

A STUDY OF DRINKING WATER RESOURCES MANAGEMENT IN RAJASTHAN: SOURCES, POLICIES AND STRATEGIES

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ABSTRACT

Rajasthan is the largest State in India in terms of geographical area, occupying more than 10 percent of the land area and contributing more than 5.5 percent of the country's population. Further, the Thar desert situated in the state is a big impediment in the development of the state. Due to desertification, there is increasing spread of arid and semi-arid areas of the state, obstructing the progress of the area. Due to desertification, rainfall and other climate conditions, occurrence of famine is common in recent years. The surface water availability is only 1.16 percent of the entire country. More than half of the groundwater sources are affected by salinity, fluoride and nitrate contamination and other chemical disorders have made the existing water resources unfit for potable needs. The major sources of surface-water are Indira Gandhi Canal, Narmada Canal, Bisalpur Dam, Chambal River and Mahi Dam.

Keywords: Thar Desert, Semi-Arid Area of State, Surface Water Availability, Chemical Disorders.

Introduction

More than half of the population is based on agriculture and allied activities for their livelihood. Irrigation, the largest water user sector, is reeling under the pressure of increasing demands of other user sectors all over the world because of limited fresh water availability. To meet increasing demand of agricultural production, water is the most critical input, to meet the food and other requirements of the growing population. The shortage of surface-water and high dependency on ground water has resulted in its over exploitation. Out of the 302 blocks in Rajasthan, only 38 (around 12.5 percentage) are in the safe category in terms of availability of groundwater. The variability in rainfall has further resulted in low recharge of groundwater and intensified the shortage of water in the state.

The Government is committed to provide potable water to every citizen of the state. But the aforementioned factors, combined with the largest livestock population in the country, make the task of providing potable water incredibly challenging. With a state-wide office network and use of state of art reverse osmosis, defluoridation, supervisory control and data acquisition (“**SCADA**”), information technology (“**IT**”) and solar energy technology, the Government is providing safe drinking water in the remotest corners of Rajasthan. The State Government fulfills the water needs for irrigation and drinking water by making better use of the available water resources in the state, boosting the irrigation potential from 2.47 lakh hectares to 39.07 lakh hectares, and leading thereby to increased agricultural productivity.

Ground Water Sources

Due to its agroclimatic circumstances, Rajasthan heavily relies on diverse sources for groundwater replacement. The Indira Gandhi Canal, traditional structures like ponds and step wells, and modern interventions such as check dams contribute significantly to groundwater availability in the state. Urban and rural water supply schemes, including tube wells and hand pumps, serve the dual purpose of extraction and recharge. Rajasthan's rich tradition of water conservation, seen in practices

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like earthen embankments and small check dams, supports rainwater harvesting and groundwater recharge. Underground aquifers act as natural reservoirs, and sustainable management and conservation efforts are essential for ensuring continuous access to this vital resource for agricultural and domestic needs. Government initiatives have significantly helped in optimum usage and replacement therein, recognizing the diverse sources contributing to Rajasthan's groundwater sustainability.

Surface Water Sources

Rajasthan, characterized by its arid climate, relies on limited surface water sources, predominantly rivers like Chambal, Banas, Luni and Sabarmati. These rivers, though seasonal and subject to erratic flow, play a crucial role in surface water supply, especially for agriculture and allied activities. Reservoirs and dams, including the Bisalpur Dam and Mahi Dam, contribute to water storage and distribution. Projects like the Western Rajasthan Canal and the Indira Gandhi Canal provide irrigation to vast areas. While surface water is scarce and variable, Government is determined on effective management and sustainable uses of water for diverse needs of Rajasthan's population and supporting agricultural activities.

Population (%) getting water through Pipe Water Supply. Source: PHED (NRWDP MIS)	Year	Rural	Urban
	2015-16	22.06	72.37
2016-17	24.5	72.52	
2017-18	27.15	72.68	
2018-19	28.33	74.97	
2019-20	33.96	78.85	
2020-21	NA	82.73	
Population (%) using drinking water source (Rural). Source:-PHED Department, (NRWDP-MIS),	2015-16	83.00	
	2016-17	83.33	
	2017-18	86.13	
	2018-19	88.72	
	2019-20	89.90	
	2020-21	92.60	
Urban Proportion (%) with drinking water supply. Source:-PHED Department	2015-16	81.23	
	2016-17	81.94	
	2017-18	82.1	
	2018-19	84.40	
	2019-20	87.23	
	2020-21	91.25	
Rural Proportion (%) with drinking water supply. Source: - PHED Department, (NRWDP-MIS)	2015-16	44.86	
	2016-17	44.42	
	2017-18	47.98	
	2018-19	50.72	
	2019-20	41.27	
	2020-21	43.54	

Source: Rajasthan SDG Report, 2022 (Government of Rajasthan)

The aforementioned table provides valuable insights pertaining to share of population accessing safe and drinking water in rural and urban areas of the state. The table highlights data on population accessing safe drinking water or public water system ("PWS") in both areas over the years. In rural Rajasthan, the percentage increased from 22.06 percentage in 2015-16 to 33.96 percentage in 2019-20. In urban areas, the corresponding increase was from 72.37 percentage to 82.73 percentage during the same period.

Additionally, the table also presents rural population using an improved drinking water source, showing a steady increase from 83.00 percentage in 2015-16 to 92.60 percentage in 2020-21. The proportion of urban habitations with water supply also demonstrates consistent growth, rising from 81.23 percentage in 2015-16 to 91.25 percentage in 2020-21. On other hand, the proportion of rural habitations fully covered by water supply experienced fluctuations, reaching as low as 50.72 percent in 2018-19 but declining to 41.27 percentage in 2019-20 before a slight increase to 43.54 percentage in 2020-21.

Rajasthan State Water Policy:

The Rajasthan State Water Policy has evolved out of a new perspective of integrated management of water resources, which is holistic and includes a bottom-up approach. The policy document addresses issues of water supply and development, integrated water resource management, irrigation, water resources infrastructure, water conservation, water quality, environmental management, water pricing, legal enablement, capacity building and research.

Eastern Rajasthan Canal Project (“ERCP”)

Eastern Rajasthan Canal Project (“ERCP”) will prove to be a lifeline to thirteen districts in the state, namely, Ajmer, Dausa, Alwar, Baran, Bharatpur, Kota, Karauli, Jaipur, Bundi, Sawai Madhopur, Dholpur, Jhalawar and Tonk. After its implementation, 38,668 villages, i.e., about 90 percent of the rural area will be getting water supply from surface water sources. It will also enable irrigation of a new command area of two lakh hectares and stabilize 80,000 hectares of 26 existing projects. The Detailed Project Report (“DPR”) of this scheme was prepared in 2017 and was submitted to the Central Government for approval. While the approval has is still awaited, in the meantime the State Government has planned the first phase of ERCP. The ERCP Corporation Limited (“**ERCPCL**”) was incorporated in 2022 for this purpose.

Jal Jeevan Mission (“JJM”/“Mission”)

The Mission was announced in the year 2019 with focusing on providing water supply (*‘Har Ghar Jal’*) to all rural households by the year 2024. The JJM also focused on generating local infrastructure so that rainwater, ground and surface water can be recycled and reused for agriculture activities. All schemes related to water management have been merged in this mission to effectively work on objectives and goals.

- JJM is being implemented in mission mode in Rajasthan to facilitate water supply to rural inhabitants with service level of 55 litres per person (capita) per day (“**LPCD**”) of potable quality. Prior to JJM in 2019, only 11.74 lakhs (11 percent) rural households had access to water through tap connection. Overall, there are 106.64 lakhs households in rural Rajasthan, the schemes have been planned for 92.11 lakh households.
- All the 228 cities/towns of the state are benefiting from the Piped Drinking Water Scheme, in which drinking water is being distributed through 28 lakh water connections. Out of these, 120 cities/towns are based on surface water sources, 62 cities/towns are based on ground water sources and the remaining 46 are based on both.
- A complete (100 percentage) rebate has been provided in water duty/charges exemption on consuming up to 15,000 litres of water per month on current metered household connections.

Atal Mission for Renewal and Urban Transformation (AMRUT 1.0 & 2.0)

Under the Atal Mission for Rejuvenation and Urban Transformation (“**AMRUT**”) Amrut 1.0 & 2.0 scheme, work worth Rs. 1,067.83 crore for 22 cities and Rs. 5,122 crores for 183 cities will be undertaken for drinking water distribution system. In the AMRUT scheme, focus is on non-revenue water reduction works including construction of new sources, pump houses and reservoirs, replacement of pipelines and laying of new pipelines.

Beside above schemes, several other small schemes for better water resources management have been initiated in the state which are summarised below.

- Under the State funded Rajiv Gandhi Jal Sanchay Yojana, the State has completed around 1.32 lakhs works costing Rs. 1,580 Crores in phase I. Under phase II, 1.92 lakh works have been identified for water conservation and water harvesting for recharge of ground water.
- Rajasthan Government launched Rajasthan Micro Irrigation Mission in 2021-22 to conserve and make efficient use of water. Rain water harvesting and its efficient use in agriculture is a prime requirement of the mission and the State.
- Rajasthan Water Sector Livelihood Improvement Project launched for renovating of 65 irrigation sub-projects (irrigated area 2.62 Lakh hectares) in 21 districts of the state. Out of the above 65 Irrigation sub-projects, the work of 38 irrigation sub-projects (area 1.49 Lakh hectare) have been completed. The remaining 27 Irrigation sub-projects are under progress.
- Rajasthan Water Sector Restructuring Project (“**RWSRPD**”) has been initiated in desert area for construction of 176 kilometres of Indira Gandhi feeder and main canal and renovation/modernization of distributaries in 1322.48 kilometres.
- The State has prepared a Climate Change Policy in collaboration with IIT Mumbai in 2022 to

deal with climate issues and contain the environmental quality.

- The State Forest Policy 2023 has been prepared with an aim to increase vegetation cover to 20 percentage of the geographical area within the next twenty years with special focus on increasing vegetation cover outside forests as part of strategy of forest and wildlife management in Rajasthan.
- Development of rainwater harvesting infrastructure has been initiated for constructing subsurface barriers/subsurface dykes etc. in the "over-exploited" & "critical" category blocks.
- Micro irrigation system has been implemented for maximum utilization of water in the state, all the latest irrigation projects are being developed compulsorily on micro irrigation system.
- IEC (Information, Education and Communication) activities have been promoted for making awareness for stakeholders for judicious use of water, recycling of waste water for gardening, toilet flushing, washing of floors etc.

Strategies

For adequate supply to water and sustainability of such resources, the State has adopted a set of certain strategies to achieved the outlined goals and objectives. It encompasses initiatives for widespread water connections, transitioning from groundwater to surface-based supply, and judicious water use. The strategy addresses equitable water distribution, river inter-linking for disaster risk reduction, and modernization of irrigation projects. The key points of the strategy adopted by the state is briefly summarised below.

Safe, Adequate and Reliable Drinking Water for all

The state government plans to:

- Ensure long-term drinking water security by shifting from groundwater to surface-based water supply through inter and intra-state projects like the Indira Gandhi Canal, Narmada Canals, Eastern Rajasthan Canal Project and others;
- Safe, equitable, and reliable water distribution through subsidized or free of cost private water connections to urban poor and slums in all towns/cities and a nominal price for others;
- Promote Water Conservation by reduction of water loss in conveyance and Non-Revenue Water ("NRW") in urban areas; and
- Provide drinking water facilities to urban poor by 2030 through a piped network in all slums (*'kachhibastis'*) and water dispensing kiosks operated through smart cards.

Equitable Distribution of Water and Disaster Risk Reduction through River Inter- Linking

The state government has proposed to tackle regional imbalance of water availability, address concurrent flood and drought situations, and create a buffer against climate extremities, using intra and inter-basin water transfer synergy.

Modernization of Irrigation Projects, Asset Management, and Efficient Use of Water

The state government has proposed to:

- Review maintenance and efficacy of all other water resources infrastructure, (such as small dams, canals, irrigation off-takes, weirs, and flood protection works); and
- Renovate and modernize the irrigation schemes and institutionalization of central schemes like 'Pradhan Mantri Krishi Sinchayee Yojana' ("PMKSY") for piped distribution network, canal lining, and increase the overall system efficiency for irrigation.

Robust Decision Support Systems and Knowledge Management

The state Government has devised to revamp the monitoring infrastructure for various criteria such as increasing the frequency of water level monitoring, ensuring availability of accurate data, and pre & post-monsoon monitoring to enable accurate assessment of groundwater draft from the aquifers. It also aims to implement an Integrated Management Information System ("IMIS") in the drinking water sector to capture operational data for effective monitoring and enabling informed decisions.

Promoting Safe Reuse of Treated Wastewater & Transformation of Wastewater Treatment Plants into Resource Recovery Plants

The state Government aims to reduce gap between demand and supply of water considering current and future challenges. It has drawn elaborate plan to make efforts to promote integrated resource recovery and pollution control centrosto treat wastewater that can be used for various purposes and waste water treatment plants ("WWTPs").

Capacity Building and Strengthening of Department

The state Government aims for creation of internal capabilities to ensure a culture of constant improvement and learning for making water utilities future-ready. It will up-scale knowledge creation & dissemination by creating opportunities for utilities and water resource departments to collaborate and learn from previous shortcomings, and ensuring development, education, and engagement opportunities.

Conclusion

The present study reveals that the complex challenges faced by the state are due to its arid climate, desertification, and overexploitation of groundwater. The Government's commitment to providing potable water to every citizen is commendable, considering the significant hurdles posed by limited surface water availability and contamination of groundwater sources. The implementation of various projects, such as ERCP and JJM, highlights the state's efforts to enhance water security, promote sustainable agriculture, and address the diverse needs of its population. The progress indicated by data on water access in both areas reflects positive trends, although challenges persist, particularly in achieving equitable distribution. The state's comprehensive strategies demonstrate a holistic approach to water resource management. Overall, the multifaceted initiatives and strategies discussed in the study reflect a determined effort to achieve long-term water sustainability in Rajasthan.

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