Irrigation Problems in India

Posted at: 17/05/2025

Irrigation Problems in India Agriculture – Different types of irrigation and irrigation systems

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Introduction

Irrigation is a fundamental pillar of Indian agriculture, which employs more than half of the country's population and contributes significantly to food security and rural livelihoods. In a country where rainfall is seasonal and unevenly distributed, irrigation systems play a critical role in ensuring year-round cultivation and improving agricultural productivity. Despite significant advancements in irrigation infrastructure over the decades, India continues to face serious challenges in ensuring efficient, equitable, and sustainable irrigation. These issues are deeply linked to regional disparities, outdated technologies, groundwater over-extraction, and policy inefficiencies. The recent suicide of a nationally recognized young farmer in Maharashtra has once again highlighted the gravity of the situation and the urgent need for reforms.

Why in the News

A young farmer from Maharashtra who had received the 2020 Young Farmer Award tragically ended his life, citing the persistent neglect of irrigation requirements in his region. This incident has reignited the national conversation on the systemic problems plaguing India's irrigation sector and the broader agricultural ecosystem.

What are the Major Irrigation Problems in India

Limited and Unequal Access

Although India is among the world's highest consumers of water for agriculture, access to irrigation remains limited and highly unequal. Small and marginal farmers often lack formal irrigation facilities, forcing them to rely on erratic rainfall or informal, costly water sources.

Inequitable Distribution of Water

While some improvement has been seen in equitable access through traditional systems like canals and tanks, tubewell irrigation has widened the gap between rich and poor farmers. Wealthier farmers are more likely to own tubewells and extract groundwater, whereas others remain underserved.

Regional Disparities
Irrigation infrastructure is unevenly developed across Indian states. Punjab enjoys nearly full irrigation coverage, while states in eastern and southern India still lack comprehensive systems. This results in stark differences in agricultural productivity and resilience.

Social Inequalities
Access to irrigation is not only regionally unequal but also socially skewed. Marginalised communities, including Scheduled Castes and Scheduled Tribes, often have restricted access to irrigation facilities, limiting their agricultural potential.

Unsuitable Cropping Patterns
The cultivation of water-intensive crops such as rice, wheat, and sugarcane in water-scarce regions adds stress to the irrigation systems. For example, growing paddy in northwestern India requires large amounts of groundwater, depleting local resources.

Unsustainable Expansion of Irrigation
According to a 2024 study published in *Nature Water*, India accounted for 36 percent of the global unsustainable irrigation expansion between 2000 and 2015. This includes expansion in areas already suffering from water scarcity.

Low Irrigation Efficiency
The average irrigation efficiency in India is only about 38 percent, compared to 55 percent in many developed countries. Much of the water is lost due to leakage, evaporation, or inefficient application techniques such as flood irrigation.

Low Irrigation Water Productivity
India's water productivity remains low despite high land productivity in some states. For example, Punjab has high rice yields but one of the lowest water productivity figures. Similarly, Tamil Nadu leads in sugarcane yields, but water usage is inefficient.

Groundwater Depletion
Over-reliance on groundwater has led to alarming depletion rates. Currently, around 17 percent of the country's groundwater blocks are classified as over-exploited, while another 4 percent are in a critical condition.

Unpredictable Monsoons
Indian agriculture is heavily dependent on the monsoon, which is becoming increasingly unreliable due to climate change. This unpredictability hampers planning and limits the effectiveness of traditional irrigation schedules.

Inter-State Water Disputes
Water is a state subject under the Indian Constitution, and this often leads to conflicts between states over the sharing of river waters. These disputes slow down or stall important irrigation projects, impacting farmers on both sides of state borders.

What are the Impacts of Irrigation Problems

Worsening Social and Economic Inequalities
Unequal irrigation access reinforces income disparities between regions and communities,

keeping some areas trapped in low productivity and poverty.

Groundwater Crisis
Unregulated extraction of groundwater has caused water tables to drop in many parts of India, making irrigation more expensive and less sustainable over time.

Environmental Degradation and Emissions
Pumping groundwater consumes large amounts of energy, contributing significantly to carbon emissions. It is estimated that groundwater-based irrigation contributes up to 11 percent of India's total emissions.

Soil and Cropland Degradation
Over-irrigation and improper practices such as continuous rice flooding have led to soil erosion, salinization, and greenhouse gas emissions from croplands, particularly methane from paddy fields.

What is the Way Forward

Enhance Irrigation Efficiency
India must shift from quantity-based irrigation to efficiency-focused strategies. Modern systems like drip and sprinkler irrigation reduce water wastage and should be scaled up across water-stressed regions.

Promote Climate-Smart Agriculture
Techniques such as alternate wetting and drying in paddy cultivation can save water and reduce methane emissions. These climate-resilient methods need active promotion through farmer training and incentives.

Encourage Appropriate Cropping Patterns
Policies must incentivise the cultivation of less water-intensive crops in water-scarce regions. Crop diversification can reduce stress on both water and soil.

Implement Groundwater Regulations
Strict monitoring and control of groundwater use, especially in over-exploited areas, is essential. Community-based water management and government-led policies must work together to manage this precious resource.

Adopt Solar and Regulated Irrigation Technologies
Solar-powered pumps can reduce emissions, but their use must be regulated to prevent over-extraction. Linking solar irrigation to grid systems with incentives for reduced use can be a win-win solution.

Promote Rainwater Harvesting and Supplemental Sources
Rainwater harvesting systems, check dams, and tail-water storage pits can help improve irrigation reliability in rainfed regions and reduce dependence on groundwater.

Strengthen Institutional Coordination
Greater collaboration between the central and state governments is necessary for integrated water resource management. A shift from infrastructure-centric to management-centric

irrigation policies is the need of the hour.

Conclusion

India’s irrigation sector stands at a critical juncture. Despite substantial investments and expansions, the system continues to suffer from inefficiencies, inequities, and ecological stress. Addressing these issues requires a holistic approach that combines technological innovation, sustainable practices, social inclusion, and strong governance. With climate change intensifying and the demand for food rising, ensuring equitable and efficient irrigation is not just an agricultural priority—it is a national imperative.
