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Conservation Of Ground Water Resources: Significance Of Jal-Jeevan-Hariyali Mission (JJHM) In Kaimur District Of Bihar

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ABSTRACT

Water is requisite for chow of life. It is a bounded resource. Human utilize both forms of water, Surface water and Groundwater. But groundwater resources are foremost for drinking water needs and agriculture in Bihar. The state government has carried out a multipurpose scheme JAL-JEEVAN-HARIYALI MISSION (JJHM) to nurture groundwater conservation in all districts of Bihar. This programme has inspired schools to harvest rainwater within their outskirts in kaimur district. Not only the new creation of water bodies but also the identification and rejuvenation of conventional water bodies; Wells ,Ponds, Tanks and Ahar Pyne is going on and some water bodies have been completed in the study area. This mission has not been completed yet so work is going on. This approach will enhance the potential for groundwater recharge. This study is based on secondary data. These are sources; National Compilation on Dynamic Ground Water Resources of India, 2022 and JJHM Annual Report FY 2022-23. This scheme plays a remarkable role in assuring sustainable water management in kaimur. By elevating rainwater harvesting and reviving conventional water sources, the Bihar government is working to conserve invaluable groundwater resources for future generations.

Keywords: Groundwater Conservation, Groundwater Extraction, Groundwater Resource, JAL-JEEVAN-HARIYALI MISSION (JJHM), Rainwater Harvesting

Introduction:

Water is an adorable resource for Human. Earth's surface with water-covered is about 71 percent. The wide part of water on the Earth's surface, about 96.5 percent, is saline water in the oceans. The freshwater resources are icecaps and glaciers, rivers and lakes, water vapor, groundwater etc. According to U.S. Geological Survey, global water distribution (Percentage of total water) is such as ; Oceans, Seas, & Bays - 96.54% , Ice caps ,Glaciers & Permanent Snow - 1.74% , Groundwater – 1.69% and others. Human utilize both forms of water, Surface water and Groundwater. Even though surface water is used more to supply drinking water, to irrigate crops, industrial needs and daily needs of life in India.

Water that packs the extents between rocks, sand and gravel underground is called Groundwater. A ground-water system comprises of a lump of water flowing through the pores or cracks below the Earth's surface. It's root in aquifers, which are permeable rocks and sediments. Ground water is a main contributor to flow in many streams and rivers. The depth of Groundwater level is from 2-5 m bgl in Bihar and also in kaimur district. The paramount ground water sources are wells, springs and infiltration galleries. Groundwater is naturally replenished by surface water from precipitation, streams, and rivers. It is manually recharged by surface water from tanks/ponds, wells, sokhta, ahar pyne, rooftop rainwater harvesting and water storage structures. Groundwater is the world's largest source of freshwater, consisting of about 30% of the planet's available freshwater. Groundwater is vital natural resource for domestic, agricultural and industrial consumption. Quality of ground water is as much demanding as its quantity. Suitability of groundwater for drinking and irrigational purpose is crucial for its safe and potent use. In the state of Bihar, the pressure on ground water is considerable to meet urban water requirements as well as the irrigation requirements in the semi-urban areas.

Statement of the Problem:

The conservation of groundwater has been a burning issue. By many schemes state government has protected ground water resources. Ponds/Tanks, Wells and Public Water Storage Structures have been constructed for completing demand of water. The Construction of Rooftop Rainwater Harvesting Structures and Sokhta has been completed under different schemes for ground water conservation. But these are not as much as effective to conserve the ground water. No progressive outcome has been seen therefore there is an urgent need to launch a scheme which will protect the groundwater. So under JJHM, Public Wells has been identified and rejuvenated for ground water conservation. Not only Wells but Ponds/Tanks, Rooftop Rainwater Harvesting Structures, Public Water Storages Structures also have been rejuvenated and newly created under this scheme. Through this research, i hope to highlight the importance of JJHM for conservation of groundwater.

Literature Review:

Ground water is a huge and major source of water supply. Its supply is recharged by water annually available from the hydrological cycle. Ground water and Surface water are closely related. Perhaps the attribute of the concept of ground-water sustainability is that it promotes a long–term perspective (Winter et al., 1998). Water conservation can be achieved by digging ponds, lakes, canals, channels and expanding the size of existing water reservoir (Kurunthachalam, 2014). The groundwater recharge in the aquifer occurs via mechanisms in which direct precipitation (rain and snow), surface water, sewage water, artificial recharge programs, irrigation water and subsurface inflows are variables that enter into the aquifer balance system (Balali et al., 2011). Ahar-Pynes, Ponds and Check-Dams are various types of managed aquifer recharge (MAR) techniques in South Bihar (Bandyopadhyay et al., 2021). Ponds recharge, Wells recharge, and Water bodies recharge are the schemes for the recharge of ground water Chadha (2014).

Rainwater harvesting is necessary to prevent the decline in groundwater level and is less expensive & easy to construct, operate and maintain (Kumari et al., 2016). Rainwater harvesting checks the declining water table (Kumar et al., 2005). The lowering of water level means that the wells and ponds around it will dry up because water from the pond percolates into the ground and fills underground streams, which replenished wells and other water bodies (Chatterjee, 2008). Chauhan (1966) looks at the configuration of the water table in the Jamuna-Hindon tract, while Mathur (1967, 1970) talks about the fluctuations in the water table level in Meerut District in relation to topography, local rainfall and rate of pumping by tube-wells as well as ground water recharge rates. Jain (1972) has evaluated the attainments of India in the development of water resources. Healy and Cook (2002) employed of water level fluctuations for estimation of recharge to ground water. Karanath and Srinivasa Prasad (1979) approximated rainfall infiltration factor by water balance computation and ground water storage approaches. Dommon (1975) debates the introduction of bamboo tube-wells to the benefit of Bihar, which area has a shallow ground water table. Public access to information on groundwater conservation and preservation is mannered; there is no effective way to foster public awareness of the need for groundwater protection (Jie et al., 2018). Dinesh Sharma (1970) has implored for an integrated and comprehensive approach to India, s water resources. The importance of ground water resources and ever increasing dependence on aquifers for various societal needs underline the importance of identifying, delineating, characterizing, quantifying and management of groundwater (Vittala, S.S. et al., 2011).

Research Gap:

While there have been a lot of studies on water conservation in India, there is a lack of concentrated research regarding ground water conservation in this small district. Previous works have widely covered water conservation context, its method and other related topics in different regions. There are many researches on the topic water conservation and its utilization in agriculture has completed yet in different

area. And also, research on the topic surface water and its utilization in agriculture has been concluded. But these researches have taken place many years before from today. Not only any research exactly on this topic in kaimur has been initiated but also any research has occurred in recent years. So this study area is a big opportunity to explore ground water conservation and its utilities for human life.

Purpose of the Study:

This study directs to inspect the actual condition of ground water conservation in a determined region of India on ground level. The center of attention is on remote villages and municipalities of Kaimur district of Bihar. This agriculturally developed region includes both hilly area and plain area so there are many challenges before the government to execute JJHM scheme. These challenges provide a microcosm to study the actual progress and implementation of this scheme on the ground level to conserve the groundwater in the kaimur district

Significance of study:

- This study will help us to get to know the execution of this scheme in kaimur district.
- This study will assist us to inspect the development of structures for groundwater conservation**.**
- It will aid us to analyse the current water structures and mention the needs for developing new water storage constructions.

Study Area:

In this research paper, the study area is Kaimur district of Bihar. This district, expanding between 24^0 54' N to 25^0 20' N latitude and 83^0 20' E to 83^0 40' E longitude, lies in the South-western part of Bihar. Kaimur is a part of Mid Ganga alluvial plains. Geographically, the district can be furcated into Hilly area and Plain area. The hilly area consists of Kaimur plateau. The Kaimur plateau is an undulated tableland having thin shrubby jungles, spreading about 1200 sq. kms. The plain area consists of fertile alluvial lands, which become rocky as one proceeds southwards. As one approaches the Kaimur foothills, the soil becomes stony and poor in fertility. The plain area on the western side is edged by the rivers, The Karmanasha and The Durgawati. The river Durgawati originates from Kaimur hills and flows in the northern direction. It is joined by the Kudra River before it merges finally into the river Karmanasha. Durgawati and Karmanasha rivers are perennial in nature and overwhelm a wide area of land during heavy rains. The Kudra river lies on it eastern side.

Kaimur's geography, climate and socio-economic factors influence the status of its groundwater resources. In summer the climate of the district is hot and dry but winter months are slightly cool and pleasing. Agriculture is the leading occupation of the people of the district and also the principle source of livelihood of the people. The district mostly turns on traditional system of irrigation. Kaimur has a number of canal systems such as Indrapuri (Dehri), Durgawati main canal, Garachaube canal etc. In the hilly spans of

Adhaura, Chainpur and Bhagwanpur blocks, only trenches and ponds are used to conserve rainwater. New techniques of water conservation and harvesting practices are required in plain as well as these hilly areas to operate rainwater. Reservoir tanks can caches water from hill streams and rivulets especially when 'Hathia' rain falls.

Kaimur is bounded by Buxar district and Ghazipur district (U.P.) in the north, Chandauli and Mirzapur district (U.P.) in the west and Rohtas district in the east and south. The geographical area of the district is 3332 km^2, making it 35th district in Bihar by area. According to census of India (2011), total population of Kaimur is 16,26,384. Administratively, the district is divided into two subdivisions namely Bhabua and Mohania and further the district is demarcated into eleven blocks namely, Adhaura, Bhabua, Bhagwanpur, Chainpur, Chand, Durgawati, Kudra, Mohania, Nuaon, Ramgarh and Rampur.

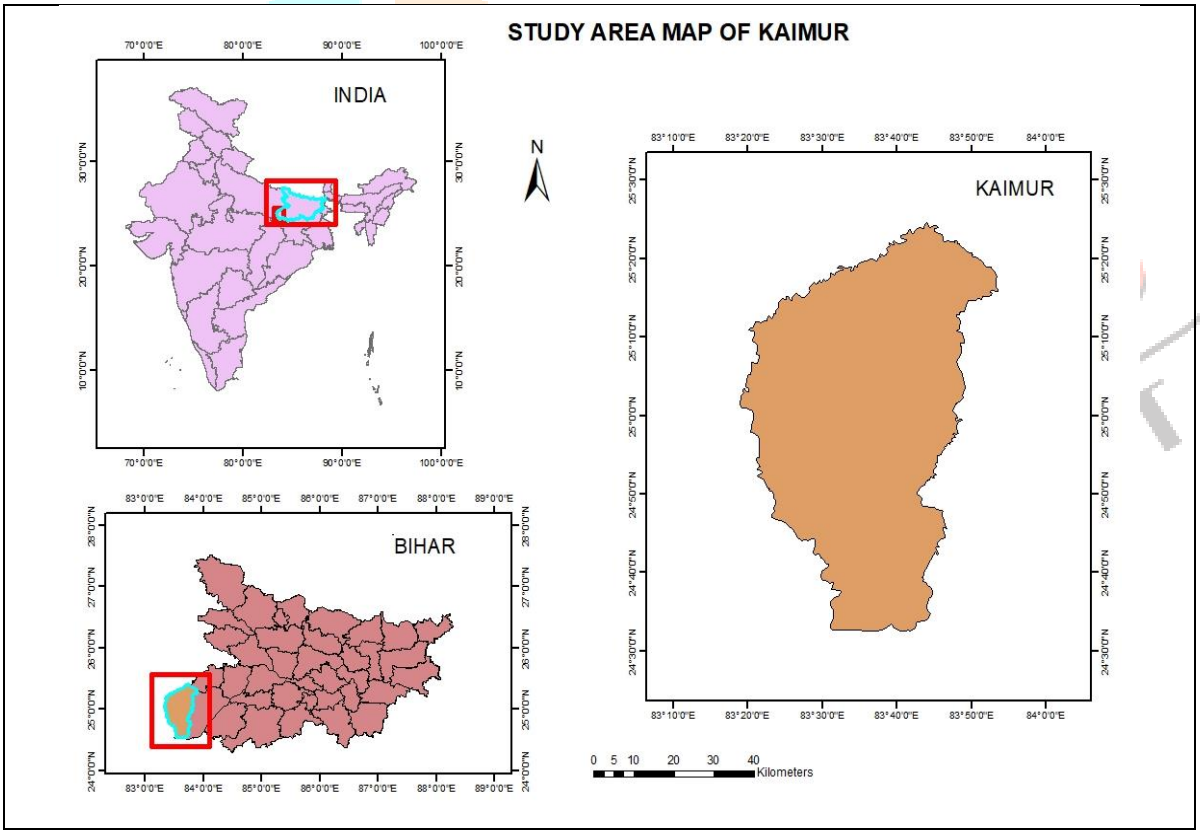

Figure 1: Location of Study Area

Objectives of the study:

The present paper will work on the following objectives:

- To point out the works which play role in conservation of groundwater
- To examine the impact of this scheme on the conservation of groundwater

Research Questions:

1. Which works have been done for conserving groundwater resources?
2. What is the impact of this scheme on the conservation of groundwater resources?

Study Approach and Scope:

This study calls on existing research from websites and reports, covering not just Kaimur but also conservation of groundwater across various districts in Bihar. It explores distinct methods of ground water conservation, the works putting up to its success, its interests, and the elements that nurture its growth. Under this scheme, the research has spotlighted the potential benefits of elevating constructive ground water conservation from casual works of conservation. However Kaimur district has potential to achieve milestone in the implementation of JJHM, it is a continuation of works which play role in conservation of ground water.

Methodology:

In this research paper, Descriptive research method has been operated. Under this research method, observational research has been applied to get actual confirmation regarding the enactment of this scheme on ground level. Therefore the study is based on both primary and secondary data. For authentication of this scheme, observation has been performed randomly in the villages of Kaimur district. During field visit it has been observed that this scheme is carried out at ground level. This primary data is granting the Annual Report of JJHM. The sources of secondary data collection are JJHM Annual Report FY 2022-23 and The Report of Dynamic Ground Water Resources Assessment of India -2022. The study area is Kaimur district of Bihar state. This research paper is focused on Bihar government's scheme "JJH Mission" which was appreciated by the UNO.

Overview of JJH Mission:

The Jal-Jeevan-Hariyali Mission was launched on August 9, 2019 and implemented in Bihar from October 2, 2019. JJHM centers on nurturing natural resources through rejuvenating public water bodies; including ahar-pynes and constructing soak and recharge pits near wells and hand pumps. In this scheme, 3public conventional water storage structures; tanks, wells have not been only identified and rejuvenated but also new creation of water storage structures in almost districts of Bihar. Construction of Rainwater Harvesting Structures in the government buildings is going on in all districts of Bihar. Rainwater Harvesting could be a promising alternative for Sustainable Water Resources Management. The performance of this scheme is admirable in the study area. This is the reason why the research has done in kaimur district. For this scheme,

Bihar gets attention in the Newspaper. In the category of Best State, The third prize had been given to Bihar in the 4th National Water Awards 2022.

Figure: 2

Source: JJHM Annual Report FY 2022-23

Result and Discussion:

On the basis of Secondary data sources, quantitative analysis has been done and from this the useful data has been organized in the table-1, table-2 and table-3. In Kaimur, 452 public water storage structures have been marked and freed it from encroachment but 463 structures are encroached upon. 476 Public wells have been freed it from encroachment.

Table: 1

Structures	Marked and freed it from encroachment	Encroached upon
Public water storage structures	452	463
Public wells	476	000

Source: Compiled from JJHM Annual Report FY 2022-23

Figure: 3

Source: JJHM Annual Report FY 2022-23

The rejuvenation of 307 ponds has been completed but 388 ponds has been initiated out of 2280 Ponds/Tanks/Pools in this district. The rejuvenation of 593 wells has been completed but 751 wells has been initiated out of 3937 wells in the study area.

Table: 2

Structures	**Rejuvenation completed**	**Rejuvenation initiated**
Ponds/Tanks/Pools	307	388
Wells	593	751

Source: Compiled from JJHM Annual Report FY 2022-23

Figure: 4

Source: Field Visit

The construction of 202/1184 sokhta or recharge structures on the side of public wells/hand pumps has been completed but 299/1203 structures has been initiated. The new creation of 515 water sources has been completed but 537 water sources have been intiated. The construction of 233 rooftop rainwater harvesting structures in buildings has been completed but 233 structures has been initiated

Table: 3

New constructions	Completed	Initiated
Sokhta or recharge structures on the side of public wells	202	299
Sokhta or recharge structures on the side of public hand pumps	1184	1203
Rooftop rainwater harvesting structures in buildings	233	233
Water sources	515	537

Source: Compiled from JJHM Annual Report FY 2022-23

Figure: 5

Source: JJHM Annual Report FY 2022-23

Kaimur district is a part of South Bihar Plains (SBP). There are 11 Hydrograph Network Stations (HNS) in this district. Here is the positive impact of JJHM not only in Kaimur district but also in Bihar. In the report of 'Dynamic Ground Water Resources Assessment of India -2022', the Total Annual Ground Water Recharge (TAGWR) and Annual Extractable Ground Water Resources (AEGWR) for Bihar have increased from 28.05 to 33.14 bcm (billion cubic meter) and 25.46 to 30.04 bcm respectively and The annual Ground Water Extraction has increased from 13.02 to 13.5 bcm as compared to 2020 assessment. In Ground Water Information Booklet, September 2013, Kaimur District, Bihar State, Central Ground Water Board, The depth to water level comes under range 3-12 m bgl (below ground level). But according to "Ground Water Year Book, Bihar, Year 2021-2022" of Central Ground Water Board, The depth to water level comes under range 2-10 m bgl (below ground level). TAGWR and AEGWR have also increased in study area but we have no secondary data to know how exactly increased. Bihar government has extended this scheme from FY 2022-23 to 2024-25. So many works may be completed. Therefore the result may be changed in JJHM Annual Report FY 2024-25.

Conclusion:

Groundwater conservation is a censorious dare that needs a multifaceted approach. By addressing the pointer issues of inefficient use, encroachment of public water storage structures, less new creation of water storage structures, more dependency on traditional water resources and governance challenges, we can make certain the sustainable management of groundwater resources. In this research paper, JJHM has revealed positive result in conservation of ground water resources in the study area. In the end of FY 2024-25 the progressive outcome will have been seen and so on. The state government should focus on not only more and more identification of public wells, tanks and water storage structures but also rejuvenation of all these. Now the next step of state government should be to spread public awareness to identify and rejuvenate all private wells, tanks and water structures for conservation of ground water resources. Sustainable development of ground water resources and various mitigation programs will be required in the event of climate change in the country. Ultimately, the success of groundwater conservation relies on the commitment and collaboration of governments, communities, and individuals. By working together, we can shield groundwater as a valuable and indispensable resource for future generations.

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