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IMPACT OF WATER TABLE ON SOIL AND CROPS-CASE STUDY OF A VILLAGE OF HARYANA

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ABSTRACT : In the present paper the porductivity and protective functions of the soil have been studied in relation to sub-soil water table in a village, where a large part of porductive land is turning into saline or alkaline land.

INTRODUCTION

Water logging and its attendant ills in the areas irrigated by the Western Yamuna Canal (Haryana) first received attention around 1850. By 1907, similar phenomena appeared in areas of other canal systems in Punjab. In the Deccan, the Nira Irigation project was opened for its irrigation in 1884; it caused serious waterlogging and salt affliction in deep black soils of the command areas. In the post Independence period, research on these problems has been intensified and remedial measures taken in several areas, notably in Punjab and Haryana. The deveopment of ground water resources in the wake of the introduction of high yielding varieties of wheat helped a great deal in lowering the water table.

STUDY-AREA

The village of Mahalsara Mothsara is situated at 29-15 N, Latitude and 75-65 E. longitude in Adampur Tehsil of district Hisar, It lies about 22 km. North West of Hisar and 65 km. North East of Tehsil Bhadra (Border Tehsil of Rajasthan). A metalled road passes through the village. The Krishangarh Canal traverse through the western part of the village. The land on the whole is on an aproximate elevation of 217 metres above M. S. L. The village land east of the canal is low and remains water lodged during rainy season. This part of the district, on the whole, is a level plain with soil of loam and sandy loam.

METHODOLOGY

This is a micro level field study based mainly on primary data and field observations, supplemented with secondary sources of data from village Patwari.

Ten wells have been selected for the measurement of ground water level in the different rainy periods of the year (June, July and August) to show the water level impact on soil and crops. These wells have been selected on the basis of distance from canal i.e. near canal (within 1 km. radius) and away from canal (over 2 km. radius).

The ground water table in the district of Hisar is rising gradually.The same problem exists in this vaillage.

Factors associated with the gradual rise of water table.

Drainage: The most prominent factor is the Krishangarh canal which flows into the village to irrigate the cultivated area. Due to this and

another sub-canal the pressure on existing wells has considerably reduced. In canal irrigated tracts of the country, indeed, with the continuous loss of water through seepage, the water table of the nearby area rises up and this village is not an exception. In some areas hard clay pans and indurated calcareous layers prevent the downward movement of water specially in the eastern part of the village, thereby bringing a consdirable rise in underground water table.

It is seen from the survey of wells situated near the canal that the water table is higher. In the month of July the water sometimes flows out of the wells. In the month of August it was only 1.45 feet below the surface. On the other hand, in the wells which are more than two Kilometre away from the canal, the water-table was 5.10 feet below the surface. The rise in water table around the canals was partly due to percolation of canal waters.

PHYSIOGAPHY

The land has impercaptible slope therefore, most of the rain water accumulates in a place, percolates into the soil and brings up the water table. Loam and sandy loam are the main soil types of this village which allow the water to percolate freely into the ground that increasing the existing stock of ground-water.

RAINFALL

The variation in the amount of rainfalll affects the amount of underground water-level. In order to measure the impact of rainfalll on gound water level, the water depth of 5 wells of different places was recorded for different months prior to and during the rainy season i.e. June, July and August. The average water table is always the lowest in June. it is seen that the average water table in wells away from the canal in June 1992 was 6.06 feet. In July there is sometimes an overflow of water in most of

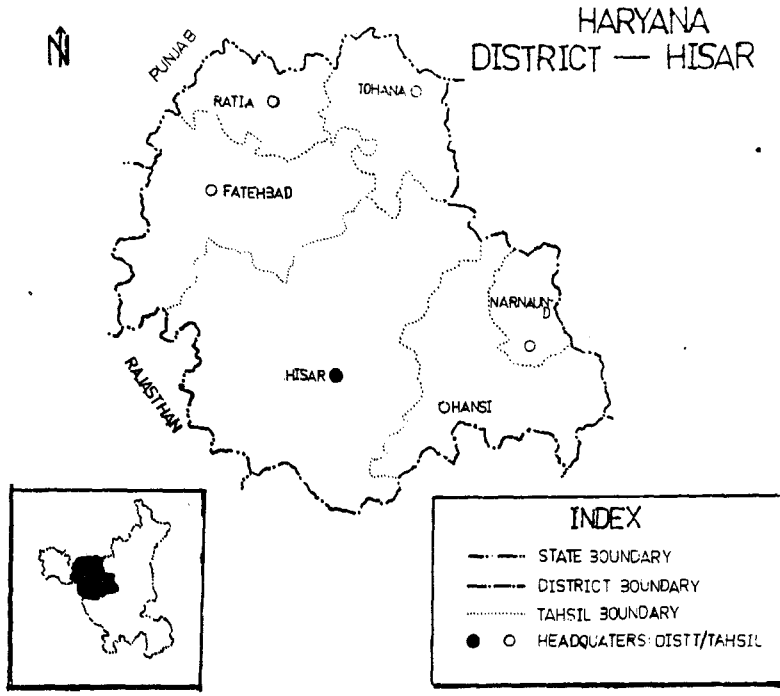

Fig. : Haryana District — Hisar

the wells but generally the average depth of water table in these wells was below 1 feet from the ground-water level. In the month of August, 1992, it went down upto 2.5 feet below the surface. In 1994 when the rainfall was 610 mm. the average depth of water table in these wells was about half feet below the surface in the rainy season. Thus it is clear that rise and fall of gound water level, that took from June to Aug. in 1993 and 1994, are due to variation in the amount of rainfally in these years.

EFFECT OF HIGH GROUND WATER LEVEL ON SOIL AND CROPS

In the high gound water level area, water-table rises to an extent that the soil pores in the root zone of a crop become saturated, resulting in restriction of the normal circulation of air, decline in the level of oxygen and increase in the level of carbon dioxide.

The free exchange and flow of water and air is of extrme biological significance. Restricted drainage is inimical to root growth. In harms the soil and crop in many ways. Shallow root penetration inducing water logging, frost and drought injuries, and the starvation of plants because of interference with the intake of minerals and water are remarkable. Poor drainage system abets the accumulation of soluble salts, because when the water moves upward and saturates the upper soil then the injurious salts come on the surface. As evaporation proceeeds these salts remain on the surface and make the soil saline.

It has been seen that many hectares of land of this village degenerated into saline land. This is more serious in that part of the village where the water table touches the surface during the rainy season.

The water table which is considered harmful would depend upon the type of crop, type of soil and quality of water. The actual depth of water table, when it starts affecting the yield of the crop adversely, may vary over a wide range from zero for Rice to about 1.5m for other crops.

Crops adversely affected by water table

Crop	Water Table (In mt.)
Rice	zero
Wheat, Sugarcane	0.6
Maize, Bajra, Cotton	1.2
Gram, Barley	0.9

The village study has revealed that in the last few years, cropping pattern (Kharif & Rabi) of this village has undergone drastic change. Earlier where Bajra, Maize, Gram, Barely were the main seasonal crops now these are Rice, Cotton and Wheat of high yielding dwarf varieties which are unaffected by water logging and salinisation.

Remedial measures in the shape of land-levelling, construction of field channels and field drainage, irrigation during the night and avoidance of waste of water have been undertaken in this region to improve this condition.

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