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# Water Crisis in Bihar: Causes, Impacts and the Road to Recovery

**Manoj Kumar*, S.B. Tarate, R.K. Rout, V.K. Padala and S.M. Raut**

*ICAR-National Research Centre for Makhana, Darbhanga, Bihar (846 005), India*

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**Corresponding Author**

Manoj Kumar

✉: mkumar_iari@yahoo.co.in

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**Abstract**

The water crisis in Bihar is real and aggravating with every passing year. Traditionally flood prone districts of north Bihar, such as Sitamarhi and Darbhanga to name a few, are facing acute water shortages even for drinking and domestic purposes, let alone agricultural needs and that too in the middle of the monsoon. Qualitative water degradation further compounds the problem adding human health dimension to the crisis. Overexploitation of ground water and poor recharge, changing rainfall patterns under a changing climate, neglect of surface water systems and excessive groundwater pollution are the major causes of the water crisis which demand urgent remedial measures. We, in this article, elaborate upon the human, social and agricultural impacts of the water crisis, and propose strategies to ensure mindful utilization of the water resources for securing the future growth prospects of Bihar.

**Keywords:** Climate change, Groundwater depletion, Groundwater recharge, Rainwater harvesting

## Introduction

Water crisis in Bihar is becoming increasingly evident with each passing year. The northern part of Bihar, once known for its recurrent flood menace, is now battling acute water shortage, not only for agricultural irrigation but also for drinking and domestic use. Wide cracks in the paddy fields, even during the monsoon, are a common sight in the otherwise traditionally flood affected regions of north Bihar (Figure 1). This year, majority of the hand pumps in districts like Sitamarhi, Darbhanga, Madhubani and the adjoining areas dried up in the latter half of the July, the time which has traditionally witnessed floods in these regions. Even in the mid-monsoon, women and children in these areas are seen struggling to collect drinking water (Figure 2). This has been the case for the past 3-4 years at a stretch, indicating that this may not be a one-off event but rather a trend in the making. In addition, qualitative degradation of the water resources is further complicating the water woes of Bihar. Overexploitation of groundwater, poor recharge, increasing pollution of water resources and changing pattern of rainfall induced by ongoing climatic changes are perceived to be the underlying reasons behind this worsening water crisis. Given the fact that Bihar is already a water stressed state, further aggravation of the water shortage may hamper the future growth prospects of Bihar, a state with the highest population density and heavy dependence on agriculture.

Figure 1: The lead author (Dr. Manoj Kumar) observing the cracks in a paddy field in Kapchhahi, Bahadurpur, Darbhanga, North Bihar on July 27, 2024

## Nature of the Water Crisis

### *1. Quantitative Scarcity*

It refers to the rapid decline in per capita water availability. The average per capita water availability in Bihar dropped from ~5,000 $m^3$ $year^{-1}$ at independence to around 1,000 $m^3$ today. Projections suggest it could further fall to just 635 $m^3$ by 2050. Nearly 90% of Bihar's water supply depends

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Figure 2: Women and children in Shrikhandi Bhittha village, Sursand block, Sitamarhi queue up with buckets in hand to collect drinking water (July 27, 2025); the crisis continued through the month of August & September 2025 (PC: Rajeev Nand)

on groundwater, with crop production being its primary consumer (Sharma and Kumari, 2024). Unregulated extraction of groundwater has caused water tables to plunge far beyond traditional depths, leaving wells dry during summer months. Seasonal rivers dry during summers. Thousands of wetlands have disappeared due to encroachment, drought and neglect. Presently, per capita water availability in Bihar is significantly lower than the national average of around 1,486 $m^3$ and far below the global average of over 5,000 $m^3$ $year^{-1}$, indicating a situation of water stress in the state.

*2. Qualitative Degradation*

It refers to the widespread chemical pollution. Groundwater in over four-fifths of the districts in Bihar is contaminated with arsenic, fluoride, iron and even uranium. Around 80% of the population have unsafe drinking water. Arsenic exposure raises cancer risk; fluoride causes dental and skeletal fluorosis (Kumar *et al*., 2021a). Elevated iron and microbial contamination cause chronic illnesses.

**Causes of the Water Crisis**

*1. Climate Change and Hydrological Shifts*

Below average rainfalls in monsoon (June-September) are becoming a trend in Bihar and this is the single most striking manifestation of climate change in the state. According to the India Meteorological Department (IMD), the monsoon rainfall in Bihar fell short by 33% in 2022, 25% in 2023 and 20% in 2024, with July showing the sharpest declines. This year too, between June 1 and August 22, the state witnessed nearly 27% less rain than normal. Interestingly, while Bihar is running dry, Rajasthan received nearly 42% more rain than usual over the same period. This trend of declining monsoon rainfall is triggering recurrent droughts in traditionally flood affected districts of North Bihar such as Sitamarhi, Darbhanga and Madhubani among others. In fact, declining trends of rainfall have been observed in almost all the districts of Bihar in recent two decades (Singh *et al*., 2024).

*2. Overexploitation of Groundwater*

Pressure on water resources in Bihar, the most densely populated state in India, is huge. Bihar shares nearly 1.67% of the global population while its share in fresh water resources is less than 0.1%. Heavy dependence on agriculture which accounts for over 80% of the total water consumption in Bihar further compounds the pressure. Out of the total annual groundwater withdrawal of 13.5 bcm (billion cubic meters), more than 10.0 bcm (73%) is used for irrigation (Sharma and Kumari, 2024). Heavy reliance on water-intensive crops like rice (as a staple crop) and rapid ongoing expansion of an even more water-heavy crop like Makhana also does not help the cause. In many districts of Bihar, the water table has been going down by over one meter annually, making water access more difficult, expensive and less equitable.

*3. Poor Groundwater Recharge*

A major reason behind the worsening water crisis in Bihar is excessive groundwater extraction and very poor groundwater recharge. Bihar receives slightly higher rainfall than the national average, but due to rapid and unplanned urbanization, increased surface concretization, siltation of water bodies including rivers, ponds and *chaurs*, reduced wetlands, inadequate green cover and poor watershed management, groundwater recharge remains very poor posing an increasing threat to the water security of Bihar.

*4. Polluted Water Sources*

Groundwater contamination is severely affecting nearly four-fifth of the state population. Bihar reports high levels of arsenic, fluoride and iron. Use of the contaminated water poses serious threat not only to human health but also affects crops and livestock, threatening the state's health and food security in the long term.

*5. Neglect of Surface Water Systems*

Many perennial rivers have gone dry during summer months. Canal and similar irrigation systems suffer from poor maintenance and leakage, reducing effective water delivery. Bihar once had elaborate pond, ahar-pyne and canal-based designs for managing floods and drought. Encroachment and poor maintenance have caused massive declines in these systems.

**Impacts of the Water Crisis**

Bihar is already the most vulnerable state to climate change in India due to its heavy dependence on the most climate sensitive sector *i.e.*, agriculture, coupled with socio-economic backwardness, frequent floods and droughts in north and south Bihar, respectively and poor adaptive capacity. The ongoing aggravation in the water crisis can further jeopardise its agriculture and hence food security besides posing challenges of the water shortages for meeting domestic household demand and even drinking water (Figure 2). Worsening water crisis also endangers social stability as we see rising number of social conflicts due to water shortages. Growing number of cancer cases and associated health issues in the state could be ascribed to the consumption of water contaminated with arsenic and other pollutants (Kumar *et al*., 2021a). Makhana (Gorgon nut) has recently gain popularity as a high value aquatic crop, with its demand soaring in global market owing to its

rich nutritive and medicinal values (Kumar *et al*., 2021b). However, reduced water availability in the prime crop growth period, caused by declining monsoon rainfall in the major Makhana growing regions of north Bihar, is causing frequent crop failure (Figure 3), challenging the future prospects of Makhana expansion in Bihar. Thus, the impact of water crisis in Bihar is multi-dimensional and unless addressed with a sense of urgency, it threatens to undermine the state's future development prospects.

Figure 3: A Makhana crop dying due to water shortage in Kokat village, Bahadurpur block, Darbhanga (July 14, 2025)

**Tackling Bihar's Water Crisis: A Roadmap**

Water crisis in Bihar needs to be addressed with utmost urgency. The solution lies in thorough understanding of the problem and a multipronged strategy to overcome the same. To tackle the crisis at hand, immediate water supply arrangements must be made through water tankers or other means to meet the drinking and domestic water needs, particularly in rural areas where water supply systems have been traditionally poor and inadequate. Rejuvenation of the traditional water systems such as ahar-pyne systems and the revival of the wetlands and floodplains are also important for managing the crisis in the long run. Awareness drives must be initiated for promotion of rainwater harvesting and water conservation techniques, judicious use of water and prevention of water wastage. Improving the state's green cover through large scale plantation and agroforestry systems will also improve ground water recharge. Regular monitoring of water quality, particularly for arsenic and fluoride contamination and public disclosure of the results, ascertaining the sources of the contamination and strictly regulating them and creating public awareness about the health impacts of contaminated water use are essential to manage the causes and impacts of the qualitative water degradation in Bihar.

Since Bihar is a state with heavy dependence on agriculture and most of the groundwater extracted is used for irrigating the crops, promotion of less-water-consuming crops like millets and pulses in place of water intensive crops will significantly reduce the need for groundwater extraction for irrigation. Micro-irrigation techniques such as drip and sprinkler irrigation must be promoted where possible. Cultivation of Makhana, a hugely water intensive crop, is expanding very fast in Bihar. The majority of the new areas brought under Makhana cultivation adopt field system of cultivation, depending largely on groundwater for meeting its water requirement. The practice may not be sustainable in the long run. Expanding the area under Makhana cultivation is the need of the hour given its huge demand in domestic and international markets and considerably higher income potential for the growers (Kumar *et al*., 2020), but it must only be expanded in the areas with abundant natural availability of surface water, with less dependence on groundwater. Such areas are abundant in Bihar which can support the future expansion needs of Makhana in the state without threatening its future sustainability. In fact, extraction of groundwater for agricultural, commercial and industrial usage must be strictly and rationally regulated to ensure the future water security of Bihar.

**Conclusion**

Water crisis in Bihar is fast transforming from a subject of future speculation to the harsh reality of the present. The impact is multidimensional, which poses a grave threat to rural livelihoods, social stability, human health and the overall growth prospects of Bihar in the long run. Given the water resource scarcity in the state and its heavy dependence on agriculture, the most water intensive sector, the crisis cannot be allowed to aggravate any further. Immediate responses in terms of climate resilient agriculture, strict regulation of groundwater use and chemical contamination, revival of wetlands and water bodies, rejuvenation of traditional water systems, promotion of state's green cover and awareness about water conservation and efficient water use are required to tackle the crisis and ensure the water, food and growth security of Bihar.

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