Research, 4(1), 29-34.