



EXPLOITATION OF GROUND WATER RESOURCE AT ITS LARGE IN DISTRICT SIRSA, HARYANA

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ABSTRACT :

The paper analyses condition of ground water depth of district Sirsa in 2005 and 2015. Ground water is the most important resource used as drinking water, for irrigation and for other household use in the district. The results show big change in the use of ground water from one block to another. The depth of ground water is continuously declining. Ground water is mostly exploited by growth of industries, agriculture, and municipal sectors. In all the blocks ground water depth is declining. The stage of development is 154 percent which implies that the annual water consumption is more than annual ground water recharge. Alarming situation of ground water resource of Sirsa district highlights the need of immediate action required for its conservation in the district. Government has to take strong action against over exploitation by industries/factories, over use in irrigation and wastage in households. So, the future of ground water in Sirsa district is in danger, if emphatically action for its preservation is not taken immediately.

KEYWORDS : Ground water resource, water table level, Pre-monsoon and Post-monsoon changes,seasonalf fluctuation.

INTRODUCTION

Ground water is the sub-surface water. It is one of the most important natural resource and also play dominant role in socio-economic development of the country. Ground water provides the drinking water for the population. Ground water is also important resource for industrial sector as well as agriculture sector. Ground water resource is also used for many domestic purposes.

Ground water is directly connected with landscape and the human activities above the landscape affect both the ground water quality and quantity. Land use affects Ground water quantity through changing demand for water. On the other side, Inappropriate land use and poor land management affects the ground water quality badly.

In Haryana state, the demand for ground water for irrigation started increasing with the advent of Green Revolution in 1960's. The change in cropping pattern has further increased the demand for ground water to irrigate the fields. The region is climatically more suited for wheat but farmer preference for rice crop has changed the entire scenario. This has led to over exploitation of ground water resources and the ground water level is falling rapidly at an alarming rate.

In Sirsa district, ground water resource also plays a major role in domestic use and industrial use in general and in irrigation in particular because Sirsa district is agricultural region. The farmers of Sirsa district have developed irrigation facilities and the most efficient irrigation is tube well irrigation system.

The present research problem is taken to study the existing as well as the previous condition of the water table in the district of Sirsa (Haryana). Farmers of this district depend on the ground water for their agricultural requirements. To increase the production farmer had used high yielding variety of seeds, which require large quantity of water.

RESEARCH METHODOLOGY

The present study deals with Sirsa district as study unit and the data considered for this study is secondary in nature. The time period of research is from 2005 to 2015 studying for the water level fluctuation. Main methodology of this study can be divided into two parts:

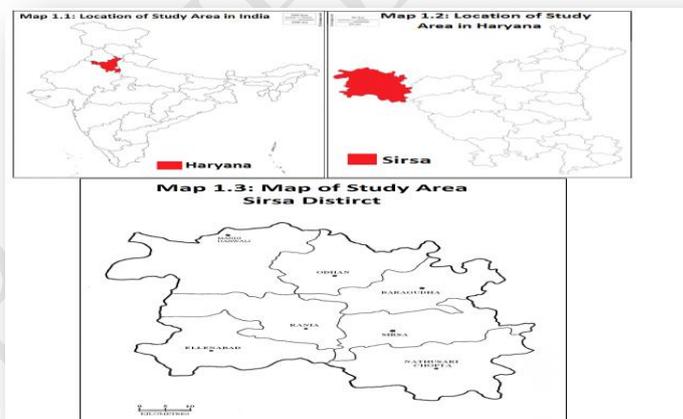
(i) **Collection of information and data:** The data and information collected from the Department of Agriculture and Farmer Welfare, Panchkula (Haryana). The base map has been taken from Primary Census Abstract of Sirsa District, Haryana.

(ii) **Processing of Data:** The statistical data will be then computed, tabulated and analyzed with the help of the following cartographic technique:

- Various maps of the study area will be prepared.
- Certain diagram, bar graphsetc. will be used to analyze data.
- Various choropleth maps will be prepared.
- Various line graphs will be prepared.
- Other diagrammatic representation.

STUDY AREA

Sirsa is the north western most district of Haryana state with a total geographical area of 4270 sq. Km. Sirsa's latitudinal extent is from 29°13' to 29°59' North latitude and 74°30' to 75°7' East longitudes. District is divided into seven Development blocks namely Sirsa, Mandi-Dabwali, Odhan, Baragudha, NathasariChopta, Rania and Ellenabad. Physiographical, the district is characterized by four distinct features i.e. Upland Plain, Alluvial bed (Flood plain) of Ghaggar River, Sand dune tract and Aeolian Plain. The district has basically two type of



Source: Primary Census Abstract, Sirsa

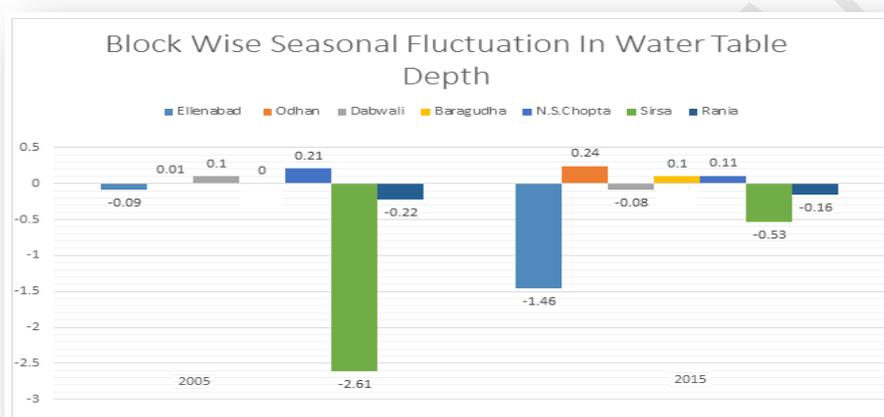
Soils i.e. Sierozem and Desert Soils. Climate of Sirsa district is tropical desert type, arid and hot which is mainly dry hot summer and cold winter except during monsoon period. Only a seasonal river Ghaggar is flowing through central part of the district and Bhakhra Canal is the only other source of Irrigation.

GROUND WATER SCENARIO IN SIRSA

It is clear that agriculture in Sirsa is largely dependent on the ground water because most of the irrigation works are being done through tube well irrigation. So, it is imperative for us to know the

situation of the ground water in the district. Growth of industrial, agricultural, and municipal sectors has resulted in increasing utilization of water, which caused considerable pressure on the development and sustenance of water resources, especially ground water resource. The major source of recharge to ground water in the district is inflow of ground water from north eastern and northern parts, rainfall, and seepage from canals, return both unconfined and confined aquifers. In general the unconfined aquifers occur down to 60 meters depth below ground level in the district. The ground water in confined condition is abstracted through hand pumps and shallow tube wells where as in deep and confined aquifer through medium and deep tubewells (CGWB, 2013). We will discuss about the block wise seasonal fluctuation in water table depth, and changes in ground water table levels in present and last decade.

In order to assess the quantitative change in ground water resources, water levels as a routine were monitored two times: Pre-monsoon and Post Monsoon. We compare the seasonal fluctuations block-wise in Sirsa district that occurred in 2005 and 2015.



Source: Department of Agriculture and Farmer Welfare, Panchkula (Haryana)

SEASONAL FLUCTUATION OF GROUND WATER IN SIRSA: 2005

Only N.S. Chopta Block is in very good condition with a seasonal fluctuation of 0.21 meters. There is no fluctuation in Baragudha Block. Ellenabad and Rania Block show negative fluctuation. Sirsa block is shows very worst seasonal fluctuation, with negative value of -2.61 meters. Odhan and Dabwali Block shows moderate fluctuation, with positive value of 0.01 and 0.10 meters.

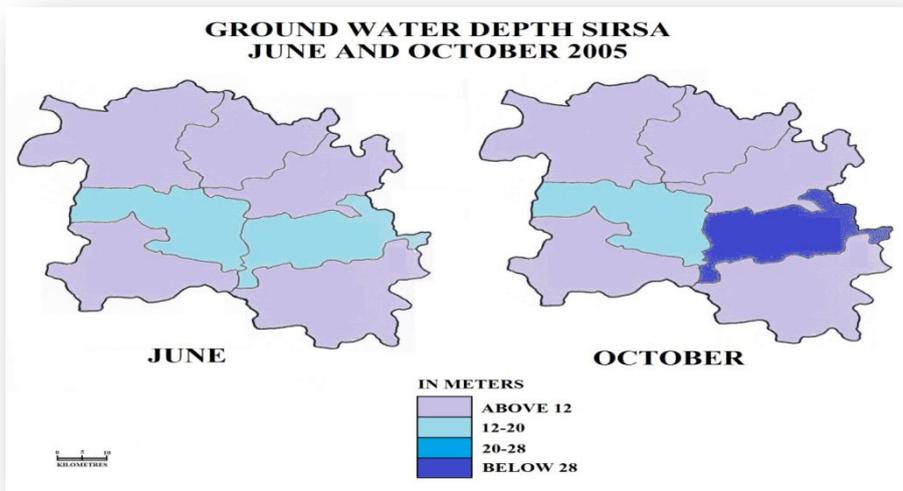
SEASONAL FLUCTUATION OF GROUND WATER IN SIRSA: 2015

Odhan block is in good condition with positive value of 0.24 meters. Baragudha and N.S.Chopta Blocks are showing moderate seasonal fluctuation. Rest of all four Block showing negative fluctuation and out of these four Ellenabad Block is in very worst seasonal fluctuation with negative value of -1.46 meters.

DEPTH OF GROUND WATER TABLE IN SIRSA: 2005

A detailed account will be taken regarding fluctuation in the water table in the district from 2005 to 2015:

In the pre-monsoon period, five blocks out of total seven Blocks i.e. Baragudha, N.S.Chopta, Odhan, Dabwali and Ellenabad blocks fall under the category of high water table depth, with depth ranging from 5.14 to 11.80 meters below ground level. Rania and Sirsa block were under the category of moderate water table depth, with an average depth of 14.22 and 19.91 meters below ground level respectively.

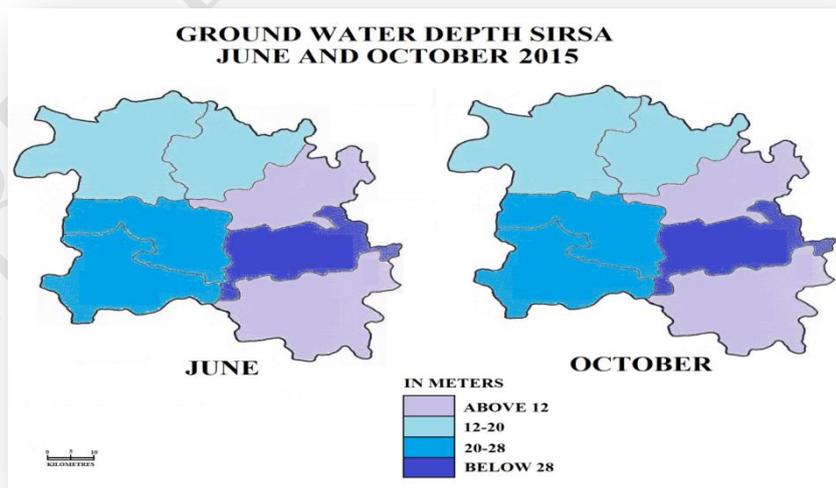


Source: Department of Agriculture and Farmer Welfare, Panchkula (Haryana)

In post-monsoon period, same five blocks i.e. Baragudha, N.S.Chopta, Odhan, Dabwali and Ellenabad blocks fall under the category of high water table depth, with depth ranging between 5.14 to 11.89 meters. Rania Block fall under the category of moderate water table depth, with depth of 14.49 meters below ground water level. Sirsa block fall under the category of low water table depth, with depth of 22.52 meters below ground level.

DEPTH OF GROUND WATER TABLE IN SIRSA: 2015

In pre-monsoon period, N.S. Chopta and Baragudha block fall under the category of high water table depth, with depth of 9.21 and 10.03 meters respectively. Dabwali and Odhan block fall under the category of moderate water table depth, with an average depth of 12.13 and 12.36 meters below ground water level respectively. Ellenabad and Rania block fall under the category of low water table depth, with depth of 24.56 and 26.78 meters below ground water level respectively. Sirsa block fall under the category of very low water table depth, with depth of 37.53 meters below ground water level.



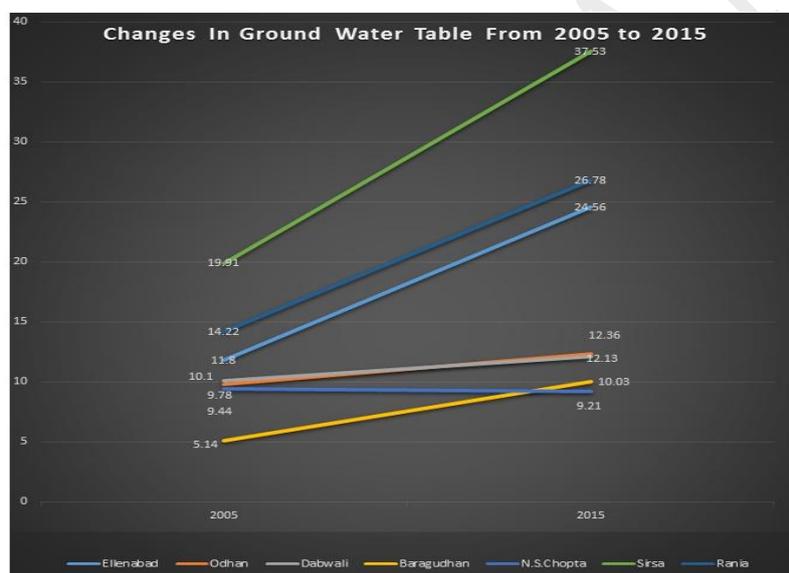
Source: Department of Agriculture and Farmer Welfare, Panchkula (Haryana)

In the post-monsoon period N.S.Chopta and Baragudha block fall under the category of high water table depth, with an average depth of 9.10 and 9.93 meters below ground water level respectively. Odhan and Dabwali block fall under the category of medium water table depth, with depth of 12.12 and 12.21 meters below ground water level respectively. Ellenabad and Rania block fall under the category of low water table depth, with an average depth of 26.02 and 26.94 meters respectively. Sirsa block fall under category of very low water table depth of 38.06 meters below ground water level.

CHANGES IN GROUND WATER TABLE LEVEL DURING LAST ONE DECADE

We will discuss about changes in ground water table levels in the district from 2005 to 2015:

Water table in the district has shown a great variation during the last decade. The depth of ground water in district falls very rapidly from last decade i.e. 7.46 meters. The main reason behind this great fall in water table is expansion of agricultural and industrial sector as well as growth of population in the region. As far as block wise analysis of ground water is concerned, only N.S.Chopta block is in very good condition with rise in ground water level i.e. 0.23 meters increase. Rania, Ellenabad and Sirsa these three blocks are in very worst condition with rapid fall in ground water table depth i.e. 12.56, 12.76 and 17.62 meters respectively. Dabwali, Odhan and Baragudha blocks have also observed continuous fall in ground water table with depth of 2.03, 2.58 and 4.89 meters respectively.



Source: Department of Agriculture and Farmer Welfare, Panchkula (Haryana)

ISSUES

- i. In the district, the farmers adopt rice cultivation which requires abundance of water for irrigation. This crop is not suitable according to the climate of that area.
- ii. Farmers are not aware about problems related to ground water quality and depth. As a result, they are adopting injudicious cropping pattern which leads to fall in the water level. This can lead to future problems like desertification, issues of food security etc.
- iii. Leakage occurring from water supply lines is another issue. Due to leakage water wastage is occurring which will impact on human health in future.
- iv. The ground water situation of all the blocks is not good. Out of total 7 blocks, 5 blocks are in over exploited condition, 1 block in critical condition, and also 1 block in semi-critical condition. It is must to take strong preventive measures to sort out this problem.
- v. Pollution is one of the main ground water issue related with environment. Ground water pollution comes from many sources, many harmful substances are mixed in soil and when rains come these substances goes into the ground water beneath the earth surface. There are many agriculture

pollutant which pollutes ground water such as pesticides, fertilizers etc. Manufacturing industries are also playing major role in ground water pollution. Many toxic chemical are not properly disposed of and they leach into the ground water.

- vi. Over exploitation of water is second ground water issue related to environment. 62902 tubewell and pump sets are working continuously in the district (District Statistical Officer, Sirsa).
- vii. Continuous falling of ground water level is also another environment related issue. From last 15 years depth of ground water is lowering rapidly, due to over exploitation of ground water.
- viii. Ghaggar river is the only source of surface water in the district. Therefore, most of the farmers exploit ground water through tubewell that requires electric power. To fulfill the requirement, government provides electricity at very low price. This leads to wastage of electricity by farmers, which will hinder future economic growth.
- ix. There is poor quality of drinking water in the district. Purifying water is a costly activity being under taken by our government and by wasting our drinking water, we are intact causing economic problems for Haryana State.

CONCLUSIONS

Ground water is the most important natural resource of the Sirsa district. Ghaggar river is the only source of surface water in the district. Therefore, ground water is exploited by farmers for irrigation, industrial purposes, domestic purposes and many other purposes. It is evident from the analyzed data of last two decade that depth of ground water is continuously declining. After analyzing the whole data we have come to the following conclusions:

- During green revolution farmers adopted new technology and methods of agriculture. This resulted in pollution of water, pest infected crops, overexploitation of ground water resources and water logging in drier tracts.
- It is clear that agriculture in Sirsa is largely dependent on the ground water because most of the irrigation works are being done through tubewell irrigation.
- Growth of industries, agricultural and municipal sectors has resulted in rapid exploitation of water.
- Water table in the district has shown a great variation during the last decades. From last one decade, the average water table depth decreased by 7.46 meters.
- In the district, ground water situation of all the blocks is very serious. Out of 7 blocks, 5 blocks are in overexploited, 1 block in semi-critical and remaining 1 block in critical condition.
- In the district, the stage of ground water development is 154 percent which implies that the annual water consumption is more than annual ground water recharge.
- Number of tubewells is increasing at very rapid rate, because of which proper recharge of water could not take place. This is the main cause behind overexploitation of ground water.
- Urban Growth also plays a dominant role in decreasing water table level because of urbanization concrete roads are constructed and due to these concrete road rainwater could not penetrate ground surface.

SUGGESTION

- i.) Government should make farmers aware about the adverse impact of over use of insecticides, pesticides, fertilizers and the ground water table. The relevance of maintaining the quality of ground water resources should be also highlighted.
- ii.) Today, main problem is falling of ground water table, it can be solved through changing the cropping pattern by adopting crop diversification.
- iii.) Install water saving shower heads and control the flow of taps to avoid wastage.
- iv.) This area has an urgent need of implementing means of artificial recharge for the upliftment of ground water table.
- v.) Should turn off the tap after use whether it is public or domestic water tap.

- vi.) Use native plants in your landscape. They look great and don't need much water or fertilizer.
- vii.) Involve children and adults in water education, learn more about ground water and share your knowledge with others.
- viii.) The modern methods of irrigation like sprinkler, drip irrigation and laser technique should be used.
- ix.) Crops should be grown which is suitable for environment i.e. salt tolerant crops should be grown in Sirsa district like maize, wheat etc.
- x.) Roof technique should be used for the rain water harvesting.
- xi.) Adopt the irrigation technique according to crops, soils, and climate.
- xii.) To recharge aquifers renovation of village ponds, trenches, bore well etc. should be promoted at large scale.

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BLOCKWISE DEPTH TO WATER TABLE JUNE, 2005 & JUNE, 2015

S.NO.	BLOCK	GROUND WATER DEPTH(meters)	
		2005	2015
1	ELLENABAD	11.80	24.56
2	ODHAN	9.78	12.36
3	DABWALI	10.10	12.13
4	BARAGUDHA	5.14	10.03
5	N.S.CHOPTA	9.44	9.21
6	SIRSA	19.91	37.53
7	RANIA	14.22	26.78
	AVERAGE DEPTH	11.48	18.94

SOURCE: DEPARTMENT OF AGRICULTURE AND FARMER WELFARE, PANCHKULA (HARYANA).

BLOCKWISE DEPTH TO WATER TABLE OCT, 2005&OCT, 2015

S.NO.	BLOCK	GROUND WATER DEPTH(meters)	
		2005	2015
1	ELLENABAD	11.89	26.02
2	ODHAN	9.77	12.12
3	DABWALI	10.00	12.21
4	BARAGUDHA	5.14	9.93
5	N.S.CHOPTA	9.23	9.1
6	SIRSA	22.52	38.06
7	RANIA	14.49	26.94
	AVERAGE DEPTH	11.86	19.20

SOURCE: DEPARTMENT OF AGRICULTURE AND FARMER WELFARE, PANCHKULA (HARYANA).



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