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The Condition Of Groundwater In Bihar : An Analysis

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Abstract : The state is undergoing several developments in different sectors for its growth as well as to meet the needs of people living in the state. The surge of population has led the state to fast-track its development. The continuous exploitation of river Ganga to support the development has made people to switch to groundwater for the drinking as well as the irrigation purposes in Bihar, raising the issue of groundwater contamination. Hence, the article explains the definition of groundwater and attempts to understand the condition of groundwater in Bihar through the several researches and the government reports which have been concluded to assess portability of groundwater in the state.

Keywords : Groundwater Contamination, Bihar

Introduction

Since the ages, India has been a center of attraction in the world for its glorious history and vast resources. The presence of resources such as water, land, agricultural areas etc. makes it stand out among the several countries. In respect of water resources, standing of the Himalayas in the north (Balasubramanian, 2013) and flowing of the Bay of Bengal, the Arabian Sea and the Indian Ocean in the east, the west and the south respectively provide a surplus amount of water. However, the presence of water in the form of snow in the Himalayas and the salinity of the oceans make the water non-potable. Earlier, the perennial and seasonal rivers and their tributaries were enough to fulfil the requirement of drinking water for the people in India, but gradually with increasing time, complaints of water contamination have been raised by the people in India and Bihar as well. In state like Bihar where majority of the population is dependent on the groundwater for their consumption and daily work, the groundwater contamination is a concern for the well-being of all the people in the state.

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Groundwater

“Groundwater can be described as the water that exists in the pores and water channels below the surface area” (Brands et.al, 2016). The ground water contamination occurs due to organic and inorganic materials through natural and human sources. Naturally, groundwater gets contaminated by inorganic compounds like magnesium, calcium and chloride that get absorbed by the groundwater through sedimentary rocks (JB and Joseph, 2023). Bacteria, virus, parasites, floods and erosion of radioactive materials such as uranium and radium present in a native rock also cause groundwater pollution (JB and Joseph, 2023).

The anthropogenic activities like industrial wastes, application of pesticides and fertilizers in agriculture and urbanization causes underground water contamination. (JB and Joseph,2023) In India, fluoride, iron, nitrate, salinity, arsenic and heavy metals are the major pollutants of groundwater contamination. (Kumar and Shah, 2006) In India, 30% of groundwater is contaminated (Singh et.al, 2014) and “about 201 districts out of 675 have fluoride contamination in groundwater, affecting the less than 400 million people lives in five states in India namely Rajasthan, Karnataka, Madhya Pradesh, West Bengal and Bihar.” (Singh et.al, 2014)

Groundwater Contamination in Bihar

The increasing population and continuous use of surface water have increased the load on groundwater to meet irrigation, industrial and consumption purpose needs causing pollution in groundwater. In Bihar “the first case of groundwater contamination was found in Semaria Ojha Patti Village of Shahpur in 2002” (Singh et.al, 2014). In 2012, a paper ‘Current Knowledge on the Distribution of Arsenic in Groundwater in Five States Of India’ published in “Journal of Environmental Science and Health Part A Toxic/Hazardous Substances and Environmental Engineering” reported that 50 blocks in 11 districts in Bihar were suffering from groundwater contamination (Singh et.al, 2014). In 2014, a case study was done by Sushant Kumar Singh, Gin D. Sanchez and Srikanta K. Panigrahi to examine the Bihar’s groundwater. “The research found that “out of 532 community blocks, 42% were polluted with iron, 32% of community blocks were contaminated with fluoride, 13% were contaminated with nitrate, 19% with Arsenic and 18% with fecal coliform. In the state, 4 districts were contaminated by iron by 100% and 10 districts were less or equal to 50%contaminated with iron. 11 districts were less or equal to 50% contaminated with fluoride and only 4 districts were safe from fluoride contamination.” (Singh et.al, 2014) “In respect of area affected by fluoride contamination, none districts was 100% contaminated with nitrate, 4 districts were less or equal to 50% contaminated with nitrate, 11 districts were completely free from nitrate contamination, 1 district was completely contaminated with fecal coliform, 13 districts were completely safe from fecal coliform”.(Singh et.al, 2014) Moreover, “the study claimed that groundwater of eleven districts namely Munger, Rohtas, Nalanda, Samastipur, Begusarai, Bhagalpur, Kishanganj, Saran, Bhojpur, Jehanabad and Nawada need special attention.” (Singh et.al, 2014). In 2023, a research was released by the Central Groundwater Board named Chemical Quality of Groundwater in Hydrograph Network Stations of Bihar State, 2022-2023(Tiwari and Shukla, 2023). During the research around 661 groundwater samples were collected from hydrograph network stations in Bihar to examine the changing quality of groundwater in the state. According to the report, in less than 6% of samples, the amount of chloride³was above the desirable limit of “BIS⁴ standard” (Srivastava et.al, 2023), 2012, whereas in 99.85% of samples, the presence of chloride was under the permissible limit of BIS standard. (Tiwari and Shukla, 2023) The amount of nitrate⁵ was higher in Bikramganj, Dinara, Mairwa (near petrol pump), Naugachia, Chand, Chausa and Udwantanagar while in 96.52% samples the concentration of nitrate was under the

³ Desirable limit – 250 mg/l ; Maximum Permissible limit – 1000 mg/l

⁴ Bureau of Indian Standards

⁵ Permissible limit – 45 mg/l

permissible limit of BIS standard (Tiwari and Shukla, 2023) In respect of fluoride⁶ 3.79% of samples shows the concentration of the chemical was above than the permissible limit of BIS standard and Jamui has the higher amount of fluoride amongst all the location. (Tiwari and Shukla, 2023)

Methodology

This article is based on primary and secondary sources. The primary source involves a report from CGWB which has taken from the website of the Central Groundwater Board (CGWB) and the Bihar Gazette document of Bihar Groundwater Act. The secondary data involves articles that have taken from the website ResearchGate.

Conclusion

Water is an important compound available to human beings to ensure their survival on the earth. It ensures the proper functioning of human life and other living organisms but increasing population and discharge of sewage has led the exploitation of water. This exploitation has led the water contamination in India and Bihar. The above discussion shows the presence of numerous chemicals such fluoride, chloride and nitrate, arsenic etc. in groundwater of Bihar. The current research released by the Central Ground Water Board (CGWB) demonstrates that there are some areas where presence of chemicals are under desirable limit whereas some areas like Jamui needs special attention. However, to overcome this situation, Bihar government has formulated the “Bihar Groundwater (Regulation and Control of Development and Management) Act in 2006 to regulate, control and manage the groundwater and matters related to it and to keep check on the exploitation of groundwater in state.” (Bihar Gazette, 2007)

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⁶ Permissible limit – 1.5 mg/l

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