Paddy, tube wells and depleting groundwater

Rice cultivation in Punjab, which thrived in the past due to the easy availability of water resources and free supply of electricity to farmers, is under considerable strain now. **Vikas Vasudeva** examines how overexploitation has made groundwater not only scarce but also increasingly alkaline

A farmer at his paddy field in Sangrur as a bore well extracts groundwater. Increased cultivation of the water-guzzling rice crop, augmented by free power supply, has caused depletion in water reserves. ▪ AKHILESH KUMAR

Gurmeet Singh, 60, a tall landowning farmer in Bhattiwal Khurd village, which is located in Punjab's Sangrur district, has yet again planted the water-guzzling paddy crop this summer (kharif) as he is sceptical of any other crop fetching him a remunerative price.

Standing on the edge of the Ghaggar branch canal, which flows barely a few metres away from his field, Gurmeet reveals that hardly anyone in the village irrigates his/her field with canal water. That is because motor-operated tube wells, with their powerful submersible pumps, have become an easy and preferred choice for most of the households to extract groundwater, he says.

Punjab's policy of providing free electricity to farmers, in place since 1997, along with the Central government's favourable attitude towards paddy cultivation, are the key factors that have motivated farmers like Gurmeet to persist with paddy, despite the grave groundwater crisis faced by the State.

"Most of us here in the village have tube wells installed, be it on our farm or inside our houses. We use groundwater for irrigation, drinking and other domestic purposes. In 1977, we got our first tube well drilled at a depth of 35 ft-40 ft. Water at that time was easily available at 15 ft-20 ft. Since then, we have drilled as many as four tube wells as the water levels have been consistently falling. I got the latest one installed two years ago at around 300 ft. It cost me around ₹1,00,000," he says, his head dropping in despair as he mentions the high cost of his latest tube well.

The green revolution impact

Gurmeet's father Magar Singh, 90, intervenes to point out that farmers like him shifted to cultivation of rice and wheat during the *hara inquilab* (green revolution); till then, he says, crops like pulses, maize, vegetables and cotton were mainly grown in the village.

"Paddy (rice) requires far more water than other crops and as farmers started cultivating paddy, the need for tube wells arose. The extraction of groundwater only increased as farmers shifted from the use of monoblock pumps in the 1980s to other types like submersible pumps," he says.

Ideally, groundwater should be available at a depth of 50 ft to 60 ft, but in Punjab, its level has significantly dropped to 150ft to 200 ft in most places. Many attribute this drastic fall to an indiscriminate extraction of groundwater in the last two decades.

Further, deepening of tube wells, and purchase of the powerful motors to carry out the deepening, is costing farmers ₹1,100 crore per year, according to government data. The State, which gives free power to farmers, is also facing an increased financial burden due to the rising use of electricity. This year, the total power subsidy to the farm sector is estimated at ₹9,674 crore.

To counter this, the Punjab State Farmers' Policy, drafted by the State's Farmers and Farm Workers' Commission in June last year, suggested rationalising of power subsidy and asked the government to restrict the subsidy to the non-income tax payee farmers. It also recommended that cultivation of paddy on common lands be disallowed. Common (*shamlat*) village lands, whose utilisation is regulated under Punjab Village Common Lands (Regulation) Act 1961, have been increasingly used for paddy cultivation over the years. Experts feel that a restriction on such usage can help arrest groundwater depletion. The government, however, is yet to take a final call on these policy proposals.

The Punjab government is well aware of the fast depleting groundwater reserves. Last month, Chief Minister Captain Amarinder Singh directed the State Planning Board to chalk out a comprehensive crop diversification model. The Board was also directed to undertake a detailed review of the various schemes of the agriculture department to bring in much-needed reforms in the sector.

The Chief Minister, who has been stressing the need to prioritise the cultivation of crops that consume less water like maize, cotton and sugar cane, asked the Board to come up with a strategy to persuade the farmers to shift to these crops.

However, while the State government has been advocating crop diversification to save groundwater, farmers don't seem to be keen on shifting to other crops unless they are given an assured market and a guaranteed price for their produce. "I am aware that paddy consumes more water than other crops but what is the alternative? Government agencies purchase rice and wheat (during rabi season) at the minimum support price (MSP), which assures me of a remunerative return. But in the case of other crops, there's hardly any such assurance. The government should purchase all major crops at MSP as is done in case of rice and wheat; until then, it's difficult to shift," says Randhir Singh, 51, who grows paddy at his three-acre farm in Bhattiwal Khurd village.

This sentiment is echoed in other parts of the State as well. In Fatehpur village, located in the Chief Minister's pocket borough of Patiala, Karamjeet Singh says that after suffering financial loss owing to a price crash in the market, he stopped the cultivation of potato a few years ago. "Three years ago, I planted a potato crop in my field but prices in the market crashed badly. The potato was fetching as low as ₹2 per kilo in the market. I couldn't even recover the cost of my crop and suffered a loss of around ₹3,00,000. Since then, I have stopped its cultivation and have been sowing rice and wheat, for which I am assured of getting a remunerative price as government agencies will purchase my produce at the MSP," he says, as he takes a seat along with his fellow farmers at the public shed in the village.

'Wrong to blame farmers'

As the farmers beat the heat and humidity of an August afternoon under a fan mounted on the shed's ceiling, Ajaib Singh, 62, points out that it is wrong to blame farmers for groundwater depletion. "There are industries and factories that are extracting a huge amount of groundwater – legally and illegally. Not only this, the unsystematic disposal of waste from these industries is contaminating the water, making it increasingly alkaline," he says.

For Dilbag Singh, 43, usage of water from the Kherimala branch (canal), which flows barely three km from the village, is an affordable and doable way to reduce dependence on groundwater. "The government needs to upgrade and work on maintenance of canal irrigation system. It needs to ensure the supply of water at tail-ends [the last part of the water outlet]. If an underground pipeline system can be laid, it will help us optimise water use. Also, it will check the theft of canal water," he says.

"Farmers like me are using tube wells because it's an easy way of extracting water with powerful submersible pumps these days, but if the government develops a mechanism and lays a pipeline till my farm, why would I need to invest in a tube well? I remember we used to get water in canal outlets and also from wells for irrigation during the 1980s, but now almost every house in the village has a tube well," says Kesar Singh, 52, who has sown rice in his five-acre farm.

Another rice-growing farmer, Nirmal Singh, who is a farmer leader as well, points out that the government needs to focus on establishing an assured market mechanism. "What farmers want is a market – where the purchase of their products is guaranteed and they get an assured remunerative price," he says.

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> RANDHIR SINGH,
> Farmer at Bhattiwal Khurd village

Punjab's economy is highly dependent on agriculture. The sector. however, is experiencing slower growth as the State's cropping intensity and irrigation potential have been fully exploited and the growth in productivity has also reached a saturation point.

The intensive groundwater extraction in the last five decades through installation of shallow tube wells is reflected in tube well numbers – which have increased by almost 200% in 35 years, from six lakh in the 1980s to 14.76 lakh in 2017-18. Also, the area under rice cultivation has increased from 11.83 lakh hectares in 1980 to 28.86 lakh hectares in 2017-18. On an average, there are 34 tube wells per sq. km of net sown area in Punjab (2015-16).

According to the Draft Dynamic Ground Water Estimation Report-2017, 109 blocks out of the 138 blocks taken for its study were "over-exploited", two blocks were "critical" and five blocks were "semi-critical" while 20 blocks are in "safe" category. The water table was declining in nearly 80% of the area of the State.

The report also said that while the annual replenishable groundwater resource in Punjab was about 17.5 million acre-ft (MAF), the annual draft (extraction) was 29 MAF, implying that the extraction rate outstripped availability by quite a few notches.

"If this trend continues, it will adversely affect the agricultural economy of the State and it is apprehended that irrigated area may decrease by up to 15% in the year 2025. Further, in the coming 20 years, supply from about 60% of top aquifers may be jeopardised. There will be an increase in the cost of raising crops, placing an increased financial burden on farmers and the government. A shortage in water supply could also act as a deterrent when it comes to investment in industries requiring water. Around 30 million residents of the Punjab region may face a collapse in agricultural output," says S.K. Saluja, Superintending Engineer, Directorate of Ground Water Management.

Salinity in water

The report also raised concerns about the deteriorating quality of groundwater due to pollution caused by urbanisation, industrialisation and an increased use of fertilisers and pesticides. It said that while nearly 50%-60% of groundwater was "fresh and fit", 20%-30% was "moderately saline and of marginal quality". Further, about 15%-25% of the groundwater was "saline, alkaline and not fit for irrigation".

Water in south and southwestern districts – like Sangrur, Muktsar, Bathinda and Mansa – came under the last category, containing "varying concentration of soluble salts" and its use for irrigation will adversely affect agricultural production, said the report.

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An increased awareness about the need for safe drinking water has caused many households in Bhattiwal Khurd village to install RO (reverse osmosis) water purification systems. "I felt the need for RO system at my home after my family members started falling ill due to water-borne diseases at regular intervals. We have been consuming groundwater directly from tube wells for a long time," says Randhir Singh.

Untreated industrial effluents

P.S. Rangi, a noted agriculture economist and a former adviser to Punjab State Farmers Commission, says that water quality is being impacted by untreated or inadequately treated industrial effluents and sewage that flows into rivulets and rivers in Punjab.

"Also, traditional water bodies such as ponds and wells in the villages are under threat. In most of the places, ponds have been filled and encroached upon while in other places, they have become a dumping ground for sewage. The problem is further compounded by the mixing of storm water and sewage in various municipal towns. The pollution and contamination of water resources due to industrial waste, sewage and excessive use of chemical pesticides in agriculture is a major cause of concern that needs immediate attention," says Rangi.

Given the grim situation, Punjab's Department of Water Supply and Sanitation is planning to implement 10 surface water projects at a cost of ₹1,021 crore. These projects intend to provide potable piped water supply to 1,021 "quality-affected" villages, making them less reliant on groundwater and more on canal water.

A total of 130 such villages – including 85 uranium-affected villages in Moga and 45 iron-affected ones in Roopnagar – have so far been shifted from groundwater to canal water.

Lakhwinder Singh, professor of economics at Punjabi University, Patiala, who has been mapping rural Punjab for decades, asserts that agriculture in the State thrived in the past due to easy availability of both groundwater and surface water but, over the past few years, the availability has reached a saturation point.

Increase in indebtedness

"Successive State governments invested on drainage systems that saved crops from damage in the case of heavy and untimely rains. Over the years, due to an incentivising of groundwater irrigation by the government and an irrational increase in the number of electric tube wells, water tables have receded. Experts have been time and again cautioning the State on the long-term consequences of excessive exploitation of groundwater. Now, farmers are forced to borrow from informal and formal sources to install tube wells, causing indebtedness and farmer suicides," says Lakhwinder, adding that that faulty public policy and irrational cropping system should be blamed for the scenario.

"Governments never visualised a scenario where agriculture would block the natural groundwater recharging process and create conditions for falling water tables," he says.

He proposes that the drainage system be used for artificial recharge of groundwater. "There is also a dire need to change the cropping pattern, especially in major parts of Malwa, which need to take up cotton cultivation again," he says, adding that "water recharging system, if put in place, can solve weather-related problems and economic incentives can be used to change farmers' mindsets, making them shift to multi-cropping system".

He feels that a "major policy shift with long term vision can solve both the agrarian crisis and the problem of water depletion."

Realising the magnitude of agrarian crises, the draft policy framed by Punjab's Farmers and Farm Workers' Commission points out that a decade of business as usual has left farmers in an unenviable position.

The policy strikes a cautious note in telling that the State is struggling to meet the aspirations of its farmers and the time has come to take a critical look at the deteriorating resources, the changing economic environment and the emerging market scenarios.

Farmers in Fatehpur, Patiala, looking at an abandoned well, which once used to be a major water source for irrigation but has now run dry due to over-extraction of groundwater. ▪ AKHILESH KUMAR