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IRRIGATION PATTERN IN JAIPUR DISTRICT OF RAJASTHAN

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ABSTRACT

Water is an essential natural resource for sustaining life and the environment, but over the last few decades' water quality has deteriorated due to overdevelopment. Water quality is an essential parameter of research when the overall focus is on human-centered sustainable development. Ground water is a major source of drinking water in both rural and urban areas, and in India more than 94% of his demand for drinking water is filled with groundwater. Fluoride and nitrate are important chemical parameters that affect the quality of groundwater. Proper water conservation is beneficial to farmers and helps to cultivate more land. One possible solution to economically utilize these precious natural resources is drip irrigation. This minimizes water and fertilizer losses, increases plant yields and improves profits and product quality. After evaluating the data in this study, it was concluded that urgent corrective actions need to be taken in these areas to protect the population from health problems. It has also been observed that the average yield of vegetable crops per hectare increased significantly after the introduction of the drip irrigation system as farmers earned more income from crop production, demonstrating the positive effects of the drip irrigation system. The article describes irrigation and groundwater patterns in the Jaipur district of Rajasthan.

Keywords: *Irrigation System, Ground Water, Economic Development.*

Introduction

Agricultural production plays a very important role in the national economy. The increase in human population, along with rapid industrial and urban development, has led to a sharp increase in the demand for agricultural products. Water is a well-known basic and most important input for agricultural production. Due to the rapid decline in irrigation water potential and increasing water demand from various sectors, there is a demand for management strategies and program to save water and increase the existing water use efficiency in Indian agriculture. In the traditional method of surface irrigation, the losses during the transport and application of water are large. Farmers can significantly reduce these losses by adopting irrigation technologies.

Water is an important resource, and population growth, urbanization, and related consequences have created alarming conditions about future ultimate availability. Irregular rainfall and climate change can also have an impact. There is sex. Approximately 25% of water is used for household, industrial and other purposes. 75% is used for agriculture nationwide. In Rajasthan, about 83% is used for irrigation. Increased demand from other competing industries can reduce to 75% 1. For sustainability reasons, the use of water must be efficient. Effective use and protection is a means of solving serious problems. To solve this problem and understand the seriousness of the problem, the Rajasthan State Government has begun a water benchmarking and irrigation system audit exercise through the Department of Water Resources, with real-world conditions, changing inflow conditions and behind it. Understand why, gaps in water transport channels that close, problems and solutions. Rajasthan remains largely agricultural and about 70% of its population depends on agriculture-related activities. This underscores the importance of water resources regarding the use of water for irrigation purposes. Irrigation, a major user of water resources, is the basis of all water planning and use. There is a large gap between the irrigation potential

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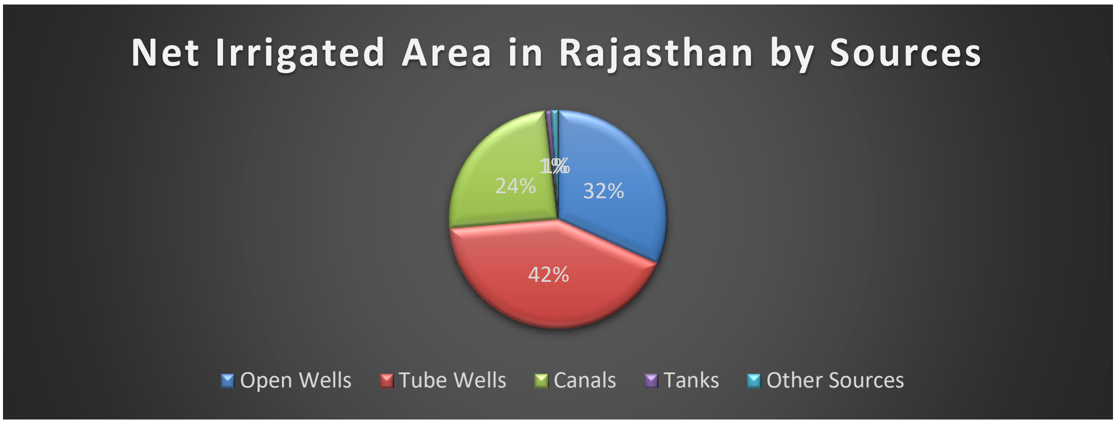
created and the potential utilized. The Rajasthan Water Resources Department has approximately 3320 irrigation systems (large, medium and small). Large irrigation systems have over 10,000 hectares of cultivable command area (CCA), and medium irrigation systems have over 2,000 and up to 10,000 hectares of CCA. All groundwater structures and surface water structures (both flow and upwelling) with CCA up to 2000 ha are considered separately as minor irrigation structures. At the end of the 8th Plan (1992-97), the 9th Plan (1997-2002) and the 10th Plan, Rajasthan has 6545.5 thousand hectares and 8678.1 thousand hectares in large, medium and small plans, has a potential of 9235.6 thousand hectares). The difference between net irrigated area and net sown area in Rajasthan is around 31%. In addition, most of the projects lost their planned CCA due to various losses, changes in cultivation patterns, variations in inflow or watershed yields, etc. This has had a significant impact on the productive economic performance of irrigation projects. Given these facts, it is important to reassess the project and its design parameters, identify where deficiencies lie, andprovide actionable corrective actions to improve overall project efficiency.

It was also observed that the average yield of vegetable crops per hectare increased significantly after the introduction of the drip irrigation system as farmers earned more income from crop production, indicating the positive effect of the drip irrigation system.

Irrigation Statistics in Rajasthan & Jaipur

Rajasthan is India's largest state, accounting for about 11% of the country, but has only 1% of the country's water availability and an average rainfall of 575 mm. Due to the dry and semi-arid climate, i. H. Negative moisture index, poor soil, traditional agricultural practices, food security, food security, sustainability and profitability of the state's horticultural production system are still distant dreams. Rajasthan's irrigation scenarios are characterized by irregular or low rainfall, reduced groundwater resources, increased demand for alternatives from local and industrial sectors, or reduced water available for agriculture. Agriculturalists relied heavily on rainfall for irrigation purposes. However, drip irrigation technology has provided a solution to the nation's internal problems. As a result, drip irrigation in such areas has provided farmers with additional income. The introduction of drip irrigation led to vegetable production, which was more advantageous than agricultural production and increased farmers' income. With all these facts in mind, this study was conducted on the impact of drip irrigation systems by farmers in the Bikaner district of Rajasthan.

Net Irrigated Area in Rajasthan by Sources



In 1982 and 1994, a report on the hydraulic geology of the district was completed. The groundwater balance is monitored four times a year for water level and once a year for water quality by 64 canal stations (16 wells, 41 piezometers). Groundwater surveys were conducted to decipher the shape of the aquifer and determine water quality potential and parameters. So far, a total of 100 EWs, 15 OWs, 01 SHs and 56 piezometers have been manufactured.

Salient Features of Ground Water Exploration

Type of Well	No.	Depth Drilled (m)	SWL (m)	T (m2 /day)	Discharge (lpm)	EC (µ/cm) at 25oC
EW	99	19.9-169.4	0.59-55.66	0.76-3144	18-1879	360-6270
PW	15	45.5-136	2.2-21.04	7.3	60-1200	490-2600
PZ	56	25-196.8	3.91-60.79		6-1200	325-10390
SH	1	18.37				

Jaipur area corresponds to the agricultural climate zone 3-A semi-arid eastern plain the area is characterized by mild winters and hot summers. The average maximum and minimum temperatures in the region are 40.6 degrees Celsius and 6.2 degrees Celsius, respectively. Temperatures fluctuate up to 47 ° C in May and June and up to 1.0 ° C in January. The average temperature in the area is 24.3 degrees Celsius. The normal annual rainfall in semi-arid areas is 527 mm (1901-71), while the average annual rainfall over the last 30 years (1991-2021) is 565 mm. The average annual rainfall from 2001 to 2010 was 527 mm (Table 3). Over 90% of total annual rainfall falls during the monsoon season. The total annual potential evapotranspiration is 1744.7 mm. The coefficient of variation is modest at 32.6%, indicating a slightly unreliable amount of precipitation. The Jaipur district is characterized by a variety of landscapes including hills, peaks, hilly river plains, aeolian dune fields, gorges and paleochannels. The structural hills (mainly in the north and northeast) running from the NE to the SSE are usually quartzite from Delhi. Major peaks include Jaigarh (648mm), Nahagarh (599m), Manoharpura (747m) and Bichung (656m). Around Dudu, Phagi and Chaksu, thin to thick overburden shields form flat gneiss outcrops. The area is dominated by fluvial/fluvial-aeolian hilly plains, forming reliefs of fluvial terraces, flood plains and subterranean beds of various drainage systems. Aeolian dunes are found mainly in the western regions (Sambar, Jobnah and Renwal regions) and range in height from a few meters to 10 meters. In addition to canyon and wasteland terrain, barriers and shadow dunes are also found in parts of the district. The area is drained by the temporary Banganga, Bandi, Dundo, Menda, Masi, Sota, Sabi rivers and their tributaries. The Sotha and Savi rivers flowing through the northern part of the district flow northeast, while the Banganga river flowing to the southwest flows through the Shapura, Bailas and Jamwa blocks of Ramgarh, feeding the famous Ramgarh Lake and from there eastward to the Dausa district. flow in. The Menda River in the northwest of the district flows into the famous Sambal Lake, while the Masi River in the southwest flows east.

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Irrigation Projects Completed

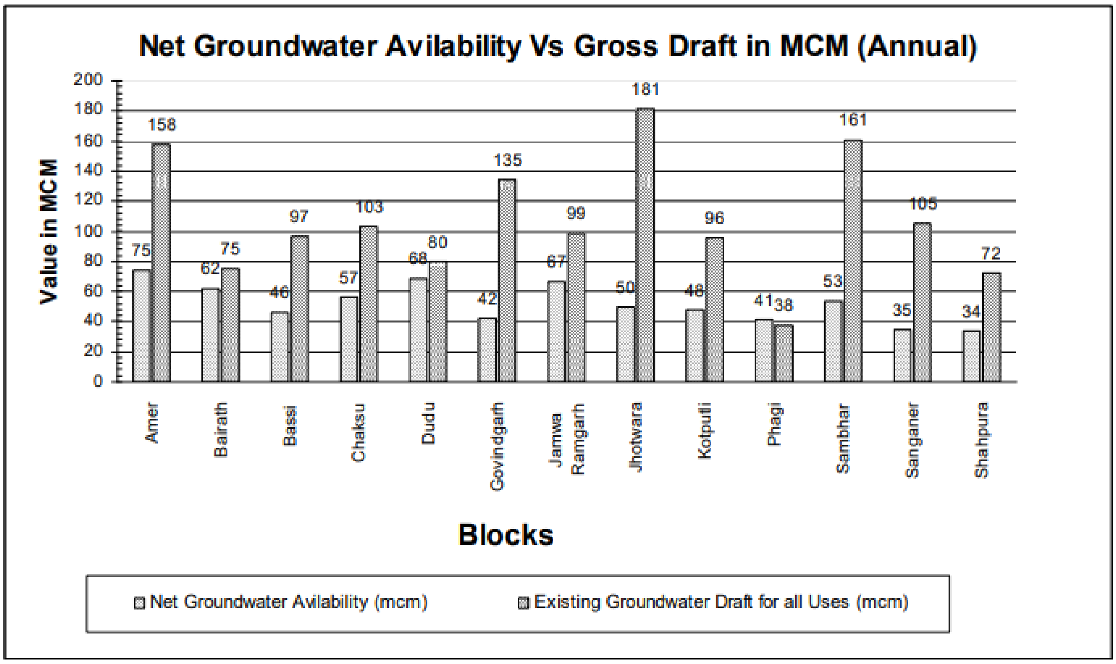
S.No	Schemes	Number of Projects
1	Major (CCA above 10000 Ha)	22 No.
2	Medium (CCA between 2000 -10000 Ha)	77 No.
3	Minor (up to CCA 2000 Ha)	660 No.
4	Tanks transferred to Panchyat Raj Department	3139 No.
	Total	3898 No.

The Rajasthan Government has made a policy decision to base all new irrigation systems on pressure irrigation systems. WRD has begun work on 10 new irrigation projects under a pressure irrigation system in the command area of 2.87 lakh. Eight new medium-scale irrigation projects covering an area of 51717 hectares are underway an area of 10,708 ha will be covered by 49 new small-scale irrigation projects. NDB-funded NDB-funded IGNP Phase I sewerage system discharges worth 3,291 million to improve the efficiency of existing irrigation systems. A project in the desert. Phase I work on Rs900 Crore is underway. This will benefit about 4.86 lakh CCA and 22,831ha of flooded area reclamation. The program will allow for the diversion of excess floodwaters flowing into Pakistan and the use of excess water by Ravi & Beas.

Drip irrigation, also known as drip irrigation or micro irrigation, is a method of irrigation that minimizes water and fertilizer use by dripping water slowly towards the roots of plants. A network of valves, tubes, channels and emitters. Drip irrigation is ideal for row crops (vegetables, fruits), trees and vines where each plant can be provided with one or more emitters.

Ground Water Resources

Central Groundwater Board and Rajasthan State Groundwater Department (RGWD) have jointly estimated groundwater resources in Jaipur district based on GEC-97 methodology. Groundwater resource estimates were made for 9994.67 km2 The non-command area and 340.06 km2 area within the Fagi block is salt water. The total annual renewable resources of the district is estimated at 750.45 million m3 and the annual net availability of groundwater is estimated at 677.14 million m3. The total annual groundwater withdrawal for all uses was estimated at 1,399.58 million m3 with a groundwater development rate of 207%. In addition, the annual net available volume of saline groundwater resources in Phagi block was estimated at 23.47 million m3, compared with the annual net water withdrawal estimated at 23.96 million m3, with a groundwater development rate of 102%.



Precipitation in the area is the main source of groundwater recharge. Groundwater levels are falling due to decreased precipitation and increased groundwater abstraction. Irrigation in this area is mainly provided by groundwater, ie dug wells and pipe wells. There are currently 120,471 fountains/fountains/pipes for irrigation and 27,378 hand pumps/fountains/fountains for domestic and industrial use. The area has a groundwater development rate of 207% (as of March 13, 2009). Phagi falls into the critical category and the remaining blocks are overdeveloped with groundwater development levels ranging from 117% for Dudu to 364% for Jothwara. Conductivities range from 370 µS/cm at 25°C at Datal Gurjaran in Jamwa Ramgarh block to 12310 µS/cm at 25°C at Nasnota in Dudu block. Conductivity of over 3000 µS / cm has been observed at 25 ° C in some of the Dudu, Sambar, Chaksu, Jamwa Ramgarh, and Kotputli blocks (Figure 8). Conductivity greater than 10000 µS / cm was observed at 25 ° C only from one isolated pocket on the Dudu block. There are concerns about the presence of high levels of fluoride in the groundwater of the district. Fluoride concentrations in the district range from

0.16 mg / L for Nasnota in the Dudu block to 16.4 mg / L for Phullera in the Sambar block. Approximately 29% of groundwater samples taken for chemical analysis had fluoride levels above the maximum allowable limit of 1.5 mg/L. Approximately 64% of the samples and 7% of the samples have fluoride concentrations within the required (1 mg/L) and maximum acceptable limits. Dudu, Sambhar, Phagi, Chaksu, Sanganer, Jothwara and Jamwa Ramgarh blocks are the most affected by fluoride contamination.

Conclusion

Rajasthan is a desert country and recognizes the importance of water conservation. Rajasthan makes every effort to conserve water. According to a report published by her Niti Ayog in 2018, Rajasthan ranks her first in 'change in state-level performance over time – change in combined water index scores for non-Himalayan and Northeast and Himalayan states'. it was done. According to the above report, "Rajasthan has improved its scores in all indicator themes, including the fact that Water Users Associations (WUAs) are playing a greater role in the irrigation and restoration of surface water bodies. Building on this momentum, Rajasthan received a US$100 million loan from the New Development Bank (NDB) in 2018 to improve the Indira-Gandhi Canal system. It is expected that WUA enhancement and water body restoration will be the major activities of the proposed plan. Be. In addition, use of treated industrial wastewater for irrigation, horticulture and aquifer recharge, industrial wastewater treatment to control contamination of fresh groundwater sources, price of groundwater for irrigation to relieve pressure on groundwater. Setting and use in high water demand crops should not be recommended. Appropriate agricultural advisory services should be provided to farmers so that they can use alternative crops that consume less water. Economic crops are also very efficient.

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