

India's Groundwater Woes

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Summary

The decline in the groundwater table is a matter of serious concern for India. To protect, conserve, manage and properly govern the country's groundwater, the Indian government has, since the 1970s, come out with a number of model bills. The individual states have their own legislations to protect and conserve their groundwater. However, due to unregulated extraction, poor management and inadequate recharge of groundwater, the problem is more acute than what one can see on the ground.

Introduction

In February 2020, the Minor Water Resources Department (MWRD) in Bihar released a report on the status of the groundwater table in the state between August 2019 and February 2020. This report noted that the groundwater in the state, which was earlier available at a range from 40 feet to 200 feet, is now down to between 60 and 250 feet.¹ The MWRD report also highlighted the particularly alarming groundwater situation in the Seemanchal region (Araria, Kishanganj, Katihar and Purnia districts) and in the southern parts of Bihar.²

It is not just Bihar that is facing this problem. The groundwater in large parts of India is declining. This paper looks at India's groundwater situation and discusses its impact on the country's agriculture. It also explains policies and schemes to preserve and protect the country's groundwater resources.

The State of Groundwater in India

India has 16 per cent of the total world's population and depends on just four per cent of the total global share of fresh water resources. Quantity wise, the total water resources potential of India, which occurs as a natural runoff in the rivers, is about 1,869 billion cubic metres (BCM). Of this amount, the estimated utilisable water is about 1,123 BCM – 690 BCM of surface water and 433 BCM of groundwater per year.³

¹ Santosh Singh, 'Report shows sharp dip in water table across Bihar', *The Indian Express*, 22 February 2020, <https://indianexpress.com/article/india/report-shows-sharp-dip-in-water-table-across-bihar-6280413/>. Accessed on 22 February 2020.

² Ibid.

³ Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Central Water Commission 'Annual Report 2016-17', http://www.cwc.gov.in/sites/default/files/CWC_AY_2016-17.pdf. Accessed on 2 March 2020.

An estimated 62 per cent of irrigation, 85 per cent of rural water supply and 45 per cent of urban water supply in India depends on groundwater.⁴ According to the 2017 assessment report by India's Central Groundwater Board, the total annual groundwater recharge in the country is around 431.86 BCM. Following a subtraction of the allocation for natural discharge, the total annual extractable groundwater recharge in India is around 392.70 BCM. According to the assessment report, out of the total 6,881 units (blocks/mandals/talukas/firkas)⁵ that were assessed, about 1,186 units (17 per cent) in various states have been categorised as 'over exploited'. 'Over exploited' means that the groundwater extraction in these units is more than 100 per cent, which exceeds the annually replenishable groundwater recharge in these regions.

These 1,186 units also witness a declining trend in long-term water levels in both pre-monsoon and post-monsoon periods.⁶ A total of 313 units (five per cent) are at the 'critical' position, where the groundwater extraction is between 90 and 100 per cent. A further 972 units (14 per cent) are in a 'semi-critical' state where the groundwater extraction is between 70 and 90 per cent. Of the total, 4,310 assessment units (63 per cent) have been categorised as 'safe' where the groundwater extraction is less than 70 per cent. Another 100 assessment units (one per cent) have been categorised as 'saline', as a major part of the groundwater in phreatic aquifers is brackish.⁷

About 15 out of the 29 Indian states account for about 90 per cent of the groundwater potential. Among them, the key ones are Uttar Pradesh, which accounts for 16.2 per cent, Madhya Pradesh, 8.4 per cent, Maharashtra and Bihar, 7.3 per cent each, West Bengal 6.8 per cent, Assam 6.6 per cent, Punjab 5.5 per cent and Gujarat 5.2 per cent.⁸ Compared to the decadal average for 2009-18, the Minister of Jal Shakti (Water Power), in a reply to a question in the Indian Parliament in 2019, stated that there has been a decline in the groundwater level in 61 per cent of wells monitored by the Central Groundwater Board. Among the states where at least 100 wells were monitored, the highest depletion has been in Karnataka (80 per cent), Maharashtra (75 per cent), Uttar Pradesh (73 per cent), Andhra Pradesh (73 per cent) and Punjab (69 per cent).⁹

The depleting groundwater affects the agriculture sector whose contribution, along with the allied sectors, to India's Gross Value Added in 2019-20 was around 16.5 per cent. Analysing the use and consumption of water in the agriculture sector, Ashok Gulati and Gayathri Mohan, in their working paper for the *Indian Council for Research on International Economic Relations*, find that Indian agriculture consumes about 78 per cent of total freshwater

⁴ Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Central Groundwater Board, 'National Compilation on Dynamic Groundwater Resources of India, 2017', <http://cgwb.gov.in/GW-Assessment/GWRA-2017-National-Compilation.pdf>. Accessed on 1 March 2020.

⁵ Known by different names, these are administrative units below the district level in India.

⁶ Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Central Groundwater Board, 'National Compilation on Dynamic Groundwater Resources of India, 2017', op. cit., p. 2.

⁷ Ibid.

⁸ Harikishan Sharma, 'Explained: Atal Bhujal Yojana – Why a scheme for groundwater', *The Indian Express*, 27 December 2019, <https://indianexpress.com/article/explained/why-a-scheme-for-groundwater-recharge-atal-bhujal-yojana-6186562/>. Accessed on 20 February 2020.

⁹ Ibid.

resources available in the country. Of this, water guzzling crops such as rice and sugarcane occupy about one-fourth of the gross cropped area and consume more than about 60 per cent of the total irrigation water available in the country.¹⁰ Gulati and Mohan find that the water guzzling crops in the states such as Maharashtra, Uttar Pradesh and Punjab use a million litres of water per hectare of crop. Despite using so much water, Maharashtra grows only about 22 per cent of the total sugarcane output in the country. Similarly, Punjab, which is the third largest producer of rice in India, uses three times more water (2,500-5,000 litres to produce one kilogramme of rice)¹¹ than Bihar and more than twice the amount of water than West Bengal, to produce one kilogramme of rice. Of the total, 80 per cent of the water used for irrigating the paddy fields in Punjab is drawn from groundwater sources.¹²

Figure 1: Diesel pumps used to extract a large quantity of groundwater to irrigate fields across India



Source: Photograph by the author

¹⁰ Ashok Gulati & Gayathri Mohan, 'Towards sustainable, productive and profitable agriculture: Case of Rice and Sugarcane', *Working Paper No. 358*, April 2018, http://icrier.org/pdf/Working_Paper_358.pdf. Accessed on 28 December 2019.

¹¹ Prashant Krar, 'Falling groundwater levels driving farmers in Punjab to move away from paddy', *Economic Times*, 27 September 2019, <https://economictimes.indiatimes.com/news/economy/agriculture/falling-groundwater-levels-driving-farmers-in-punjab-to-move-away-from-paddy/articleshow/71341938.cms?from=mdr>. Accessed on 2 March 2020.

¹² Ashok Gulati & Gayathri Mohan, 'Towards Sustainable, Productive and Profitable Agriculture: Case of Rice and Sugarcane', *Working Paper No. 358*, April 2018, op. cit., and National Institution for Transforming India, Government of India (2019), *Composite Water Management Index*, <https://niti.gov.in/sites/default/files/2019-08/CWMI-2.0-latest.pdf>. Accessed on 2 February 2020.

Besides the agriculture sector, urbanisation and industrialisation have led to the indiscriminate extraction of groundwater without any check on the users. Urbanised and developed states such as Karnataka and Maharashtra use more groundwater than less developed states of India. To protect and conserve groundwater, state governments implemented their own laws but these have not been successful.

Policies to Regulate Groundwater in India

In India, groundwater is being regulated by a British colonial law called the Indian Easement Act, 1882 under which landowners have the right to “collect and dispose” all water under the land within their own limits.¹³ In independent India, from the 1970s to 2005, model legislations have been promoted with a focus on introducing new control measures for groundwater usage without addressing either the rights to groundwater or the need to protect, manage and regulate it at the aquifer level.¹⁴ In 2011, the Planning Commission of India drafted a comprehensive groundwater model law to protect and use groundwater from the local to the state level. In 2015 the Ministry of Water Resources (now called the Jal Shakti Ministry) looked at the draft and requested for its updated version from the National Institution for Transforming India (NITI Aayog), which replaced the Planning Commission in 2014. A fully revised version of the draft incorporating comments from the states and NITI Aayog was submitted to the Ministry of Water Resources in 2017.¹⁵

Constitutionally, as both the central and state governments can make laws on water issues,¹⁶ Andhra Pradesh, Assam, Goa, Bihar, Delhi, Himachal Pradesh, Jammu and Kashmir (now a Union Territory run by the Union government of India), Karnataka, Kerala, Lakshadweep, Puducherry and West Bengal have enacted their own legislation on groundwater. While enacting these legislations, these states have mainly used the provisions from the earlier draft model bill.¹⁷

In 2017, the Groundwater (Sustainable Management) Bill was framed with the aim of decentralising groundwater regulation in India. Phillippe Cullet (Professor of International and Environmental Law at the School of Oriental and African Studies in London and Visiting Fellow at the Centre for Policy Research in New Delhi), a member of the drafting committee, says, “Groundwater as a local source of water may become even more important in the future in the face of the push for privatisation, since that may be one way in which panchayats [village councils] may maintain some ‘public’ control over drinking water

¹³ Vijayta Lalwani, ‘As the water crisis deepens, can India afford to leave groundwater unregulated?’, *Scroll.in*, 11 July 2019, <https://scroll.in/article/929433/as-the-water-crisis-deepens-can-india-afford-to-leave-groundwater-unregulated>. Accessed on 18 December 2019.

¹⁴ Philippe Cullet, ‘Protecting Water while Providing Water to All: Need for Enabling Legislations’, *Centre for Policy Research*, 10 June 2019, <https://www.cprindia.org/policy-challenge/7870/regulation-and-resources>. Accessed on 2 March 2020.

¹⁵ Ibid.

¹⁶ There are three lists in India: the Union list, State List and Concurrent list. The Union government can make laws on items in the Union list. The State government can make laws on items in the State list. Both the Union and State governments can make laws on items in the Concurrent list.

¹⁷ Vijayta Lalwani, ‘As the water crisis deepens, can India afford to leave groundwater unregulated?’, *Scroll.in*, 11 July 2019, op. cit.

supply.”¹⁸ Another member, Himanshu Kulkarni (Executive Director and Secretary at the Advance Centre for Water Resources Development and Management in Pune) said, “In India, we need a legislation on water which can incentivise conservation ... How do we replace the command and control mode in a legislation with a more protective mode that incentivises participatory, social norms of groundwater management and governance?”¹⁹ Kulkarni also accepts that it is difficult to prevent external factors, even if some efforts were taken to conserve groundwater. “For instance, if a village comes together and conserves water, how does it get protected from other villages or industries that could free ride on the benefits of conservation?”²⁰

Earlier in 2016, the central government developed the draft National Water Framework Bill, which states that “Groundwater is a common heritage of the people held in public trust, for the use of all, subject to reasonable restrictions to protect all water and associated ecosystems and in its natural state is not amenable to ownership by the state, communities or persons; for which the state at all levels is the public trustee.”²¹

In December 2019, India’s Prime Minister Narendra Modi launched Atal Bhujal, a groundwater scheme named after former Prime Minister Atal Bihari Vajpayee. This scheme aims to strengthen the institutional framework for participatory groundwater management and bring behavioural changes at the community level for sustainable groundwater resource management in seven Indian states – Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.²²

It is expected to benefit about 8,350 gram panchayats (local government at village levels) in 78 districts of these states. The scheme will promote panchayat-led groundwater management and behavioural change among water users with the primary focus on demand-side management.²³ Fifty per cent of the total cost of ₹6,000 crore (\$1.13 billion) for this project is in the form of a loan from the World Bank, to be repaid by the Indian government, while the remaining 50 per cent will be in the form of central assistance to the seven states.

Conclusion

By 2050, India’s population is expected to be around 1.66 billion, and the per capita availability of water is expected to decrease to about 1,219 CM. The per capita availability of water in 2019 was about 1,500 CM and is expected to decline to about 1,486 CM in 2021. To compare, by 2050, the total demand for grains is expected to increase to about 375 million tons, including grain to feed the livestock. While it is anticipated that the per capita

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India, ‘The Draft National Water Framework Bill, 2016’, p. 14, http://jalshakti-dowr.gov.in/sites/default/files/Water_Framework_May_2016.pdf. Accessed on 12 June 2019.

²² Press Information Bureau, Government of India, Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, 25 December 2019, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=196118>. Accessed on 2 March 2020.

²³ Ibid.

consumption of cereals in 2050 will decrease for rice, coarse cereals and maize by nine per cent, 47 per cent and 60 per cent respectively, the per capita consumption of sugar, fruits and vegetables will increase by 32 per cent, 65 per cent and 78 per cent each. This surge in the demand for water-intensive crops will multiply India's current agricultural consumption of water. According to one estimate, the requirement of water for livestock will rise from 2.3 BCM in 2000 to 2.8 BCM in 2025 and 3.2 BCM in 2050.²⁴ Such widening of the demand-supply gap of water will not only affect the agriculture sector, but also impact industrial production and other economic and human activities in India.

The decline in groundwater table has made many farmers in states such as the Punjab move away from the water-guzzling crops such as paddy to cultivate crops that do not require so much water.²⁵ However, this is not an ideal or appropriate solution because India also needs paddy and other water-guzzling crops for its food security. The best solution, therefore, is to have seeds that are able to produce more food per drop of water and manage the groundwater situation in a more effective and efficient manner.

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²⁴ National Institution for Transforming India, Government of India (2019), *Composite Water Management Index*, op. cit.

²⁵ Prashant Krar, 'Falling groundwater levels driving farmers in Punjab to move away from paddy', *Economic Times*, 27 September 2019, op. cit.