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Climate Change and Ground Water Depletion in Narnaul Block: A Geographical Analysis

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ABSTRACT

The adverse effects of climate change means changes in the physical environment, biodiversity and water resources which have significant harmful effects on the composition, spirit or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare. Alteration in the Study area monsoonal patterns are the most important consequences of climate change that Narnaul block is going to face. Ground water is not only an essential element for survival of life but also it is an important vehicle for economic development in the south western Haryana. Over-exploitation of the underground water resources is the major problem due to climate change leading to underground water depletion in the Narnaul block, one of the major semi-arid highland basins of south western Haryana. As water demand rises rapidly, some regions of Narnaul block are extracting groundwater faster than it can recharge. Ground water levels are fast depleting in study areas due to low rainfall the agriculture is based on tube well irrigation and above 95% tube well irrigation are prevalent in the study area. Because of ground water level is declining continuously. The study area lie arid and semi-arid areas where low precipitation results in low or zero natural recharge, mining of fossil groundwater from aquifers depletes a non-renewable resource. This paper focus on Groundwater depletion due to underground water extraction rates have shown to be more influential than climate change in the study areas.

Keywords : Climate Change, Underground water, Tube well, Irrigation, Rainfall, Depletion.

I. INTRODUCTION

The climatic conditions in the block are different from arid to semi- arid. The summer months are very hot whereas winter season is very cool and dry, and even sometimes the temperature reached to freezing point during the months of December and January. Occasionally, frost also occurs in winter. When rainfall occur some water enter in to the pores of the soil and accumulates, it is ground water. Ground water is also called under- ground water which occurs blew the surface of earth. The quality and quantity of underground water depends on geological structure of an area. It flows beneath the surface with the slope. At a certain depth the pore space in the soil is completely filled with water known as water level. Level at which it occurs is known as water table. Over exploitation of ground water and as a consequence decline in water table are the serious concerns today. The concepts of ground water depletion explain that when the groundwater is pumped from well, the level of water in the well drops and surrounding water table is lowered. In the south and south western part of Haryana, the underground water is found at greater

depth in comparison to other parts. In the block Mohindergarh and particularly in Narnaul block it is a problem of senior level.

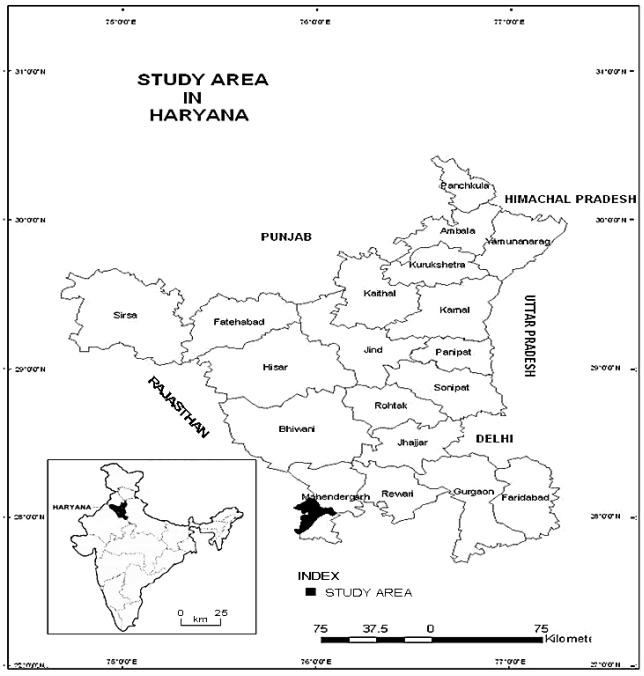
Objectives

- To examine the intra-village variation in the depth of ground water level.
- To examine the main causes of declining ground water level and to give an appropriate salvation.

Study Area

Narnaul block of Mahendergarh district of Haryana has been selected as the area of the present investigation. Narnaul block comprises an area of 3 17.75 sq.km. The study area has a total population of 517707 persons (2011). The study area has 57.39 per cent literate persons. Narnaul block stretches from 27^0 47' 12" to 280 10'48" North

Location Map of Narnaul Block



Source: Census of India 2011.

latitudes and from 75° 54' 46" to 76° 09' 03" East longitudes. The Narnaul block is bordered on the north by Mahendergarh tehsil in the east and south east by C.D. block Ateli Nangal and C.D. Block Nangal Choudhary- respectively, and on the west and south-west by Rajasthan state. Narnaul block have 67 villages and all the villages were taken for the present investigation.

Database and Methodology:

Present study is based on secondary sources of data which taken from:

- Ground water cell, at Narnaul.
- Census of India 2001, Block Census Report, New Delhi.
- Regional Division of a Cartography Analysis, Series 1, Vol. VI, Census of India.
- D.R.D.O., Narnaul.
- In order to show the depth of ground water choropleth method has been used.
- In order to show the declining level of ground water line graph is drawn.

Depth of Ground Water in Narnaul

There are marked to difference with in the region in the depth of ground water level. Therefore, a village wise study for assessing the depth of ground water is made. The study area has a big difference in the depth of ground water. The block falling in difference categories as follows:

Categories	Villages
High depth area Above 60 M.	Baproli, Nagal Katha, Chindalia, Mohammadpur, Jailab, Dohar Kalan Goad, Balaha Kalan, Balaha Khurd, Dochana, Badopur, Jadupur, Bhankhri, Khatoti Khurd, Khatoli Sultanpur, Dohar Khurd, Jakhni, Khodma
(Moderately high depth area) 50 – 60 M	Thana, Raghunathpura, Kultajpur, Kanwariwas, Hasanpur, Rambas, Maroli, Basirpur, Karoli, Amarpur Jorasi, Tajpur

(Moderately low depth area) 40 – 50 M	Danchali, Dhanota, Talot, Chhilro, Nizampur, Bamanwas, Mukhuta, Narheri Nepla, Pawere, Ghataser, Hudina, Mayee, Ajam Nagar, Hazipur, Baskirarod, Mehrampur, Abdulla Nagar, Dharsoon, Gehli, Makhauspur
(Low depth area) Below 40 M	Lehroda, Faizabad, Rampur, Niwaz Nagar, Salarpur Mehta, Mandlana, Rasulpur, Kirarod Afagan, Buchakpur, Lutalpur, Tehla, Mukandpura, Narnaul, Patikara, Shahpur Doyam, Faizalipur

II. Result and Discussion

It has been observed that in the North West and West part of Narnaul have high depth of ground water, North and South part have medium depth and North East part have low depth of ground water level. Because of ground water movement in this area from south west to north east. And a number of tube wells are also increasing from East to West part of the block which is a major cause of declining ground water level. Now there is no drainage in this area. The main seasonal streams in this area are Dohan and Krishnawati which have been disappeared.

It is observed that the ground water in this area is very less due to low rainfall and hence less recharge. After 1995 there is no water come in Dohan and Krishanawati stream in monsoon season. Some villages have deepest depth of ground water level. It is observed that there is no ground water, even drinking water bring from other villages.

Declining Ground Water Level in Narnaul Block

Depth of ground water is increasing continuously in Narnaul from 1995 to 2015. Ground water potential in this area is very less due to low rainfall and hence less recharge in monsoon season. The average depth of ground water table in is approximately 48 m. It has been observed that the rate of increasing depth of ground water level is increased in recent years. It is reported (Ground Water Cell, Narnaul) that on an average the ground water table goes down 1.04 M per year.

Table show Declining Ground Water Level in Narnaul Block

	Depth in Metres											
Year Name of Village	95	96	97	98	99	2K	2011	2012	2013	2014	2015	2016
Basirpur	39.19				35.75	37	39.1			53.55	57.5	60.9
Chillro (Talot)	40		42.35	38	38.8	41.66			39.8		47	48.7
Dhancholi	27.1	24.8	20.8	18.9	18.95	23.75	26.25	28.33	35.05	33.1	35.35	32
Dhanota	35.08	24	29.35	34	35	36.45	37	34.65	36.58	36.4	37.25	31.2
Dohar Kalan									60	60.9	61.5	60.9
Faizabad	15.4	13.55	12.21	13.27	13.65	14.78	15.8	15.7	16.9	17.85	18.2	17.3
God (Balaha Kl)	51.3	51.2	50.88	52.1	52.1	53.16	54.2	55.63	62.7	68	59.9	56.35
Hudina	32.1	30.25	27.98	25.25	25.62	27.93	34.7	31.55	43	40.1	39.54	36.9
Khodma	44.7	45.7	41.08	41.5	44.8	45.8			54.7	70	73.17	73.75

Koriawas			42.5	40.15		42.3			48	50	54	55.4
Mehrampur	30.3	25.5	21.93	22.8	23.45	27.35	1.45	31.35	34.1	35.2	36.81	32.7
Kultazpur		46.65	50.65	48.75	47.2				45.06	50.3	53.5	54.8
Narnaul	24.4	19.5	12.18	11.55	12.12	15.66	18.55	19.2	22.08	22.87	24.98	21.8
Pavera	36	36.75	31.85	31.1	31.55	36.25	40.65	39.2	43.65	44.65	43.2	35.8
Raghunathpura	32.5	20.55	16.48	17.45	18.65	22.91	25.05	27.2	23	33	59	59.45
Thana	47.6	46.2	42.85	42.55	44.7	48.65	55.3	32.7	58	46	52.4	53
Bhakhari KI											66	67
Average	34.36	32.22	31.64	31.2	31.59	33.83	34.36	31.55	42.56	45.16	48.2	46.92
Rainfall in mm	940	1289	838	521	285	352	548	209	427.8	333.7	765	433

Number of Tube wells and Ground Water Depletion

Due to lack of canal irrigation and low rainfall, the agriculture is based on tubewell irrigation and above 95% tube wells irrigation is prevalent in the study area. Tubewell irrigation is the major cause of declining ground water level. Figure 1.4 shows that the region which have high number of tubewells also have high depth of ground water level. Above 95% of the area is irrigated by tube wells which itself shows the pressure or stress on ground water of the region leading to depletion of its stock for future.

Relief and Drainage and Depletion of Ground Water Level

Relief and drainage are the dominant factor which effecting the depletion of ground water level. From relief point of view the maximum height of the region is 652 metres above mean sea level on hill top near village Thana while the minimum height is 287 metres near Kanwariwas. Aravalli offshoots are scattered. The slope of the block in which this block lies is towards south west to North West. Ground water also follows to the slop. From drainage point of view the block have to seasonal streams namely Dohan and Krishanwati, which flowed from South-West to North-East. Now these seasonal streams have been disappeared. Due to the disappearance of those streams ground water level is declining in Narnaul block.

Soils and Depletion of Ground Water Level

The water content of soil is also much related to its texture and structure. The size of the mineral particles, their shape and number of pore spaces are important in the amount of water retained by the soil. In Narnaul block there are mainly two types of soils are found namely sandy and loamy sand. South and South-West parts of the block have loamy sandy and North-East part have sandy soil. A few plains of them have rocky surface. Sandy soils have mare capacity to absorb the water than loamy sandy. Because of south and south west part of region have mare depth of ground water level than north and north east.

Rainfall and Ground Water Level

In the Narnaul block there is no streams and rivers, the ground water potential is depended on rainfall. Due to low rainfall the agriculture is based on tube well irrigation and above 95% tube well irrigation is prevalent in the study area. Because of ground water level is declining continuously. Rainfall is the dominant factor which can recharge the ground water.

Solution to Prevent the Declining Ground Water Level

- Artificial means should be applied to maintain the ground water table at optimum level for example recharges tube well.

- Roof top rain water harvesting technique should be used.
- Free or cheap electricity leads to waste full water use and ground water depletion. There should be a limit.
- There should be limited subsidy on tube well.
- To conscious the people about scarcity of ground water.

III. CONCLUSION

Over exploitation of ground water and as a consequence decline in water table is the cause of serious concern in south western part of Haryana and especially in Narnaul block. It has been observed that the ground water potential in this area is very less due to low rainfall and hence less recharge. The main cause of declining ground water level is that the streams Dohan and Krishnwati have been disappeared. So the situation demands recharging of declining water table with artificial means to maintain the ground water table at optimum levels.

In this monitoring and management for green environment.

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