

CONSERVATION OF SURFACE 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 surface water resources are need of hour for drinking water needs, agriculture and industry in Bihar. The state government has carried out a multipurpose scheme JAL-JEEVAN-HARIYALI MISSION to nurture surface water 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 traditional water bodies; Ponds, Tanks, Ahar-Pynes and Check dams 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 surface water capture. This study is based on both primary and secondary data. These are sources; Ground Water Year Book, Bihar, 2021-22 and JJHM Annual Reports. This scheme plays a remarkable role in assuring sustainable water management in kaimur. By elevating rainwater harvesting in tanks and reviving traditional water sources, the Bihar government is working to conserve invaluable surface water resources for future generations.

Keywords: JAL-JEEVAN-HARIYALI MISSION (JJHM), Rainwater Harvesting, Surface Water Capture, Surface Water Conservation, Surface Water Resources

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.

Any body of water on the Earth's surface as ponds, tanks, rivers, lakes, streams, reservoirs, wetland, seas and oceans is called surface water resource. A surface-water system comprises of a lump of water run off above ground. It is key part of water cycle, mainly originating from precipitation. Surface water can be either freshwater or saline water is a main contributor to the hydrological cycle. The paramount surface water sources are rivers, lakes, ponds, tanks, streams and reservoirs in kaimur district. But it's demand of time to protect our surface water resources. Conservation of surface water means the protection, preservation and careful management of water resources to prevent waste, damage or loss. Surface water is naturally replenished by precipitation and ice melting. It is also manually replenished by human- made tanks/ponds, ahar-pynes, water storage structures and reservoirs. Surface water is one of the world's largest sources of freshwater, consisting of about 30% of the Earth's available freshwater. Surface water is vital natural resource for domestic, agricultural and industrial consumption. Quality of surface water is as much demanding as its quantity. Suitability of surface water for drinking and irrigational purpose is crucial for its safe and potent use. In the state of Bihar, the pressure on surface

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

Literature Review:

Surface water is a huge and major source of water supply. Its supply is replenished by water annually available from the hydrological cycle. Dinesh Sharma (1970) has implored for an integrated and comprehensive approach to India's water resources. Jain (1972) has evaluated the attainments of India in the development of water resources. Karanath and Srinivasa Prasad (1979) approximated rainfall infiltration factor by water balance computation and ground water storage approaches.

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). Healy and Cook (2002) employed of water level fluctuations for estimation of recharge to ground water. Water conservation implies improving the availability of water through augmentation by means of storage of water in surface reservoirs, tanks, soil and groundwater zone (Kumar *et al.*, 2005). For the preservation of pond water harvesting is important because water scarcity would be major problem in coming years (Chatterjee, 2008). 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). Water conservation can be achieved by digging ponds, lakes, canals, channels and expanding the size of existing water reservoir (Kurunthachalam, 2014). A. Balasubramanian (2019) has explained that redistribution of water and renovation of traditional water sources are methods of water conservation. Ahar-Pynes, Ponds and Check-Dams are various types of managed aquifer recharge (MAR) techniques in South Bihar (Bandyopadhyay *et al.*, 2021).

Research Gap:

While there have been a lot of studies on water conservation in India, there is a lack of concentrated research regarding surface 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 surface water conservation and its utilities for human life.

Purpose of the Study:

This study directs to inspect the actual condition of surface 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 surface water 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 surface water 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 $24^{\circ} 54' N$ to $25^{\circ} 20' N$ latitude and $83^{\circ} 20' E$ to $83^{\circ} 40' E$ 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 surface water 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 km², 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.

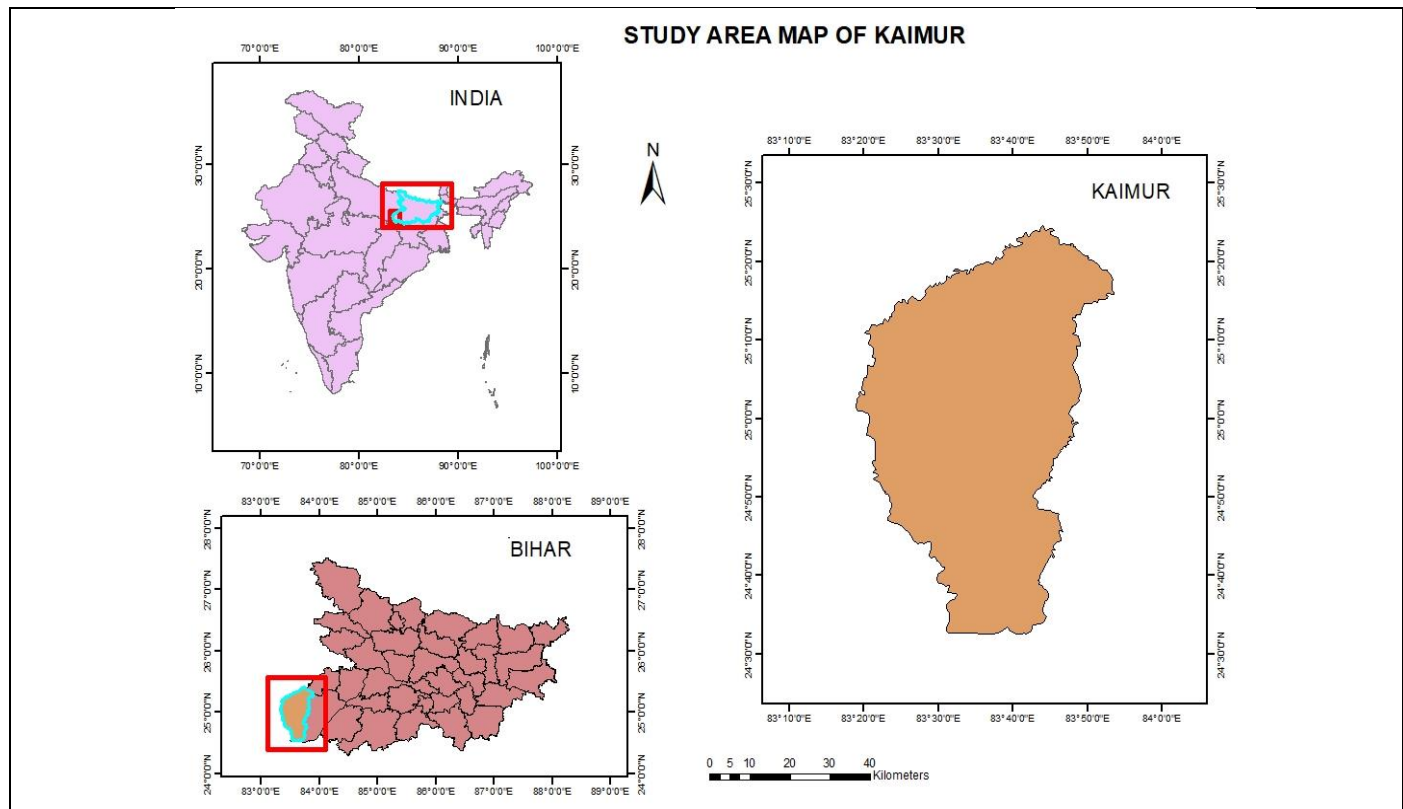


Figure 1: Location of Study Area

Objectives of the study:

The present paper will work on the following objectives:

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

Research Questions:

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

Study Approach and Scope:

This study calls on existing research from websites and reports, covering not just Kaimur but also conservation of surface water across various districts in Bihar. It explores distinct methods of surface 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 surface 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 surface 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 2021-22 & FY 2024-25 and The Report of Dynamic

Ground Water Resources Assessment of India -2022. This study covers the time period from 2019 to 2025. 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 surface water resources through rejuvenating public water bodies; including ahar-pynes and constructing check dams and reservoirs. In this scheme, public conventional water storage structures; tanks, ponds have not been only identified and rejuvenated but also new creation of water storage structures in almost districts of Bihar. Construction of water storage structures as check dams, ahar-pynes is going on in all districts of Bihar. Rainwater Harvesting in tanks 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 following tables. In Kaimur, 270 public water storage structures (tanks/ponds/ahar-pynes) have been marked and freed it from encroachment but not any structures are encroached upon.

Table: 1

Structures	Marked and freed it from encroachment	Encroached upon
Public water storage structures (tanks/ponds/ahar-pynes)	270	00

Source: Compiled from JJHM Annual Report FY 2024-25



Figure: 3

Source: JJHM Annual Report FY 2024-25

The rejuvenation of 984 ponds has been initiated but 980 ponds have been completed out of 2174 Ponds/Tanks/Pools in this district.

Table: 2

Structures	Rejuvenation initiated	Rejuvenation completed
Ponds/Tanks/Pools	984	980

Source: Compiled from JJHM Annual Report FY 2024-25



Figure: 4

Source: Field Visit

The new creation of 1184 water sources had been initiated and all 1184 water sources have been completed. In hilly areas of kaimur district, the creation of 288 check dams and other water conservation structures had been initiated but 287 check dams and other water conservation structures have been completed.

Table: 3

New constructions	Initiated	Completed
Water sources	1184	1184
Check dams and other water conservation structures	288	287

Source: Compiled from JJHM Annual Report FY 2024-25

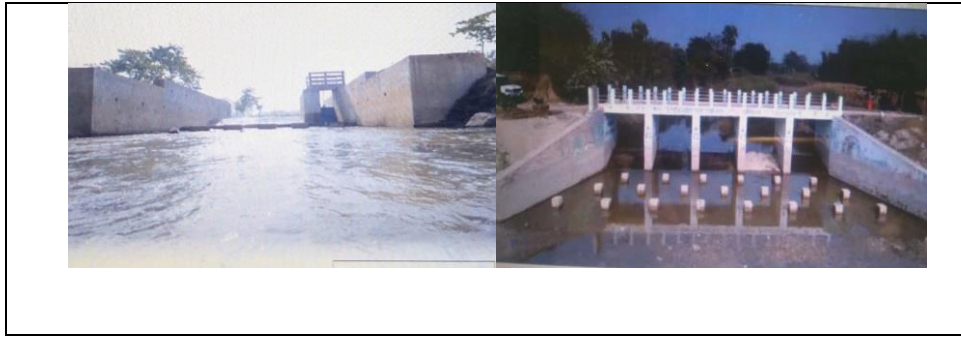


Figure: 5

Source: JJHM Annual Report FY 2024-25

Conservation of surface water resources includes removal of encroachment of water bodies (pond, pool, tank, ahar-pynes, and public water storage structures), rejuvenation of water bodies and new construction of check dams & water structures. A total of 1396 public water storage structures (tanks/ponds/ahar-pynes) have been marked and freed from encroachment. The rejuvenation of 2179 ponds has been completed. The new creation of 1184 water sources has been completed. And the creation of 697 check dams & other water conservation structures has been finished.

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. Drip and Sprinkler irrigation techniques have conserved surface water resources. Bihar government has extended this scheme from FY 2024-25 to 2029-30. So many works may be completed. Therefore the result may be changed in JJHM Annual Report FY 2029-30.

Conclusion:

Surface water 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 surface water resources. In this research paper, JJHM has revealed positive result in conservation of surface 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 ponds, 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 ponds, tanks and water structures for conservation of surface water resources. Sustainable development of surface water resources and various mitigation programs will be required in the event of climate change in the country. Ultimately, the success of surface water conservation relies on the commitment and collaboration of governments, communities, and individuals. By working together, we can shield surface water as a valuable and indispensable resource for future generations.

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