





GAYA'S JOURNEY TOWARDS CLIMATE RESILIENCE

DOCUMENTING BEST PRACTICES UNDER THE JAL-JEEVAN-HARIYALI MISSION

2025

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Executive Summary_ Introduction

Bihar's Gaya district, is not only a site of immense cultural and spiritual significance—known as the place where Buddha attained enlightenment—but also a region increasingly vulnerable to climate impacts. Gaya faces severe challenges such as rising temperatures, erratic rainfall, and frequent droughts, which threaten its agriculture, water resources, and overall livelihood security. These vulnerabilities make Gaya a critical area for focused efforts on climate resilience and sustainable development. The Jal-Jeevan-Hariyali Mission (JJH Mission) aims to address these issues through integrated water management and ecological restoration through active community involvement. This mission is essential not only for enhancing water availability but also for promoting climate resilience and sustainable livelihoods in Gaya among other things. Understanding the best practices under this mission is vital for informing future climate action strategies in Bihar and similar regions.

Objectives

The primary objectives of documenting best practices under the Jal-Jeevan-Hariyali Mission are:

Highlighting Successful Practices:

To identify and showcase effective strategies implemented under the JJH Mission that have led to improved water management, environmental sustainability, and community engagement.

Understanding Success Factors:

To analyse the factors contributing to the success of these practices, including community involvement, government support, and innovative approaches to water conservation and climate resilience.

Guiding Future Implementation:

To leverage the insights gained from these best practices to inform and enhance similar initiatives across Gaya and the broader region of Bihar, ensuring that lessons learned can be applied effectively.

Methods

The study employed a comprehensive approach to gather mostly qualitative and some quantitative data on experiences of beneficiaries from the Jal-Jeevan-Hariyali Mission. The methods included:

Field Visits:

Conducting on-ground assessments of various project sites across more than 10 blocks in Gaya district to observe practices and their impacts firsthand.

In-Depth Interviews:

Engaging with local communities, beneficiaries, and governmental stakeholders to gather insights into their experiences, and perceptions regarding the mission.

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Discussions with Stakeholders:

Discussions among various stakeholders to understand more about project implementation outcomes at a community level.

Findings

The findings from the study reveal some key insights into the effectiveness of the Jal-Jeevan-Hariyali Mission:

Streamlining Local Welfare with Climate Resilience

The JJH Mission provides an effective mechanism for convergence of goals related to 11 target interventions that relate to building climate resilience, improving water security, livelihood of communities and climate resilient agriculture practices. This approach has led to:

- Improved livelihood security for local populations through the promotion of climate-resilient agricultural practices, water management techniques, and diversified livelihoods.
- Significant climate co-benefits, such as improved air quality, improved local environment and local economy, which contribute to long-term sustainability.
- A sense of environmental stewardship among local communities, fostering a culture of conservation and sustainable resource management.
- Strengthened relationships of trust and cooperation between local administrations and communities, facilitating better implementation of government initiatives.

Collaboration Between Communities and the Government

Effective collaboration between local communities and government entities has emerged as a cornerstone of the mission's successful projects. Key aspects include:

- Initiatives where both stakeholders actively listen to each other, leading to tailored solutions that meet local needs.
- The establishment of community-based models that empower residents to take charge of natural resource management and engagement with the government for their needs in the context of resilience-building activities.
- The role of different line departments and schemes like Jeevika in facilitating and promoting the collaboration between community stakeholders and the government.

Potential for Scaling Up

There is substantial potential for scaling up successful initiatives through increased community involvement and replication across the district and the state. This includes:

Expanding and replicating the success of projects that run a community-based model. A prominent example is the community biogas plant at Basarhi in Bodhgaya, which not only provides renewable energy but also promotes waste management and reduces reliance on fossil fuels while promising air quality and health benefits.

Executive Summary_

- Replicating successful climate-resilient agricultural practices from Paraiya and Barachatti in other parts of Gaya and Bihar as appropriate. Disseminating success stories to inspire confidence in farmers across the region to adopt such practices.
- Developing innovative and creative models such as the promotion of fisheries in rejuvenated water bodies in Mohanpur that are sustainable and can be administered in an inclusive and fair manner with local communities.

Conclusion & Way Forward

In conclusion, the Jal-Jeevan-Hariyali Mission in Gaya presents a robust framework for addressing climate change and water management challenges through community engagement and sustainable practices. The successful practices identified in this report serve as a blueprint for future initiatives, emphasising the importance of local involvement and government collaboration.

Key recommendations for the way forward include:

- Enhancing Community Engagement: Strengthening community participation in planning and implementation phases to ensure that projects are tailored to local needs, and conditions and cater to the varying needs of people across social categories.
- Promoting Knowledge Sharing: Establishing platforms for sharing best practices and lessons learned from the JJH Mission to inform similar initiatives across Bihar and other regions facing comparable challenges.
- Investing in Capacity Building: Focusing on training and capacity-building programs for local stakeholders to empower them in managing water resources and implementing sustainable and climate resilience practices effectively.
- Monitoring and Evaluation: Implementing robust monitoring and evaluation mechanisms to assess the impact of initiatives continuously and adapt strategies as needed for improved outcomes.

By adopting these recommendations, stakeholders can build on the successes of the Jal-Jeevan-Hariyali Mission, fostering a more resilient and sustainable future for Gaya and the state of Bihar in the face of climate change.

Message from the Minister DOEFCC, Govt. of Bihar.

डॉ॰ प्रेम कुमार मंत्री पर्यावरण, वन एवं जलवायु परिवर्तन विभाग -सह- सहकारिता विभाग बिहार सरकार



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Message from the Minister DOEFCC, Govt. of Bihar

It is with great pleasure that I write this message for the report developed by Asar Social Impact Advisors Pvt Ltd highlighting the best practices in Gaya district under the Jal-Jeevan-Hariyali Mission undertaken by the Government of Bihar. As the Minister for Environment, Forests and Climate Change, I am proud to convey the Government of Bihar's unwavering commitment to supporting environment-friendly development in our state, with a particular focus on empowering our people while developing their resilience to climate change.

The Jal-Jeevan-Hariyali Mission, launched by our visionary Chief Minister Nitish Kumar, is a testament to our dedication to ensuring water security, afforestation, and climate resilience for all. Through this ambitious program, we have undertaken numerous initiatives to revive our water bodies, recharge groundwater, and increase green cover across the state. From constructing check dams and ponds to promoting sustainable agriculture practices and tree plantation drives, our efforts have yielded tangible results in improving the lives of our citizens and safeguarding our environment.

I commend Asar Social Impact Advisors for their tireless efforts in engaging with the most important stakeholders at the grassroots level – our farmers, women, and youth. By working closely with these communities, Asar has been able to understand their unique challenges and aspirations, and develop innovative solutions that address their needs while promoting sustainable development. Their initiatives in building climate resilience through in-depth engagement with local communities are particularly noteworthy and align perfectly with our government's vision for a greener and more prosperous Bihar.

The Government of Bihar extends its full support to Asar's work and appreciates their valuable contributions to our shared goals. This report, which showcases the fruits of our collective efforts and their impact on the people of Bihar, is a crucial tool in highlighting the progress we have made and the challenges we still face. As the minister responsible for safeguarding our environment and natural resources, I am confident that this report will serve as a blueprint for other districts in Bihar to emulate and build upon.

I encourage Asar Social Impact Advisors to continue their excellent work and to replicate this report for all 38 districts in Bihar. Together, we can create a future where the people of Bihar live in harmony with nature, where our rivers flow freely, our forests thrive, and our communities are resilient in the face of climate change. Let us work hand in hand to make this vision a reality and to build a better, greener Bihar for generations to come.

> (Dr. Prem Kumar) (Dr. Prem Kumar) Minister for Environment, Forests and Climate Change Department, Government of Bihar

Foreword

I congratulate Team Asar for this analysis of the implementation of the Jal-Jeevan-Hariyali Mission in Gaya District. This comprehensive account captures the transformative journey embarked upon by the district administration, local communities, and various stakeholders in building resilience towards a changing climate that is posing several challenges.

Recognising the pressing need for a comprehensive solution, the Government of Bihar launched the Jal-Jeevan-Hariyali Mission, an ambitious, multi-pronged approach aimed at ensuring the people of Bihar are well-equipped in fighting the vagaries of climate.

Gaya District, a largely rural and agrarian district faced significant challenges due to oft prevalent drought conditions. The district is also among the most vulnerable to climate risks in the country. Gaya has risen to the challenge in recent years under the Jal-Jeevan-Hariyali Mission and is among the best-performing districts in the state. The district administration, under the visionary leadership of dedicated officials and with the unwavering support of the community have embarked upon a remarkable journey of transformation to make this possible.

This report showcases the scrupulous planning, tireless efforts, and exemplary collaboration that went into the successful implementation of the Jal-Jeevan-Hariyali Mission in Gaya District. It highlights the various strategies adopted, innovative approaches employed, and the significant outcomes achieved during this transformative process.

This report serves as a valuable guide for policymakers, administrators, and development practitioners invested in the pursuit of building equitable and sustainable climate resilience across the country. By sharing our experiences and insights, we hope to inspire and catalyse further progress in achieving climate resilience for everyone.

I extend my heartfelt appreciation to every individual, organisation, and institution that played a role in this remarkable achievement. The unwavering commitment, collective action, and resilience displayed by the people of Gaya District have set a shining example for others to follow.

Shri Thiyagarajan S. M., I.A.S

District Magistrate,

Gaya District

Preface

Climate change has become an undeniable reality, manifesting as erratic rainfall, water scarcity, and flooding. Being a predominantly rural agrarian economy, the vulnerability due to these extreme weather events is palpable in Gaya. The District Administration is acutely aware of the implications of these changes on its people's lives and livelihoods. In the face of such mounting challenges, the district has emerged as a shining example of proactive climate resilience initiatives due to the bold and transformative steps taken to safeguard its communities and ecosystems through the successful implementation of the Jal-Jeevan-Hariyali programme.

Gaya has adopted a multi-dimensional approach to climate resilience, encompassing both adaptation and mitigation strategies. The district administration, in collaboration with local stakeholders and community organisations, has spearheaded initiatives aimed at enhancing adaptive capacity, promoting sustainable practices, and ensuring the availability of water resources through the Jal-Jeevan-Hariyali Mission.

Faced with the twin challenges of drought and flooding, the key to climate resilience is to ensure water security, especially for the agrarian community which relies heavily on agriculture for their sustenance. Through this Mission, the district has focused on water conservation, watershed management, and the restoration of natural resources. By implementing rainwater harvesting structures, building check dams, rejuvenating water bodies, and promoting afforestation, Gaya has taken significant strides in this direction. By adopting climate-smart agricultural practices, particularly through the use of climate resilient crops and modern equipment, farmers in Gaya have been able to enhance productivity, reduce water consumption, and mitigate the impact of climate change on their livelihood. Inclusivity has been a significant aspect of all the programmes, which has been achieved by the active involvement of women through Jeevika.

The success of the Jal-Jeevan-Hariyali Mission in Gaya can be attributed not only to the efforts of the district administration and government agencies but also in equal measure to the active participation and ownership of the local communities. The programme has not only transformed the physical landscape but has also fostered a sense of empowerment, self-reliance, and environmental stewardship among the residents.

This publication provides an in-depth exploration of the climate resilience initiatives in Gaya, with a special focus on the successful implementation of the Jal-Jeevan-Hariyali Mission. It offers valuable insights, best practices, and lessons learned from Gaya's journey towards climate resilience and water sustainability. It is our hope that these experiences will inspire and guide other regions grappling with similar challenges and serve as a blueprint for building climate resilience and transforming lives.

Shri Vinod Duhan, I.A.S Deputy Development Commissioner, Gaya District

Message from the CEO, Asar.

I am delighted to present this report documenting the best practices in Gaya district under the Bihar Government's Jal-Jeevan-Hariyali Mission. This mission represents a significant advancement towards achieving climate resilience and ensuring sustainable water resources for both present and future generations. Asar Social Impact Advisors is honoured to contribute to this important initiative aimed at nurturing climate resilience in Gaya and Bihar.

The report showcases the remarkable progress made in Gaya district across various components of the Jal-Jeevan-Hariyali Mission, highlighting efforts in rejuvenating water bodies, enhancing agricultural sustainability, and promoting environmental awareness. It also highlights some pioneering initiatives by the State that have made significant strides in addressing the pressing environmental challenges faced by the region and its people.

I would like to commend the Government of Bihar, all its officials, and the local communities for their proactive initiatives in building Bihar's climate resilience. The community's involvement and ownership of projects reflect a transformative shift towards sustainable practices that not only address immediate needs but also strengthen the ecological balance. It is inspiring to witness how collective efforts have led to tangible improvements in water management and environmental conservation.

At Asar, we are deeply committed to supporting such impactful initiatives. We are grateful for the opportunity to collaborate with the Government of Bihar, aligning our expertise and dedication with the state's vision for sustainable development. Our partnership has allowed us to engage with local communities and stakeholders, fostering a shared commitment to environmental stewardship and resilience.

As we move forward, Asar looks forward to continuing our partnership with the Government of Bihar, and contributing our expertise in strategic advice, community engagement and network building to further strengthen the implementation of the Jal-Jeevan-Hariyali Mission.

Together, we can ensure a brighter, more resilient Gaya and Bihar for our generations to come.

Vinter Contral

Vinuta Gopal CEO, Asar Social Impact Advisors Pvt Ltd



Introduction About Gaya

Established on 3rd October 1865, Gaya district has been a significant centre in the cultural history of the Magadh region for over 2000 years. It is mentioned in Hindu epics like the Ramayana and Mahabharata. The region saw the rise and fall of various dynasties, from the *Shaishunaga* dynasty to the Mauryans and Guptas. Gaya was pivotal during the Mauryan Empire, with Emperor Ashoka building the first temple at Bodh Gaya to commemorate Buddha's enlightenment. The district's landscape is characterised by small rocky hills and the Falgu River. Adding to its historical and spiritual significance, Gaya is also home to *Aahars* and *Pynes* - the traditional community managed irrigation systems first developed during the Magadh dynasty.

Geography

Gaya district is located in the south-central region of the Indian state of Bihar, and lies between 24.50° to 25.100° N and 84.40° to 85.50° E. It spans an area of 4,976 square kilometres, making it the second-largest district in Bihar. Gaya is bordered by the state of Jharkhand to the south. The district is divided into 24 administrative blocks and is part of the Magadh division, which also includes the districts of Nawada, Aurangabad, and Jehanabad.

Demography

According to the 2011 census, the district has a population of 43,91,418, with a population density of 880 inhabitants per square kilometre. Gaya has a sex ratio of 932 females for every 1,000 males, and a literacy rate of 66.35%. Scheduled Castes and Scheduled Tribes make up 30.39% The landscape of Gaya is characterised bv small rockv hills. including Mangala-Gauri, Ram-Shila. Shringa-Sthan, and Brahmayoni, which surround the district on three sides. The Phalgu River, a tributary of the Ganges, flows along the eastern side of the district. Other major rivers in the region include the Son, Punpun, Morhar, and Patna Canal system, which provide irrigation for the district's agricultural activities.

and 0.07% of the population, respectively. Linguistically, Hindi is spoken by 51.36% of the population, followed by Magahi at 41.37% and Urdu at 7.04%. This demographic mix reflects the cultural richness and diversity of Gaya district.



Source: https://gaya.nic.in/map-of-district/

Introduction

Gaya's Climate Vulnerability

Gaya faces significant climate vulnerability, as highlighted by various studies and reports. According to a study by IIT Mandi and IIT Guwahati (2020), Bihar is among the Indian states 'relatively highly vulnerable' to climate risks, and Gaya is among the top 11% of Indian districts most vulnerable to climate risks. Specific challenges such as lack of forest area, a high proportion of marginal and small operational holders, and a high sensitivity of the health sector contribute to the vulnerability of the state and the district.

Gaya district is vulnerable to various climate-related risks, including floods, droughts, and heatwaves. The district's geography and climate make it prone to these hazards, which can have significant impacts on the local population and economy.

Floods

Gaya district is located in the flood-prone state of Bihar, known for its annual floods. The district's proximity to the Falgu River and other local rivers, such as the Dardha, Jamune, and Bakane, makes it susceptible to flooding. The 2016 floods in

Droughts

Droughts are another significant climate risk faced by Gaya district. The district's agricultural sector is heavily dependent on rainfall, and droughts can have devastating effects on crop yields and livestock. The district's rainfall patterns have been declining over the years, with a 25% deficiency in rainfall in 2018 compared to the long-term average. This

Heat waves

Gaya district is also prone to heat waves, which can be particularly severe in the summer months. The 2019 heatwave in Bihar, which affected several districts including Gaya, Aurangabad, and Patna, resulted in the deaths of nearly 200 people. The district's heat wave risk is further exacerbated by climate change, which is leading to more frequent and intense heat waves.

These risks highlight the essence for the district to develop effective plans and strategies to build resilience to these

Bihar, which affected several districts including Gaya, Jehanabad, and Arwal, are a recent example of the district's vulnerability to this hazard.

has led to drought declarations in over 200 administrative blocks in 26 districts, including Gaya, affecting the livelihoods of thousands of farmers. The 2019 drought in Atri, Amas, Barachatti, Belaganj, Dobhi, Dumariya, and other areas of the district are a testament to the district's vulnerability to this hazard.

hazards, which will potentially be intensified by the impacts of climate change. Gaya district's climate vulnerability serves as a microcosm of the broader climate risks faced by Bihar and India. Addressing these challenges requires a multi-faceted approach that integrates climate adaptation strategies, sustainable development practices, and community resilience-building efforts to safeguard vulnerable populations and ecosystems in the face of a changing climate.

Introduction.

Jal-Jeevan-Hariyali Mission

Jal-Jeevan-Hariyali Mission can be said to be a comprehensive programme by Government of Bihar in tackling climate change. Even though the local administration has undertaken several other measures in response to local challenges with locally available resources, the Jal-Jeevan-Hariyali Mission, has managed to creatively consolidate various efforts and schemes under one programme for better implementation and monitoring.

The mission was conceived in 2019 by the Government of Bihar in response to the growing challenges owing to climate change. It was implemented in Mission mode after it received a consensus from all parties in a joint meeting of both the Houses of Legislature.

The mission document states that this ambitious, multi-stakeholder programme aims to build climate sustenance, rejuvenate water bodies and make them pollution-free, maintain or improve ground water levels, ensure adequate water availability, promote climate resilient agriculture, implement energy conservation measures and promote climate awareness among people.

The five specific objectives of Jal-Jeevan-Hariyali Abhiyan have been recognised as:

- To mitigate the effects of climate change and the challenges it poses.
- Development, conservation and rejuvenation of water harvesting sources.
- Adoption of weather-friendly crops and its rotation.
- Promotion of renewable energy.
- Increasing green cover.

Considering the multi-sectoral approach needed for the implementation of this comprehensive mission, nine departments have been identified. In most projects, there has been an involvement of more than one department. The Rural Development Department has been

- 1
 - Electricity Department



- Agriculture Department
- 3 Urban Development and Housing Department
- 4 Department of Environment, Forest and Climate Change
- 5 Department of Animal Husbandry and Fisheries
- 6 Building Construction Department
- 7 Minor Water Resource Department
- 8 Public Health Engineering Department
- 9 Rural Development Department

Introduction

There are eleven components under this scheme. Most of the components involve conservation and revival of water bodies, which is in tune with the unique challenges that Bihar faces both in terms of flooding and drought.

Component 1

Identify public water harvesting structures such as ponds / *Aahar-Pynes* / streams and clear them of encroachment

Under this component, already existing water-harvesting structures such as ponds, ahar-pynes (traditional water harvesting structures), streams and canals are identified. The District Administration in coordination with the Revenue and Land Reforms Department implements this component. The process of making the water-harvesting structures encroachment-free has also been begun.

Component 2

Renovation and restoration of irrigation structures like old ponds, tanks, *Aahar-Pynes*

Several public water harvesting structures are in a state of disrepair and need to be renovated or restored. Recognising this need, renovation work of identified public water bodies is being carried out by the Rural Development Department, Urban Development and Housing Department, Minor Water Resource Department and the District Administration.

Component 3

Identification and restoration of public wells

Under this component, public wells which are overexploited or fallen into disuse for various reasons are identified and restored. This helps in conservation of water and recharge of ground water. Public Health Engineering Department, Panchayati Raj Department, Revenue and Land Reforms Department, Urban Development and Housing Department, District Administration and local public representatives are responsible.

Component 4

Construction of new water soak pits and water-harvesting structures near public wells, ponds, and tube wells

In order to hasten ground-water recharge, new soak pits, recharge pits and other water-harvesting structures are to be constructed near all public wells, ponds, and tube wells. The government has mandated the construction of water-harvesting structures near government/public hand pumps in rural areas using NREGS funds. People are also being encouraged to construct soak pits near private hand pumps. Rural Development Department, Minor Water Resources Department, Urban Development and Housing Department and Public Health Engineering implementing Department this are component.

Introduction _

Component 5

Construction of check-dams and restoration of natural water-bodies such as rivers and streams, especially in hilly areas

Recognising the need to conserve water in hilly areas where there is a lot of run off, the Jal-Jeevan-Hariyali Mission encourages the construction of check dams. There is also scope to restore natural water bodies such as rivers and streams. This component is being implemented by Rural Development Department, Minor Water Resources Department, Department of Environment, Forest and Climate Change, and the District Administration. District-level committees under the chairmanship of the Deputy Development Commissioner have been constituted which will recommend the construction of check dams and water harvesting structures in non-forest areas.

Component 6

Transferring water from regions of excess water to water-scarce regions

Under this component, plans are afoot to create new water sources and transfer water from areas with surplus river water to water-deficient areas. Rural Development Department, Department of Animal Husbandry and Fisheries, Agriculture Department, and the Minor Water Resources Department are responsible for implementing this component.

Component 7

Construction of rain-water harvesting structures in buildings

Construction of roof-top rainwater harvesting structures have been mandated, especially for government buildings. Regulation and awareness for construction of roof-top rainwater harvesting structures in private buildings is also proposed. This component is implemented by the Building Construction Department, Urban Development and Housing Department, Education Department, Health Department, and Panchayat Raj Department.

Component 8

Creation of nurseries and undertaking intensive tree plantation

Setting up of plant nurseries and intensive tree plantation is a major component of the Mission. Rural Development Department and Department of Environment, Forest and Climate Change are working in this direction. Jeevika has been entrusted the responsibility of procuring saplings from private nurseries set up specifically for this purpose by Jeevika Didis, members of women's SHGs.

Introduction .

Component 9

Use of alternative crops, drip irrigation, organic farming, and other techniques

Under this component of the mission, new techniques of agriculture and eco-friendly farming which require less irrigation are to be promoted. Special efforts are being made to promote organic farming. For efficient use of water for irrigation, emphasis is being laid on drip irrigation. Awareness programmes for farmers are being conducted. This component is implemented by the Agriculture Department.

Component 10

Promoting the use of renewable energy

Under this component, renewable energy in place of conventional energy is being promoted. Efforts are being made to promote the use of solar energy and also reduce energy consumption. The main objective is to install solar energy in government buildings and to bring awareness on the use of solar energy in private buildings.

Component II

Awareness campaigns on the Mission

Awareness programmes are being organised by various departments at different levels. By adopting new and traditional methods of communication, the Information and Public Relations Department and all related departments are working on this component to bring awareness among the people on the environment and the need to protect it.

On 09 August 2019, on the occasion of Bihar Earth Day, the awareness program of Jal-Jeevan-Hariyali Abhiyan was

launched by the Honourable Chief Minister. Various programmes such as meetings, workshops, tree plantation drives, oath-taking ceremonies, awareness rallies, film screenings, publicity art, painting competition, essay, debate competition, plastic waste cleaning campaign, signature campaign etc. have been organised. Information, Education, and Communication (IEC) has been integrated into the execution of all components.

We studied some of the best projects and practices installed under the Jal-Jeevan-Hariyali Mission and contributed to climate resilience of the district in different parts of Gaya. With an objective to identify the key factors underpinning these projects and the successes thereof, we visited and interacted with local communities, beneficiaries, and government stakeholders in more than 10 blocks of the district. The key highlights from the study have been presented in the following sections of this report.

Watershed Management

Pond Renovation & New Ponds

The pond renovation and creation projects in Bihar under the Jal-Jeevan-Hariyali Mission have significantly contributed to building climate resilience in local communities. These projects have focused on rejuvenating traditional water bodies, constructing new water structures, and promoting sustainable water management practices. By restoring ponds, strengthening bunds, constructing reservoirs, and implementing rainwater harvesting systems, these initiatives contribute to increased water availability for irrigation, reduced water-logging in agriculture fields, and improved soil moisture content. Additionally, they can facilitate groundwater recharge, enhanced access to water for agricultural applications, and diversified livelihood options through activities like fishery.



Under the JJHM, community organisations supported by Jeevika were allotted ponds for a period of 5 years. In Mohanpur, the Banda Pokhar was allotted to Bharti Jeevika Mahila Gram Sanghatan, and a team comprising its members have been undertaking fishery at the newly created pond. A group discussion with the women leading the efforts helped understand the underlying benefits that fisheries in such ponds could bring to the locals with technical and administrative support from the administration. It not only provides the women with a reliable local livelihood option but also contributes to their financial security while imbibing a sense of ownership in them. Continued engagement with the administration will be essential in sustaining and nurturing this initiative. The participatory community engagement in these projects has raised awareness about climate risks, encouraged efficient water use, and promoted water conservation practices.

Ponds hold tremendous cultural and religious value for the local communities. The pond renovation projects have thus had the strong support and buy-in of locals for more than just the environmental reasons. In Khizarsarai and Fatehpur, for example, a push from the Jal-Jeevan-Hariyali Mission has driven local participation to conserve the water bodies not just for its agricultural and domestic applications but also for Chath Pooja and other occasions.



Watershed Management

Well Renovation & Soak Pits

The well renovation projects have focused on improving the functionality and efficiency of existing wells, which are critical for the local communities' access to clean water. By renovating these wells, the initiative has aimed to increase the water storage capacity, reduce water loss through leakage, and improve the overall water quality. The intervention could ensure a more reliable source of clean water for the communities and also reduce the pressure on the local water resources, which is essential for maintaining an ecological balance during drought situations.

A visit to wells renovated in Kujap Panchayat showed that while the projects have been successfully undertaken, they are not being utilized as well as they possibly could be. This is partly because wells in the region are currently running dry, and a low utilization ends up dirtying them and in turn, risks rendering the renovation futile.

The soak pit projects, on the other hand, have aimed to manage rainwater runoff and reduce the risk of flooding in the area. Soak pits are shallow, open-bottomed pits that allow rainwater to percolate into the ground, recharging the groundwater table and reducing the burden on the surface water systems. By installing soak pits in various parts of the district, the initiative helps to mitigate the effects of heavy rainfall events, which are becoming more frequent due to climate change. This not only reduces the risk of flooding but also helps maintain the natural water cycle, ensuring that the groundwater remains replenished and available for future use. Soakpits in Khizarsarai and Fatehpur were well-maintained and the concerned officials in both the blocks found the installation useful in trapping water, since water from the soak pits was not actively disturbed by anyone.

Local water management infrastructure development and maintenance initiatives has helped the communities ensure a continued access to water particularly for their livelihoods.



Watershed Management

Check Dams

Families living near the check dam constructed at Imamganj across Darauna river in 2023-24 shared that the project has given them fresh hope of sustaining their livelihoods. Land that would previously lie idle is now used to cultivate three crops a year including rice, maize, and wheat in the last year. This year they have cultivated rice, sarso (mustard), wheat and plan to sow green gram next. The availability of water has given them a sense of confidence and security of continuing their agricultural practices. This has also helped the rearing of farm animals.

Villagers added that they take special care to ensure that the channel is not dirtied by anyone, highlighting ownership and stewardship displayed by the community in preserving their resources.





Conservation

Plantations

The plantation projects in Gaya district of Bihar under the Jal-Jeevan-Hariyali Mission can potentially contribute to building climate resilience in local communities. These projects aim to protect the local environment and mitigate the negative impacts of climate change by promoting tree and sapling plantations. Through the Jal-Jeevan-Hariyali Mission, the state government of Bihar has set ambitious targets to increase the green cover area by planting millions of saplings, with a focus on increasing the green canopy of the state and enhancing the green cover percentage.



Varieties planted: Sheesham, Sagwan, Neem, Bakain, Gulmohar, Green Simar, Chhavan, Aonla, Mango, Guava, *Karanj* (Indian Rosewood), Teak, Neem, Melia Azedarach, Golden Shower (Flame of the Forest), Gmelina arborea, Country Gooseberry, among others



Conservation_

Plantations under the JJH Mission also include medicinal herbs, a case in point being the nursery at Gaya Engineering College. Saplings have been planted across villages in the district on both sides of the roads, with more than 48 lakh [4.8 million] saplings planted so far (as per data from the Forest Department).





Didi ki Poudhshalas

Women in Gaya have also been benefited by the propagation of nurseries by the State through collaboration with Jeevika as well as the Forest Department in some cases. This has provided women in the village with an alternative livelihood in the form of nursery plantations.

Success Story of Manpur's Deepmala Didi

Deepmala used to be a homemaker who bravely ventured into the development of nurseries through support and guidance from her Self-Help Group. Specifically, through the intervention of Jeevika, she learnt about the concept of 'poudhsala' and got into an agreement with Jeevika and the Forest Department to grow 20,000 saplings in 2023. She invested in mahogany, sheesham, amrud (guava), aam (mango), and sagwan (teak) for her nursery. Post verifications by forest department officers, she started getting payments. She is due to be paid in 3 instalments at predetermined rates as per the agreement. She has already made a profit of INR 100,000 in two instalments received so far. She shared that this has significantly contributed to her financial wellbeing. She now looks forward to scaling her nursery further up by growing fruits like Papaya and flowers. Deepmala is an inspiration to didis in her SHG, who look up to her to get started with their own success stories.





Climate Resilient Agriculture

The district's agricultural sector is heavily dependent on rainfall, and droughts have resulted in poor harvests, particularly in the *kharif* (autumn) and *rabi* (spring) seasons. The number of rainfall days has been decreasing, and the total volume of rainfall has been reducing, making it challenging for farmers to grow crops like rice, wheat, and lentils.

The promotion of sustainable farming practices, climate-resilient agriculture, and the adoption of new techniques like drip irrigation and modern equipment have further empowered farmers in Gaya district to enhance their agricultural yields and build climate resilience. Meetings with farmers in Paraiya and Barachatti blocks indicated a positive impact on their livelihoods and agricultural practices due to the implementation of both irrigation projects as well as the use of alternative crops such as lemongrass and mushroom under the Jal-Jeevan-Hariyali Mission.



Deepak in Paraiya shared that starting with himself, a community of farmers have now taken up the cultivation of such crops as mushroom and strawberries and have accessed benefits of irrigation and modern farming equipment under the JJH Mission. Through equipment like super seeders, straw reaper, and reaper cum binders, farmers have benefited in a myriad of ways. Farming has become more water-, labour- and time-efficient. This in turn, has led to the socio-economic upliftment of farmers while contributing to environmental sustainability.

More efficient usage of water through the use of sprinklers for example has encouraged farmers to try more crops (both in terms of quantity and variety) throughout the year. This potentially has major implications on reversing migration of smaller and marginal farmers. Farmers would traditionally burn stubble and leftovers from farming but through the use of modern equipment, have found ways to reap and bind *'ghusa'* in a manner that can then be used for mushroom cultivation, furniture making or as fodder for farm animals. The reduction in stubble burning improves seasonal air quality and is likely to yield health benefits as well. Additionally, the use of irrigation and farming equipment also saves the farmers some time which helps them plan their agricultural activities in a constructive manner.

Climate Resilient Agriculture

Similarly, Santosh Kumar along with Ramsevak and others in Barachatti have successfully done and benefited from community farming. A 90% subsidy for mini sprinklers has been instrumental in supporting farming in areas where cultivation was previously difficult due to insufficient water and dependence on rainfall and open irrigation. Today, even with limited rainfall, they can confidently cultivate maize, mustard, wheat, grams, vegetables (broccoli, cabbage) etc. Crop health has improved post irrigation measures and the reliance on chemical pesticides has significantly come down. Santosh Kumar has seen a 20% increase in his rice yield in the last year; he had installed mini-sprinklers in 2023-24. He also shared that owing to the time and labour saved, his community of farmers can afford to think about ways to diversify their income through mushroom cultivation or varieties requiring lesser water. Farmers have also marketed products like lemongrass oil from practices encouraged under the Mission further highlighting the benefits from the Mission.

Encouraged by the benefits availed by Santosh and his partners on their community farm, other farmers in Barachatti have also become keen to explore the full potential of benefits from government schemes. Not only do these stories showcase the success of the Mission but they also inspire more farmers to actively learn about and pursue such benefits.





Waste Management ______ Major Highlights from other projects

Waste Stabilisation Pond

Waste Stabilisation Ponds are a natural, highly energy- and cost-effective way to treat wastewater. They are an efficient means to remove organic matter and pathogens from wastewater. Their major benefit for local communities is that they make the effluent suitable for reuse in agriculture, and if required, aquaculture as well.

The Waste Stabilisation Pond that is under construction in Basarhi, Bodh Gaya is likely to support the local communities and the local environment in both wastewater management and water conservation for agricultural livelihoods.



Community Biogas Plant & Composting Plant

Basarhi has 450 households and close to 1,200 people. It currently houses a community biogas plant which supplies clean cooking fuel for around 25 households with a capacity to supply to 25 more households through piped connections. Connections are currently provided only to households which have cattle and can supply dung and waste. Houses get 2 hours of gas supply in the morning and evening each, and the gas is used for cooking purposes.

The plant can be potentially scaled up to supply gas to up to 100 houses if there is enough dung available. The plant at its current size has been functioning effectively, and it will be interesting to explore the possibility of scaling it up or setting another one to support more houses in the village and perhaps, aim to achieve the highest potential of community biogas at the village. Biogas reduces the reliance on more conventional sources like firewood, charcoal, and kerosene. The benefits of this are two-fold: firstly, they contribute to a reduction in greenhouse gas emissions, in turn mitigating possible contributions to climate change. Secondly, biogas is a cleaner source of energy and leads to lesser indoor air pollution and associated health issues. Moreover, the digestate from biogas production can be nutrient-rich and be used as fertilisers.



Waste Management

The composting units produce organic fertilisers from agricultural waste, reducing the need for chemical fertilisers. This improves soil health and fertility, making crops more resilient to climate variability. The use of organic fertilisers like vermicompost and bio-liquid agents such as "Jeevamrut" and "Gau Krupa Amrutam" bacteria can help improve soil quality and fertility. Every Panchayat in Gaya has a Waste Processing Unit (WPU) and every WPU has 3 composting units. Across the 320 Panchayats, Gaya has a minimum of 960 composting units in operation.



Community-based initiatives like biogas plants and composting units play a huge role in building climate resilience at the grassroots level, and the Mission is an example of its success and needs further scaling up. The versatility and scalability of community biogas plants indeed make them a promising solution to promote clean cooking while reaping its benefits in climate change mitigation.

Support from the Krishi Vigyan Kendra and other local institutions are crucial to help build and sustain climate resilience from a ground level.

Rubber Dam (Gaya Ji)_____ Major Highlights from other projects

The Gayaji Dam in Gaya, Bihar, inaugurated by Chief Minister Nitish Kumar, is India's longest rubber dam on the Falgu River. This innovative dam, costing around Rs 324 crores, utilises rubber instead of concrete. It stands at 411 metres long and 3 metres high, with unique features like rubber sheets under the river and an automatic system for adjusting water levels. The dam aims to ensure a consistent water supply in the Falgu River near Vishnupad Ghat throughout the year, benefiting devotees who come for rituals like Pind Daan and bathing as well.



Rubber dams are considered to have significant benefits in watershed management, particularly acting as a defence mechanism against floods and storing water for extended periods, thereby ensuring a consistent supply of water during dry spells in the region. It is effective in reducing sediments from the water as well, improving the quality of water. By leveraging these benefits, rubber dams play a crucial role in securing water resources, enhancing agricultural productivity, and mitigating flood risks, ultimately contributing to water conservation efforts in and around Gaya.

Ganga Jal Pariyojana _____ Major Highlights from other projects

The Ganga Jal Aapurti Yojana in Bihar, also known as the 'Har Ghar Gangajal' project, is a significant initiative aimed at addressing the water crisis in the state. This project, spearheaded by Chief Minister Nitish Kumar, focuses on providing Ganga water to every household in key cities like Rajgir, Gaya, Bodhgaya, and Nawada. The scheme involves laying pipelines to transport Ganga water from the river to homes, utilising excess monsoon water stored in large reservoirs. The project, estimated to cost around ₹4500 crores, aims to alleviate the severe water scarcity faced by Bihar, particularly in hilly regions where water levels drop significantly during different seasons. The Ganga Jal Pariyojana, which aims to meet the needs of 18,65,000 people in 2050, is a crucial step towards ensuring a sustainable and reliable water supply for the residents of Bihar, especially in areas prone to water shortages.



Interviews with beneficiaries of the project in Gaya highlighted the transformation brought in the daily lives of people in Gaya. People said that in a location where even purifiers would not clean water enough, they were now able to drink water directly from the tap without using any filters or purifiers. This has also saved them time, effort, and money that would otherwise be spent on procuring water for cooking and drinking purposes from tankers or by using purifiers. A conversation with a local physician led us to the finding that the number of gastrointestinal illnesses were on the decline since the project became functional. One lady also told us that this should not be stopped at any cost since it is a blessing for all the people of Gaya, especially women who took care of household chores.

Raj Bandh ______ Major Highlights from other projects

The 'Raj Bandh' is testament to successful collaboration between local communities and the government. Constructed in 2023, locals shared that the 'bandh' has benefited 3 Panchayats constituting 27 villages and a minimum of 6,000 farmers in the surrounding villages. Water from the project reaches up to 20,000 individuals in this region. In addition to an improved access to water for irrigation and household consumption, the project has also contributed to ground water levels and mitigated the dependence of households on tankers. Farmers interviewed in the region were content with outcomes from the construction of the 'bandh'. Prior to 2023, farmers and villagers had to struggle to find tankers to meet their water requirements. There is no shortage of water currently.



Furthermore, there have been innovative efforts to ensure sustainable benefits for those who have 'lost' land to the project. Locals have crowdfunded the purchase of fish seeds for communities that have lost land. The benefits from the sale of fishing produce is equitably distributed between them. The 'Raj Bandh' is a success story for three reasons: (i) it was constructed through active engagement between the government and the local communities, (ii) it has tried to ensure that the benefits are distributed equitably among the different communities, (iii) it caters to both the immediate needs (irrigation and household consumption) as well as the long term needs (improved groundwater levels) of the local population.

Pokhar (Amri Dhobiyahi Pokhar) Major Highlights from other projects

Amri Dhobiyahi Pokhar is a project by the Minor Water Resources Department (Govt. of Bihar) under the Jal-Jeevan-Hariyali Mission done in Manpur in 2022-23.



Amri Pokhar is a farm pond that supports farmers from approximately 250 families in Amri and Amra, which are neighbouring villages both dependent on agriculture. Before the *Pokhar* was constructed, agriculture was unfeasible and a lot of the land would lie idle owing to lack of water. Farmers had dug borewells in the past to access water but low groundwater levels meant that they did not have insufficient water for agricultural activities. Today, farmers are able to cultivate *gehu* (wheat), *dhaan* (rice), *moong* (green gram) using water from the *pokhar*. Local farmers shared that the *pokhar* has been ashray for them and expressed satisfaction with the development.

Mohanpur Dam ______ Major Highlights from other projects

The Mohanpur Dam is a project by the Minor Irrigation Department of Gaya District. In a region where close to 600 acres of land previously struggled to yield owing to lack of water for irrigation, the Dam has facilitated the cultivation of 3 crops in a year. The dam helps create a reservoir which aids in multiple applications, particularly local irrigation activities. This project is beneficial, especially for the poorer communities, who are completely dependent on agricultural livelihoods.



The dam can also ensure an increase in the groundwater level, in turn ensuring that hand pumps and bores do not run dry in summers like before. Locals shared that they have better access to water for household consumption thanks to the dam.

Aahar-Pynes_____ Major Highlights from other projects

Aahar-pynes represent an ancient and sophisticated method of water management that dates back to the Magadh dynasty more than 2000 years ago. These structures are prominent in Southern Bihar and Gaya is among the districts where they can still be seen. It is based on a mechanism to harvest flood waters though channels (known as *pynes*) and storing them in lowland surrounded with earthen structure from three sides *(aahars)* for irrigation during both rabi and kharif seasons.

Agricultural scientists still believe *aahar-pyne* system as one of the most successful and dependable mechanisms not only to control flooding from rain-fed rivers like Falgu and Jamune, but also a convenient and sustainable way to irrigate farms during rabi season and recharge groundwater.

Aahar and pyne system in the district has run through rough weather owing to lack of people's participatory role, which is essential to manage it, and growing dependence of farmers on electricity-powered tube wells. However, the agencies tasked to look after minor irrigation activities have come up and renovated many *aahar* sites.

As the district battled water scarcity in the previous decade, some voluntary organisations, including Magadh Jal Jamat, had taken up the cudgel to revive and rejuvenate the community-operated *aahar-pyne* system. Water tables in rural areas started improving, and farmers started harvesting better crops and vegetables in both seasons. The availability of a sustained source of water in the water-stressed region had also led to reverse migration.

The network of aahar-pynes is so rich that people still rely on it to irrigate around 80,000 hectares of land. Tube-wells, however, continue to be the major source of irrigation, providing water to around 1.09 lakh hectare land in the district.

The district has an integrated network of two major *pynes*, Barki Pyne and Jamune Dasain, which meander through undulating terrains in the length of about 159 kms and 125 kms respectively. However, siltation of rivers and connected pynes, encroachment land identified for *aahar* and *pynes*, absence of adequate rainfalls, and proactive participation of villagers in maintaining the system has reduced its efficiency considerably over the years.



Farmers in many villages underline the need for a sustained movement from people or beneficiaries to redevelop the chains of aahar and pynes with the help of district administration. It will help the district tackle the issue of recurring water crisis and fight impending challenges of climate change. It will be helpful if the district administration could also step in to curb flow of wastewater in pynes and take urgent measures to ensure flow of water in important rivers.

Summary of Findings

The findings from the study reveal some key insights into the effectiveness of the Jal-Jeevan-Hariyali Mission:

Streamlining Local Welfare with Climate Resilience

JJH Mission effectively aligns climate resilience with the priorities of the local community, focusing on sustainable livelihoods that are both economically viable and environmentally sound. This approach has led to:

- Improved livelihood security for local populations through the promotion of climate-resilient practices in agriculture and the availability and access of water through the rejuvenation or creation of new water bodies. Diversification of crops as well as diversification of livelihoods under the JJH Mission have played a key role in this.
- Significant climate co-benefits, including improved air quality from the switch to community biogas from firewood, improved biodiversity, groundwater recharge and reduced soil erosion with safeguards for the local environment and the increasing green cover, sustained local economic activities. These benefits to both the local environment and the local environment and the local economy contribute to long-term sustainability.
- Encouragement of a sense of ecological stewardship among local communities, fostering a culture of conservation and sustainable resource management.
- Strengthened relationships of trust and cooperation between local administrations and communities, facilitating better implementation of government initiatives.

Collaboration Between Communities and the Government

Effective collaboration between local communities and government entities has emerged as a cornerstone of the mission's success. Key aspects include:

- Initiatives such as the Raj Bandh where both stakeholders actively listen to each other, leading to tailored solutions that meet local needs. This has led to outcomes that benefit a wide group of people and in turn, a greater acceptance of the mission.
- The success of community-based models such as the community farm in Barachatti or the community biogas plant in Basarhi or community fisheries at the Banda Pokhar in Mohanpur highlight the potential of community-based approaches in driving the Mission forward and farther. Such an approach empowers residents to not only take charge of their natural resource management efforts but also to engage with their governmental partners for their needs.
- The role of Jeevika with their support for women SHGs in actively being a part of the JJH Mission is a crucial takeaway. Similarly, convergences with the other line departments are a highlight of the Mission.

Potential for Scaling Up

There is substantial potential for scaling up successful initiatives through increased community involvement and replicating it across the district as suitable. This includes:

Expanding and replicating successful community-based models across the district. The community biogas plants in Basarhi (Bodhgaya) is one example, which not only provide renewable energy but also promote waste management and reduce reliance on fossil fuels while promising air quality and health benefits.

Summary of Findings

Potential for Scaling Up

There is substantial potential for scaling up successful initiatives through increased community involvement and replicating it across the district as suitable. This includes:

- Expanding and replicating successful community-based models across the district. The community biogas plants in Basarhi (Bodhgaya) is one example, which not only provide renewable energy but also promote waste management and reduce reliance on fossil fuels while promising air quality and health benefits. Given the availability of organic material (primarily cattle dung and agricultural waste) and the willingness of more communities to participate, the Basarhi plant itself could potentially be scaled up to supply to more households in the village and its case can be an exemplar for other villages in Gaya.
- Replicating appropriate climate-resilient agricultural practices that have worked in the cases highlighted in Paraiya and Barachatti through the use of irrigation, modern equipment in other blocks and villages of the district. Dissemination of these success stories across the district will facilitate better access to methods and knowledge which can potentially ensure more farmers adopt such practices.
- Developing innovative and creative models to ensure that every stakeholder including the marginalised groups participate in the decision-making and get a fair share of the benefits arising from any initiative. 2 cases in the report stand out and can potentially be a model for projects in other parts of the district, state as well as the country. In the Raj Bandh project, it was ensured that families whose land were submerged due to the project were given a fair share of the produce from fishing done at the sites. At Mohanpur, a group of women were allotted the rejuvenated Banda Pokhar to undertake fishing so they could sustain their livelihoods.

These approaches are worthy of scaling up not just because of the goals they achieve but more so because of how they achieve it in an inclusive and fair manner rooted in their collaboration with local communities.

Conclusion & Way Forward

In conclusion, the Jal-Jeevan-Hariyali Mission in Gaya presents a robust framework for addressing climate change and water management challenges through community engagement and sustainable practices for livelihood diversification and environment conservation. The successful practices identified in this report could inspire future initiatives both in terms of the 'what' as well as the 'how', particularly highlighting the importance of local involvement and government collaboration.

Key recommendations for the way forward include:

Enhancing Community Engagement

Strengthening community participation in planning and implementation phases to ensure that projects continue to be tailored to local needs. The Raj Bandh case where land-losing communities were given an equitable share in the fisheries produced from their area should serve as an example for distributive justice. More projects under the JJH Mission could be designed to cater to the varying needs of people across social categories.

Promoting Data Gathering and Knowledge Sharing

Some of the best practices in specific blocks in the district such as those from the community biogas plant project in Basarhi or climate resilient agriculture practices in Paraiya must be made accessible to other blocks in the district and other districts in the state. Platforms can be established for sharing best practices and lessons learned from different components of the JJH Mission

Investing in Capacity Building

The role of public cooperation and community engagement emerged as a critical contributor to the success of the best practices highlighted in this report. More training and capacity-building programs for local stakeholders can further empower communities in learning about how they could avail benefits of projects under the JJH Mission and taking ownership of sustaining existing initiatives

Monitoring and Evaluation

Monitoring and Evaluation (M&E) using an evidence-based framework allows decision-makers to identify successful strategies and areas needina improvement, thereby facilitating informed decisions to enhance project effectiveness. Implementing robust M&E mechanisms fosters accountability and trust among local stakeholders, including government officials, community members, and partner organisations,

to inform similar initiatives across Bihar and other regions facing comparable challenges. Further, it will be important to gather data and share it with the community on the benefits of further participating in and taking forward the management of these local systems to improve their quality of life, livelihoods and provide resilience against climate impacts.

and also propagating it to the larger population. This will aid in ensuring effective collaboration between the communities and government stakeholders in every block. It is one of the building blocks for a people-centred management of natural resources and effective implementation of sustainable and climate resilience practices.

which in turn will encourage greater participation from them. By establishing clear baselines and indicators of success, such as improvements in groundwater levels, yield, and income, stakeholders can evaluate the mission's effectiveness in achieving its goals. This data can also support future funding and policy decisions, ensuring the long-term sustainability of the mission.

Conclusion & Way Forward

Going forward, some of these steps can help stakeholders build on the successes of the Jal-Jeevan-Hariyali Mission, fostering a more resilient and sustainable future for Gaya and the state of Bihar. The mission's holistic approach to environment conservation, sustainable agriculture, and its convergences with climate and developmental action can serve as a model for other regions seeking to address similar concerns in an inclusive and participatory manner.



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Asar Social Impact Advisors (Asar) is a start-up in the social and environmental impact space in India. We are incorporated as a for-profit company under Indian law.

Our focus is the challenge and opportunity facing India today. The coming decade is critical to define the actions that the country and its people take in building a prosperous and climate-resilient future. Our solutions are predicated on the understanding that the systemic and transformative changes we require can only be catalysed by collaborative problem-solving and implementation.

Asar exists to empower individuals, organisations, and networks working on the climate crisis by collaborating, coordinating, and collectivising their efforts to amplify their effectiveness and impact.

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