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# Agriculture Hazards in Haryana
## (A Surface and Sub-Surface Water Study of Hisar Tehsil)

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### INTRODUCTION

Haryana is largely dependent on agriculture and its allied activities, which provide livelihood about 80 percent of its population. Agricultural development is determined by both physical and cultural aspects of any area but irrigation is the most important factor for agricultural development. Irrigation in our agrarian economy assumes the same importance as blood in human body, because without irrigation other modern techniques i.e. H.Y.V. (High Yielding Varieties), Modern implements, Biochemical inputs etc. cannot applied in agriculture.

The study area (Hisar tehsil) is located in the western portion of Haryana. It lies between $28^0 55'$,N to $29^0 34'$,N latitude and $75^0 22'$,E to $76^0 30'$,E longitude. It is a plain area having general slope from east to west. The north eastern and middle portion is alluvial and fertile plain while the south western portion has sand dunes containing coarse grained sandy soil. Which is adjacent to the Thar desert of Rajasthan. The climate of the study area is semi-arid, where annual range of temperature is very high i.e. $27^0$C. The highest mean monthly temperature is about $37^0$C. in the month of June, while lowest is about $13^0$C in the month of January. Monsoon rainfall is common in the study area. North eastern part of the study area receives more than 350 mm. rainfall, while south western part receives less than 300 mm. of the total annual rainfall, Monsoon is not reliable. Neither it has specific period nor it has specific quantity. So the study area developed and assured water supply of irrigation are essential for raising agricultural productivity.

### SURFACE WATER OF THE STUDY AREA

In order to meet over expanding demand for agriculture and its development, it is required that the surface water is available and properly utilised. The surface water is supplied in the study area by the Bhakra Canal System and Western Yamuna Canal System. The river Ghaggar flows at a very marginal distance in the northern boundary of the study area but it is a seasonal river. The irrigation pattern of the study area displays subtle differences. The north eastern part is highly irrigated while the south western of the study area is less irrigated due to sand dunes relief and sandy soil. The irrigated area of the tehsil increased from 16 percent of the total area in 1950-51 to 72 percent in 2010-11. (Haryana statistical abstract 2010-11). The surface water supply (discharge) and demand (indent) of the study area is also observed in the research work. It may be noted that the quantity of water provided by distributaries & Channels are always remained below the requirement of the crops as shown by the table 'supply & demand of surface water' of the study area.

The variation is not only in discharge but indent of distributaries also varies season wise. The gap of discharge and indent is fulfilled by the sub-surface water irrigation by the farmers only where fresh water is available.

**Supply and demand of surface water of Hisar tehsil**

**Kharif**

| Year | Disharge | Indent | Percent of Demand Met |
|---|---|---|---|
| 1995-96 | 165037 | 268868 | 61.3 |
| 2000-01 | 164838 | 267932 | 61.5 |
| 2005-06 | 163210 | 265416 | 61.4 |
| 2010-11 | 183025 | 219515 | 83.3 |
| 2015-16 | 184629 | 266419 | 69.2 |

**Rabi**

| Year | Discharge | Indent | Percent of Demand Met |
|---|---|---|---|
| 1995-96 | 179030 | 284202 | 62.9 |
| 2000-01 | 162015 | 267820 | 60.4 |
| 2005-06 | 142720 | 254107 | 56.1 |
| 2010-11 | 187970 | 222645 | 84.4 |
| 2015-16 | 200744 | 230249 | 87.1 |

Source : S.D.O. Irrigation, Hisar

## SUB-SURFACE OF THE STUDY AREA

Sub-surface water or underground water is that inter-terrestrial water, which occurs in the zone of saturation. It may also be defined as the sub soil below the zone of aeration or vadose zone, and is confined to the zone of saturation.

The most important factor of the underground water is its quality which is determined by the electrical conductivity in particular water. The block wise distribution of various quality of underground water of the study area is divided into four major types.

i) Fresh quality (less than 2000 E.C.)

ii) Sub marginal or slightly saline (2000-4000 E.C.)

iii) Marginal water or moderate saline (4000-6000 E.C.)

iv) Saline water (Above 6000 E.C.)

Only fresh quality water can be used for irrigation purpose but it covers only 19.9 percent of the study area. The remaining 80.1 percent underground water area is not fit for irrigation in the study area.

The second important factor of underground water is its level and fluctuation. For the analysis of water level change and the depth of water table, the HSMITC (Haryana State Minor Irrigation and Tube wells Corporation) pre-monsoon period has been considered. The depth of water table in the study area under 3 mts. is about 12 percent which lies in small patches near Uklana, Hisar and Adampur block. High ground water table near Uklana may be due to the seepage of the Ghaggar river. Adampur high water table may be due to an ancient canal Chitang which flowed through the zone. The high underground water of Hisar tract may be due high irrigation intensity in C.C.S. HAU (Chaudhary Charan Singh, Haryana Agriculture University) farms. As the study of underground water table June 2015-16 of Hisar tehsil reveals that 54 per cent area comes under 3 to 10 metres depth of water table, while 34 percent area comes under above 10 metres. It is the middle and south western part of the study area. It is due to the lowest rainfall and lowest intensity of irrigation in the tehsil. Thus the general depth varies from 1 metre to 20 metres in the study area. But the main attention and problem of the study area is the rising trend of underground water table.

The map depicting “Fluctuation of water table” of Hisar tehsil from June 1995- to June 2015 is quite useful in determining the effects of recharge or discharge on water table condition. The map clearly reveals that whole part of the tehsil water table is positiviely fluctuating. The highest fluctuation is noted in the north eastern part near Barwala where about 13 metres water has risen in 17 years. The trend of rising in Water table is from north east to south west. It may be due to the Ghaggar river and high intensity of irrigation.

## GROUND WATER BALANCE AND DEVELOPMENT

The table of underground water balance shows true position of block wise water balance on June 2015 of Hisar tehsil. The highest net utilisable recharge and net annual draft is noted in Hisar block i.e. 8811.97 and 1883.12 Ham (Hect. metres) respectively. The ground water balance of the study area is increasing with rapid speed because of the poor quality of underground water that does not promote to the farmers for installing the more tubewells. It was 27324.93 Ham in June 2015 in Hisar tehsil. In this way the average underground water development is 19.14 percent noted of Hisar tehsil.

**Ground water balance in hisar tehsil - June 2015**

| Name of | Net Annual | Net Annual | Ground Water | Ground Water |
|---|---|---|---|---|
| Adampur | 3797.48 | 1207.22 | 2590.26 | 31.79 |
| Agroha | 7580.12 | 1668.39 | 5911.73 | 22.01 |
| Barwala | 7378.94 | 899.50 | 6479.44 | 12.99 |
| Hisar -1 | 8811.97 | 1883.12 | 6928.85 | 21.37 |
| Uklana | 5909.11 | 495.25 | 5417.65 | 8.38 |
| Total | 33478.41 | 6153.48 | 27324.93 | 19.14 |

Source : Hydrologists, Underground Water cell, Hisar

The increasing ground water balance and positive fluctuation of underground water clearly indicate that the study area is going to become a wasteland. This research also support the statement given by the **Indian Express**, May 2010 that "Haryana May become a wasteland" because the water table is declining in the fresh quality zone due to high drafting than recharging and while the water table is increasing at very rapid speed in marginal or saline water area where drafting is less than recharging causing serious problem of water logging in this agricultural zone.

## SOLUTIONS OF THE PROBLEM

The climate of Hisar tehsil is semi arid where rainfall is erratic and not always when required for man to carry out various economic activities. Similarly, surface water supplies in the study area for agricultural purposes is limited. The south and south western part of the tehsil where sand dunes and sandy soil exist, the intensity of irrigation is very low. The climate is more extreme than the north eastern and middle part of the tehsil. So this part of the tehsil is more socially and economically backward than the other part of tehsil. Underground water depth is more than 20 mts. and most of the water quality is saline and moderate saline while in north and north eastern part where a very marginal distance the Ghaggar river flows, water table is very high and the water table is rising with rapid speed. So some area is pointed out as a critical area. Which can be wasteland for agriculture in the coming year. As the underground water situation depict that water balance of the tehsil is increasing day by day due to less drafting than net annual recharging in the tehsil. A large number of pumpsets and tubewells can be installed in these critical area along the channels and distributaries for the south western region of the tehsil where irrigation intensity is very low. Seepage drainage can be dug and its water can be put in these channels. By this procedure the seepage problem of north east tract can be removed and the south west region can be developed by the extending of irrigation facilities because irrigation is the most important factor for the development of agriculture, which is main stay of the economy of Haryana.