

Declining ground water resources in Rajpura block of Patiala district, Punjab

Ritu Nagdev, R.K. Meena, S.K. Mahapatra, Ashok Kumar, Vikas and Jaya N. Surya

ICAR-National Bureau of Soil Survey and Land Use Planning (NBSS & LUP),

Regional Centre, IARI Campus,

Pusa, New Delhi 110012

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The Rajpura block is located in north eastern part of Patiala district of Punjab state and extended from $30^{\circ}24'50''$ to $30^{\circ}39'16''$ N latitudes and $76^{\circ}25'56''$ to $76^{\circ}49'14''$ E longitudes (Fig 1). Physiographically, the block is situated in flood plains of *Patiala walinadi and choanadi flood plains of Ghaggar* and dissecting rolling plains in the north. The parent material of the block is alluvium originated from the sedimentary rocks of the *Shivalik*. The total geographical area is 283.15 sq km, with a population of 1,52,741 (Census, 2011).

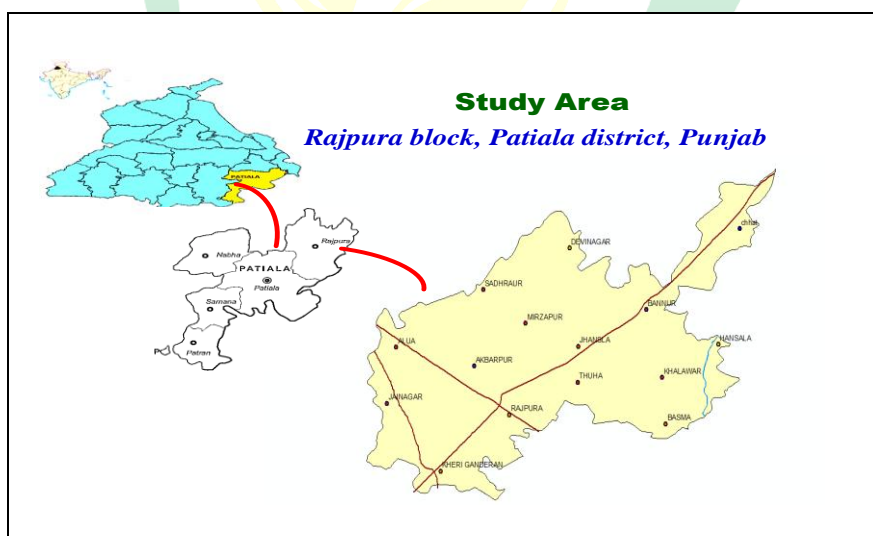


Fig 1. Rajpura block of Patiala district, Punjab

The climate of the study area is tropical steppe, semi-arid and hot, having very hot summer and cold winter. The temperature of the block varied in the range of 7.1 to

40.4° C with minimum and maximum temperature in the month of January and May/June, respectively. The mean annual rainfall is 816.9 mm with large temporal variations.

Around 90% of the total geographical area is under agriculture and it is the dominant livelihood activity in the block. The proportion of cultivators is 18% while the proportion of agriculture labourers is 11%. Rice-wheat is the major production system associated with mustard, maize, sorghum and vegetables.

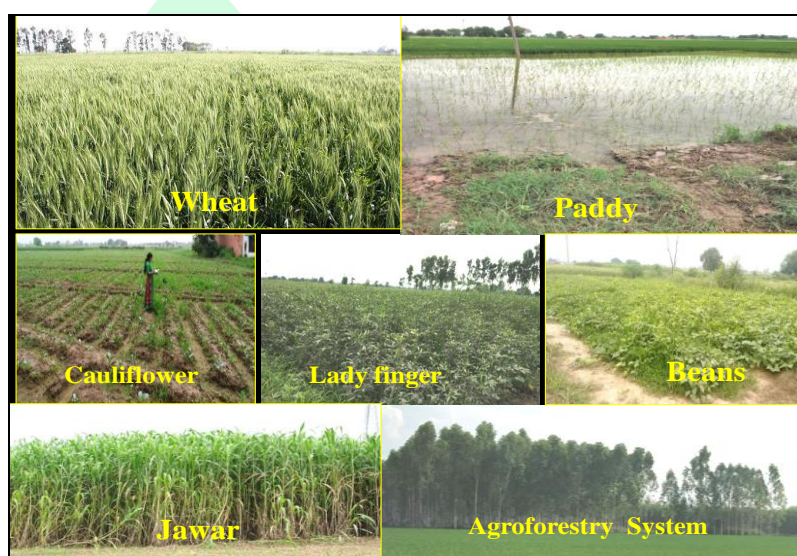


Fig.2. Agriculture land use in Rajpura block

Constraints in agriculture: Rajpura block is facing various constraints in agriculture viz., nutrients deficiency in soils, kankar layers, and water contamination due to pollutants such as pesticides, declining crop productivity, ground water depletion and non-agricultural use of potential lands. But the depletion of ground water is a major threat for agriculture.

Major constraints faced by the farmers is *availability of irrigation water* as tubewell is the main source of irrigation but ground water table is continuously declining in last few decades. About 94% cultivated area is irrigated by tube wells/wells and only 6% from canal as mentioned in census of India, 2011 (Fig 3). Thus, the depletion of ground water is a serious problem in agriculture activity.

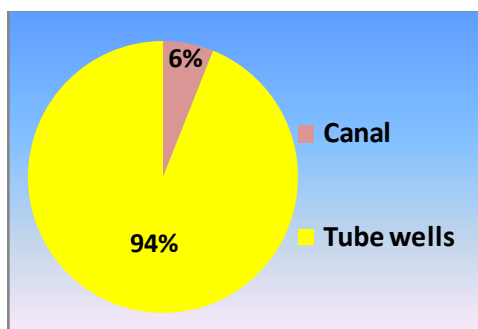


Fig.3. Irrigation resources

Ground water resources: Ground water resources are available in the different group of aquifers. The fresh water resources are estimated up to the depth of 300 m on the basis of geophysical interpretations. Total available ground water resources are 2421.02 MCM.

Thus the block is categorized as **Over-Exploited** as per Dynamic Ground Water Resources. In this block, total 114 villages have been identified under scarcity zone, while 112 villages under water supply and water tank exists in 39 villages, respectively.

Depletion of ground water: The ground water level decreased continuously from 1999 onwards in both June and October months as depicted from the wells in figure 4. The wells in some areas became dry after 2009 (Source: Department of Agriculture, Punjab).

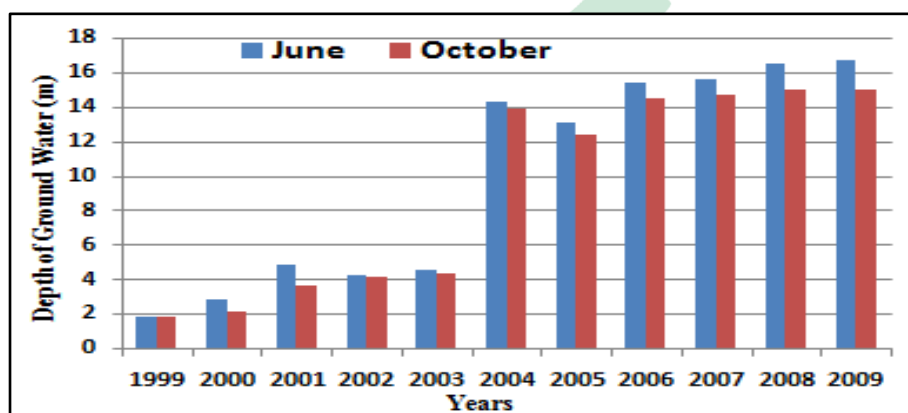


Fig.4. Declining ground water level from 1999 to 2009

The farmers from 10 villages from the block have been interviewed to determine the declining trend of ground water. The farmers revealed that the ground water table declined drastically from 1980 to 2018 in each and every village.

The maximum decline occurred in *Gopalpur* (195 feet), followed by *Urdan* (180 feet), *Aluna* (145 feet), *Takhtumajra* (120 feet), *Akar* (110 feet) and *Chakkalan* (90 feet), villages, respectively (Fig 5). The comparatively less depletion of ground water have been noticed in *Jansui* (15 feet), *Lehlan* (20 feet), and *Shamdo* (40 feet), villages, respectively .

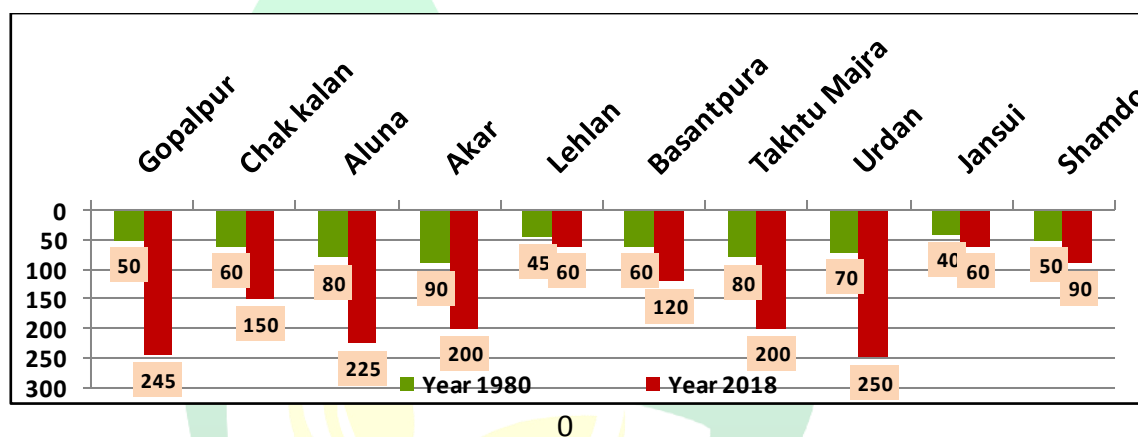


Fig.5. Status of ground water in different sites, Rajpura block

Impact of declining ground water resources: The major amount of ground water is used for agriculture purposes only. During the interaction with farmers mainly in *Lehlan*, *Jansui* and *Shamdo* villages, they explained that due to scarcity of water they were using contaminated water of Chandigarh drain for irrigation. Irrigation with contaminated (heavy metals) water poses serious threat to soil as well as agriculture produces and ultimately health of human beings. Thus, efforts to conserve the water resources must be taken on priority.

Conservation of the water resources: Since ground water resources are depleting in the block it is necessary to grow the minimum water requirement crops and rational use of ground water. Adoption of water conservation practices such as renovation of traditional water resources, collection of rain water (rain water harvesting) and make



the facility of underground storage for effective use later on besides, conservation of water resources in agriculture fields. Changes in cropping pattern, maintenance of organic matter/crop residue cover, zero tillage, irrigation planning, use of modern irrigation methods, suitable measures to reduce the runoff and drainage and use of soil water reserves, etc are the appropriate options for conservation of water resources in agriculture. It may also promote the ground water recharge in the area.

Rajpura block is facing a huge problem of water scarcity as the ground water resource in the block is declining rapidly which is causing the problem of field irrigation for the farmers. Therefore, it is required to ensure the water resource conservation as it plays a vital role in agriculture. The appropriate steps must be taken by the government, NGO's, policy makers and individuals to conserve this unreasonable water resource in the block for sustainable productivity.