



Review Of Water Resource Management And Conservation Practices In Rajasthan, India

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Abstract: Rajasthan, India's largest state, faces significant water scarcity due to arid climate conditions, overexploitation of resources, and inadequate water management practices. This review consolidates findings from multiple studies to provide a comprehensive understanding of water resource management and conservation techniques employed across Rajasthan. It highlights both traditional and modern practices, addresses challenges related to groundwater, examines the impacts of climate change, and considers gender perspectives. The review underscores the necessity for integrated strategies to sustainably tackle water scarcity. It emphasizes the importance of leveraging indigenous knowledge, implementing institutional reforms, and advancing technology to promote water security and ecological balance.

Index Terms- water scarcity, water resource management, conservation techniques, climate change, indigenous knowledge.

1. Introduction

Rajasthan, a semi-arid and arid region in India, faces unique challenges in water resource management due to its harsh climate, low rainfall, and reliance on groundwater. With an average annual rainfall of 575 mm and a per capita water availability as low as 640–807 m³, it consistently ranks among India's most water-scarce regions. This review analyzes key studies, focusing on water conservation strategies, traditional knowledge, and sustainable management practices.

2. Water Scarcity and Groundwater Challenges

Reddy (2010) highlighted Rajasthan's acute water scarcity, with groundwater overexploitation rates exceeding 100% in half of its districts. Over 83% of water resources are allocated to irrigation, leaving minimal supply for drinking water. Similarly, Gupta and Sharma (2018) revealed a recharge coefficient of merely 0.04 in Kishangarh, Ajmer district, with significant groundwater contamination. Effective strategies such as recharge enhancement and effluent regulation are urgently needed.

3. Traditional Water Harvesting Techniques

Several studies emphasize Rajasthan's rich heritage of Indigenous water conservation practices:

- **Rainwater Harvesting Systems:** Saxena (2017) discussed tankas, nadis, and khadins, which play vital roles in collecting rainwater, especially in regions with rainfall as low as 120 mm.
- **Ancient Wisdom:** Rathore (2011) detailed historical innovations like man-made lakes (e.g., Jaisamand) and roof water harvesting, which offer sustainable solutions for modern water management.
- **Community Participation:** Misra and Chaturvedi (2014) highlighted community-driven conservation through traditional structures in drought-prone regions like Jaisalmer and Barmer, showcasing resilience in harsh conditions.

4. Watershed and Land Use Management

Wani and Javed (2011) analyzed the Bankukara watershed using GIS and remote sensing, revealing an 8.85% decline in cultivated land and a 39.09% increase in wasteland from 2001 to 2005. Hydrogeomorphic mapping identified high groundwater recharge zones, recommending interventions like check dams and percolation ponds. Similarly, Haldar et al. (2011) emphasized the role of transitional landforms in enhancing recharge.

5. Impacts of Climate Change

Rajasthan's vulnerability to climate change is evident in studies by Rathore and Verma (2013), which recorded a 36% loss of forest cover in the Aravalli hills and a drastic decline in rainfall by 10–25%. These changes have reduced the rainy season to 46 days (2010), exacerbating droughts and affecting socio-economic conditions.

6. Role of Gender in Water Conservation

Sharma (2021) explored women's pivotal role as water managers, revealing that rural women walk over 14,000 km annually to fetch water. Despite this, their contributions remain undervalued in policy discussions. The study advocated for gender mainstreaming and the integration of women's indigenous knowledge into governance frameworks.

7. Integrated Water Resources Management (IWRM)

Tiwari et al. (2015) stressed the importance of IWRM in addressing Rajasthan's water security issues. Strategies like stakeholder participation, rainwater harvesting, and river interlinking were proposed to combat resource scarcity. Similarly, Everard (2015) demonstrated the success of community-led initiatives by Tarun Bharat Sangh, which revived over 8,600 water harvesting structures, achieving a 66% increase in irrigated areas.

8. Emerging Challenges in Modern Agriculture

Kar (2014) analyzed the transition from traditional agro-forestry systems to irrigation-driven agriculture, which has caused waterlogging, salinity, and land degradation. Sustainable practices, including agro-forestry revival and better water management, are recommended to mitigate these environmental issues.

9. Recommendations and Policy Implications

- **Revival of Traditional Knowledge:** Integrating indigenous systems like kunds, kuis, and baoris with modern technology can enhance water conservation (Sharma et al., 2023).
- **Community Participation:** Grassroots involvement in watershed and groundwater management is essential for sustainable outcomes.
- **Technological Innovations:** GIS-based tools and DEM mapping should be employed to identify potential recharge zones (Haldar et al., 2011).
- **Climate Resilience:** Strategies to combat deforestation and soil erosion are critical for adapting to climatic changes (Rathore and Verma, 2013).
- **Gender Inclusion:** Recognizing women's contributions and involving them in decision-making can strengthen water governance (Sharma, 2021).

10. Conclusion

Rajasthan's water scarcity presents complex challenges that demand a multifaceted approach. While traditional practices offer valuable insights, modern technology and inclusive policies are vital for ensuring long-term water sustainability. The integration of historical wisdom with innovative methods holds the key to addressing water resource challenges in Rajasthan and beyond.

References

- Everard, M. (2015). Community-based groundwater and ecosystem restoration in semi-arid north Rajasthan (1): Socio-economic progress and lessons for groundwater-dependent areas. *Ecosystem Services*, 16, 125-135.
- Gupta, P. K., & Sharma, D. (2019). Assessment of hydrological and hydrochemical vulnerability of groundwater in semi-arid region of Rajasthan, India. *Sustainable Water Resources Management*, 5, 847-861.
- Haldar, D., Sehgal, V. K., Kumar, G., & Sarma, K. S. (2011). Evaluation of ground water and land resources in relation to landforms in Alwar District (Rajasthan): A remote sensing based approach. *Archives of Environmental Science*, 5, 37-45.
- Kar, A. (2014). Agricultural land use in arid Western Rajasthan: Resource exploitation and emerging issues. *Agropedology*, 24(02), 179-196.
- Misra, K., & Chaturvedi, N. (2014). Traditional water harvesting structures and community participation in Western Rajasthan. *SAARC Culture*, 5, 94-110.
- Rathore, N. S. (2011). A historical perspective of the development of rain water harvesting techniques in the Mewar region, Udaipur, Rajasthan, India. *International Journal of Water Resources & Arid Environments*, 1(4), 285-94.
- Rathore, N. S., & Verma, N. (2013). Impact of climate change in the southern Rajasthan, India. *International Journal of Water Resources and Arid Environments*, 39(1), 45-50.
- Reddy, V. R. (2010). Water sector performance under scarcity conditions: a case study of Rajasthan, India. *Water Policy*, 12(5), 761-778.
- Saxena, D. (2017). Water conservation: Traditional rain water harvesting systems in Rajasthan. *International Journal of Engineering Trends and Technology*, 52(2), 91-98.
- Sharma, R. (2021). Indigenous Knowledge of Women: Alternative Methods of Water Conservation in Rajasthan. *Environment, Development and Sustainability in India: Perspectives, Issues and Alternatives*, 311-329.
- Sharma, P. K., Srivastava, S., & Chandaurya, M. (2023). Indigenous knowledge and traditional practices for water resource management in Rajasthan, India. In *Traditional ecological knowledge of resource management in Asia* (pp. 137-157). Cham: Springer International Publishing.
- Tiwari, K., Goyal, R., Sarkar, A., & Munoth, P. (2015). Integrated water resources management with special reference to water security in Rajasthan, India. *Discovery*, 41(188), 93-101.
- Wani, M. H., & Javed, A. (2013). Evaluation of natural resource potential in semi-arid micro-watershed, eastern Rajasthan, using remote sensing and geographic information system: A case study. *Arabian Journal of Geosciences*, 6, 1843-1854.