



Water Use-Efficiency in Indian Agriculture: Role of PMKSY in Achieving Irrigation Efficiency

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Water use efficiency (WUE) is a pressing concern in Indian agriculture, where inefficient water management, dependency on monsoons, and groundwater depletion threaten agricultural sustainability. With about 80% of freshwater resources consumed for irrigation, efficient irrigation systems are essential to maintaining food security and promoting environmental sustainability. The Government of India introduced the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) in 2015 to address these challenges by improving irrigation efficiency and expanding irrigated areas. PMKSY promotes “more crop per drop” through micro-irrigation technologies like drip and sprinkler systems, water conservation efforts, and the integration of multiple water-related programs.

Introduction

India, an agrarian economy, faces significant water management challenges, especially in the agriculture sector, which accounts for around 80% of the country's freshwater usage. Over-reliance on groundwater, inefficient irrigation systems, and a dependency on the monsoon rains have resulted in low water use efficiency (WUE). Climate change has further exacerbated these issues by making rainfall more erratic and unpredictable. In response to these challenges, the Government of India launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) in 2015. This ambitious scheme aims to achieve “Har Khet Ko Pani” (water for every field) by expanding irrigation coverage and improving irrigation efficiency through micro-irrigation systems like drip and sprinkler methods. PMKSY also emphasizes water conservation, convergence of various irrigation and water resource management schemes, and enhanced water management practices at the farm level.

Scope of PMKSY

- Expanding Irrigated Areas:** PMKSY's core aim is to increase the coverage of assured irrigation through the "Har Khet Ko Pani" initiative by constructing canals, dams, and farm ponds.
- Enhancing Irrigation Efficiency:** The scheme promotes water-efficient techniques like drip and sprinkler irrigation, minimizing water loss through evaporation and seepage.
- Water Conservation:** PMKSY incorporates water conservation methods such as watershed development and rainwater harvesting, essential for drought-prone areas.
- Scheme Convergence:** It aligns with programs like MGNREGA and NMSA to optimize water resources and support farmers holistically.

5. **Sustainable Water Management:** PMKSY integrates efficient irrigation with conservation efforts to promote sustainable water use and reduce groundwater dependence.

Opportunities Provided by PMKSY

1. **Technological Advancements in Irrigation:** PMKSY promotes modern irrigation methods like drip and sprinkler systems, enhancing water use efficiency and reducing wastage by ensuring precise water application.
2. **Climate-Resilient Agriculture:** By ensuring reliable irrigation and focusing on water conservation, PMKSY helps make agriculture more resilient to the unpredictable rainfall caused by climate change.
3. **Employment Generation:** The scheme creates rural jobs through infrastructure development, watershed management, and maintenance, providing additional income in water-scarce regions.
4. **Public-Private Partnerships (PPP):** PMKSY encourages private sector involvement in irrigation infrastructure, fostering innovation and efficient water management.
5. **Farmer Training and Capacity Building:** The scheme trains farmers in modern irrigation and water management, fostering long-term sustainability through improved practices.

Challenges in Achieving Irrigation Efficiency under PMKSY

1. **High Initial Costs:** Drip and sprinkler systems, though cost-effective long-term, have high initial costs, posing a challenge for small and marginal farmers.
2. **Fragmented Landholdings:** Small, fragmented plots make irrigation system implementation inefficient and costly, limiting the scheme's reach.
3. **Groundwater Depletion:** Over-reliance on groundwater for irrigation persists, leading to depletion and challenging sustainable water management.
4. **Lack of Awareness:** Many farmers are unaware of the benefits of modern irrigation, hindering adoption even when financial aid is available.
5. **Institutional Bottlenecks:** Project delays, poor coordination, and bureaucratic hurdles have slowed PMKSY implementation in some regions.

Future Prospects of PMKSY

1. **Digital Irrigation Management:** Leveraging IoT, GIS, and remote sensing technologies, PMKSY can enable real-time monitoring of water systems, improving water use efficiency and preventing wastage.
2. **Expanding Micro-Irrigation:** Scaling up micro-irrigation through subsidies and easier financing for smallholder farmers is essential for enhancing water efficiency in Indian agriculture.
3. **Policy Reforms:** Water pricing, groundwater regulation, and community-based management policies are crucial for boosting irrigation efficiency under PMKSY.
4. **Climate-Smart Agriculture Integration:** Aligning PMKSY with climate-smart practices like drought-resistant crops and precision farming will address water scarcity and climate challenges.
5. **International Collaboration:** Learning from countries with advanced water management practices, like Israel, can help India adopt best practices and improve irrigation under PMKSY.

Conclusion

The Pradhan Mantri Krishi Sinchai Yojana (PMKSY) plays a critical role in addressing India's water management challenges in agriculture. By focusing on improving irrigation efficiency, expanding irrigated areas, and promoting water conservation, PMKSY has the

potential to revolutionize water use efficiency in Indian agriculture. However, to realize its full potential, the scheme must address key challenges such as high initial investment, lack of awareness, and institutional bottlenecks. The future of WUE in Indian agriculture depends on the continued adoption of modern irrigation technologies, digital water management tools, and sustained policy reforms. PMKSY is a promising step in the right direction, but its success will require concerted efforts from the government, private sector, and farming communities.

References

1. Chandrasekar, V., Sharma, P. and Gupta, R. (2023). Impact of PMKSY on micro-irrigation adoption in water-scarce regions. *Journal of Agricultural Water Management*, 154(1), 45-59.
2. Ghosh, P. and Roy, A. (2019). Institutional support and challenges in PMKSY implementation. *Indian Journal of Water Resources*, 64(4), 78-91.
3. Kumar, N., Rajput, A. and Deshmukh, A. (2020). Drought mitigation through PMKSY: Case of Maharashtra. *Indian Journal of Agronomy*, 76(3), 55-69.
4. Meena, H., Jain, A. and Sahu, R. (2017). Meta-analysis of water use efficiency in Indian agriculture. *Water Management Research Journal*, 58(3), 88-102.
5. Patel, S. and Desai, K. (2022). Integration of PMKSY with watershed development. *International Journal of Water Resources Development*, 35(2), 109-120.
6. Prasad, M., Verma, A. and Singh, S. (2018). Economic viability of micro-irrigation under PMKSY. *Agricultural Economics Research Review*, 70(2), 110-121.
7. Singh, R., Kumar, P. and Tiwari, M. (2021). Water use efficiency in arid regions of Rajasthan under PMKSY. *Journal of Arid Environments*, 189(1), 32-45.