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Geography

GROUNDWATER TABLE DEPLETION: A CASE STUDY OF KURUKSHETRA DISTRICT OF HARYANA

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ABSTRACT Water is an essential commodity for human life. Increasing need of water consequent upon agriculture development may be met by intensive use of the available resources. The contribution of groundwater to irrigated agriculture in India is about 50 percent. Haryana has an agriculture-based economy confronted with perpetual deficit of water. Since canal water is not sufficient to meet the requirements of irrigation, farmers are exploiting ground water through a large number of shallow tube wells. This paper focus on water conditions, viz, ground water table and its fluctuation in Kurukshetra District. Groundwater in the most parts of this area is fresh; its over exploitation has resulted in the fall of groundwater table leading to water table depletion. The study reveals that groundwater table is going down 0.8 meters every year due to its over exploitation. Excessive use of groundwater resources has resulted in serious environmental and land degradation problems. It is believed that one of the major causes of the decline in groundwater table is the introduction of water-intensive crop such as wheat-rice which is most prevalent cropping system in this region. The present study unfolds the spatio-temporal change in water at block level in Kurukshetra District of Haryana state, and covers a period of 20 years i.e. 1990 to 2010.

KEYWORDS :

Introduction:

Groundwater is that interstitial water which occurs in the zone of saturation. Theoretical surface to which ground water rises in an open hole under its natural potential is known as water table. The depth of the ground water table from the ground level is termed as water level. The ground water is considered as a resource for human societies. The use of ground water has grown explosively since 1950s. This tremendous increase in the growth of ground water development has resulted through formulation and clearance of a number of techno-economically viable ground water based minor irrigation schemes backed by liberal funding from institutional agencies and energisation programmes. Consequently rain fed agriculture has been changed into water consumptive crops after the green revolution. Rainfall does not meet the water requirements of agriculture. As a result of that farmers depend upon groundwater resources for irrigation purposes. Due to rapid growth of population and injudicious expansion of groundwater irrigation this natural resource is facing tremendous stress. In areas where the surface water is negligible, the larger part of irrigation is being sustained by the groundwater irrigation through tubewells. This has resulted in continuous lowering of water table.

Study Area:

Kurukshetra district falls in the north-east part of the Haryana State and is bounded by North latitudes 29˚53' and 30˚1502' and East longitudes 76˚2627' and 77˚0757'. The district covers 3.46% area of the State. The district is bordered by Karnal district in the south, Kaithal district in the south and south-west, Ambala in the north and Patiala in the north-west. The district is well connected by roads and railways. Administratively the district comes under Ambala division and it has three tahsils, three sub-tahsils and five blocks. The tahsils are Thanesar, Pehowa and Shahabad and the blocks are Ladwa, Pehowa, Shahabad, Thanesar and Babain. The district is one of the most densely populated districts of the state. The total population of the district as per 2011 census is 964231. The population density is 630 persons per sq.km against the state average of 573 persons per sq.km. The climate of Kurukshetra district is mainly dry with very hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrates into the district. The general slope of the land is from north-east to south-west wards. The district falls in two basins i.e Upper-Ghaggar Basin and the Upper Yamuna Basin. A small portion in south-east part of the district falls in Upper Yamuna basin and the rest of the area falls in Upper Ghaggar basin. The district is devoid of any perennial river. The only river Markhanda flows in the north-western part of the district which originates in Nahan hills. Chautang, Khand and Omla nalas of local existence also drain the district.

Objectives of the study:

The present study is an attempt to analysis the declining water table in Kurukshetra district. The main objective of the study is outline as follows:

1. To analysis the changes in depth of water table over the years.
2. To examine the trend of water table fluctuation in the study area.

Data Base and Methodology:

The present study is based on secondary data drawn from published as well as unpublished sources. Statistics on depth of underground water was collected from Ground water cell, Directorate of Agriculture, Panchkula, Haryana for the period 1990 to 2010. To explain the groundwater resources percentage share of geographical area with respect to depth of groundwater has been calculated and presented in form of tables. Water table fluctuation from 1990-2010 has been shown with the help of table and line graph.

Result and Discussion:

Depth of Water Table

A network of about 104 observation points has been fixed up in the study area for groundwater monitoring by different agencies. The water level observation wells are being monitored twice a year, i.e. Pre -monsoon (June) and Post monsoon (October) period. Table 1.1 shows shifts in area under different water table depths (m) in the study area. The lack of canal water use, the introduction of tube well irrigation have aggravated problem of water table fall in the study area. All most 100 percent of this area underlain with groundwater depletion and experiencing the falling trend of water table during last two decades.

Table 1.1: Area under Different Water table Depths (m) in Kurukshetra from 1990 to 2010

YEAR		0-10	10-20	20-30	30-40
1990	Pre Monsoon	27.78	72.22	-	-
	Post Monsoon	32.96	65.69	1.35	-
2000	Pre Monsoon	2.44	79.66	17.9	-
	Post Monsoon	1.41	67.35	31.24	-
2010	Pre Monsoon	0.36	0.84	40.92	57.88
	Post Monsoon	0.35	0.81	43.28	55.56

Source: Groundwater cell, Directorate of Agriculture, Haryana.

The area under water table 0-10 m depth pre monsoon has decreased from 27.78 percent in 1990 to 0.36 percent in 2010. During post monsoon period area under this category has decreased from 32.96 percent to 0.35 percent during the same period. The area under water table depth of 10-20 m during pre monsoon period has decreased from 72.27 percent to 0.84 percent. On other hand in 1990 during pre monsoon period 100 percent area of the district had water table less than 20 meters. The area under water table depth 20-30 meters during post monsoon has increased from 1.35 percent to 43.28 percent.

During the same period in the district area with depth of water table 30-40 meters increased from none to 57.88 percent in per monsoon and 55.56 in post monsoon. It is evident from the table that in whole parts of the study area, water table is going down very rapidly.

Block-wise Pattern of Change in Water Table

Table 1.2 shows shifts in area under different water depth (m) in each block of Kurukshetra district from 2000 to 2010. It is evident from the table that in 2000 100 percent area of all blocks are below 30 meters depth. Babain block is worst affected in term of deepening of groundwater level in the region. In this block the area under water table 30-40 meters increased from none to 100 percent during the period 2000 to 2010.

Table 1.2: Shifts in Area under Different Water table Depths (m) in each Block of Kurukshetra District from 2000 to 2010

Block Name	2000	2010	2000	2010	2000	2010	2000	2010
	0-10	0-10	10-20	10-20	20-30	20-30	30-40	30-40
Babain	-	-	77.94	-	22.06	-	-	100
Shahabad	-	1.61	59.77	2.02	40.23	2.52	-	93.85
Ladwa	5.45	-	74.17	-	20.38	17.16	-	82.84
Thanesar	1.46	-	81.57	1.40	16.97	48.06	-	50.54
Pehowa	4.99	-	95.01	-	-	77.24	-	22.76

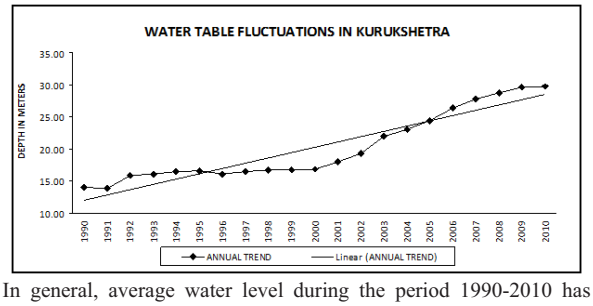
Source: Groundwater cell, Directorate of Agriculture, Haryana.

Similarly, water table decline has been experienced in all parts of Shahabad block. About 94 percent area of the block witnessed the groundwater level 30-40 meters in 2010. Some parts of this block experienced rise in water table up. In this block the area blow 10 meters depth increased from none to 1.61 percent. In 2000 whole Pehowa block and 83 percent area of Thanesar block had water table level less than 20 percent. In 2010 almost 100 percent geographical area of these blocks are above 20 meters below ground.

Fluctuations in Water table:

The fluctuation in the water table represents the net effect of both recharge and draft of groundwater during a year. The fluctuations occur due to variation in rainfall and groundwater utilization. On analyzing the water table in Kurukshetra district from June 1990 to June 2010 it has been observed that the average depth of water level in this district has declined by 16.14 meters. A glance at the line graph of fluctuation of water table reveals that it never remained stable. It evident from the fig. 1.1 the area experienced decline in groundwater table over the period. The water table in the region in 1995, when good rainfall helped in raising the water table and the water table becomes stable to 2000. After year 2000 there was again downfall in water table which is still continue. The average depth of water table in Kurukshetra has increased from 13.96 meters in 1990 to 29.83 meters in 2010 indicating an average water table fall of 0.81 meter per year. The increased in water table is mainly due to the dominance of groundwater irrigation and high exploitation of groundwater resource due to fresh quality.

Figure 1.1



In general, average water level during the period 1990-2010 has declined in all blocks. Maximum depth of water level in 2010 is found in Shahabad block (34.70), followed by Babain (32.56), Thanesar (27.65), Pehowa (27.56) and Ladwa (26.66) blocks. Highest annual decline (1990-2010) in water table (100.9 cm) was observed in Shahabad followed by Pehowa (78.55), Thanesar(66.7 cm) and Ladwa (58.8cm) blocks.

Conclusion:

In the present study an attempt has been made to examine the growth of tube wells and preferred water consuming crops have been increased on the other hand there is problem of depletion of ground water as well as environmental quality. The ground water table is going down 81 centimeters every year due to it's over exploitation. The analysis shows that inadequate rainfall, extension of area under rice crop, extent of irrigation network, increasing tube well irrigation and increasing cropping intensity are the principle reasons for the decline in groundwater table in Kurukshetra district. The falling water table has encouraged farmers to explore deeper aquifers through deeper tube wells.

The government has a crucial role to play in counteracting the myopic characteristics of individuals, and even communities, in the exploitation of depletable resources like ground water. For this purpose it needs to pay attention to generating more and better information on ground water use in different areas with active involvement of the public and independent experts. The data should be made freely and widely available in the public domain.

REFERENCES

1. Bilas, R. (1980), "Ground Water Resource of Varanasi district, India: An Assessment of Condition, Use and Quality", The National Geographical Journal of India, Vol. 26, No. 1-2, pp. 81-93.
2. Dhawan, B.D. (1995), "Ground Water Depletion, Land Degradation and Irrigated Agriculture in India", Commonwealth Publishers, New Delhi.
3. Inderjeet, (1997), "Spatio-Temporal Analysis of Ground Water Balance in Eastern Haryana", Transactions of the Institute of Indian Geographers, Vol.19, No.1, pp. 7-16.
4. Inderjeet, (2005), "Ground Water Resources of India", Mittal Publication, New Delhi.
5. Jaglan, M.S. and Qureshi M.H. (1996), "Irrigation Development and its Environmental Consequences in Arid Region of India", Environmental Management, Vol. 20, No. 3 pp. 323-336.
6. Pant, N. (1997), "Groundwater Depletion", Economic and Political Weekly, Vol. 22, No. 6, pp. 219-220.
7. Prajapati, S. and Singh, R.V. (2004) "Ground Water Analysis of Jaipur city during Monsoon Season", Indian Journal of Environment Sciences, Vol. 10, pp. 155-158.
8. Tejpal and Jaglan, M.S. (2012) "Irrigation Development and Depletion of Groundwater Resources in Southwes.