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“From Pipes to People: A Design Thinking Blueprint for Mission Bhagiratha in Rural Telangana”

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From Pipes to People: A Design Thinking Blueprint for Mission Bhagiratha in Rural Telangana

Abstract

The policy brief examines the implementation and execution of Mission Bhagiratha, Telangana's flagship drinking water supply scheme launched in the year 2016. The mission's implementation has been understood with a Design Thinking lens. Despite its ambitious goal to provide safe and affordable drinking water to the Telangana people, that is piped water to every household using the Krishna and Godavari River, the scheme has faced mixed outcomes due to its poor water quality, lack of community involvement and inconsistent supply. Employing a mixed approach involving secondary data and primary data from our discussions with six Rudraram residents, we have identified key points such as water quality issues and irregular supply. Problems such as regular maintenance of overhead reservoirs, smart water management with meters, comprehensive water quality testing and subsidized connections for low families have been proposed resolutions. The aim is to bridge the gap between the citizens and the government ensuring sustainable water supply and security in Telangana.

Keywords: *Mission Bhagiratha, Design Thinking, Water Availability, Taps.*

Introduction

Managing clean water resources is a critical problem faced by policymakers in India. If we look at the data, the situation becomes even more bleak. India houses a significant 18 percent of the world's population while only having 4 percent of its water resources, making it one of the most water-stressed countries (Chaudhary, 2024). The country also heavily relies on groundwater to meet most of its water needs, being the largest user of groundwater in the world. More than 60 percent of irrigated farming and a staggering 85 percent of drinking water in the nation comes from groundwater reserves (Ahmad, 2025).

Families in rural areas walk miles each day to fetch water, often from contaminated sources. Farmers face declining crop yields as over-extraction of groundwater depletes their wells. Children suffer from waterborne diseases due to high levels of fluoride and nitrate contamination in groundwater. Despite various government programs aimed at ensuring water security, people on the ground continue to suffer due to poor implementation and lack of community involvement.

But even then, in most cases, the groundwater is also not pure and has a lot of contaminants. The Annual Groundwater Quality Report in 2024 revealed how there were worrying levels of fluoride and nitrate contamination levels beyond the permissible limits in many states. For families dependent on hand pumps and borewells, this translates to chronic health issues, particularly for children and the elderly. With a big agricultural industry and having the biggest population in the world, water is an essential resource, showcasing an urgent need for better policies in this sector. Historically speaking, the country has had a long history of programs

related to water security, which initially began with the Accelerated Rural Water Supply Program in 1972-73 (Kuzhivelil, 2021). It was later renamed the National Rural Drinking Water Program in 2009, a major water program launched was India's National Rural Drinking Water Programme (NRDWP), which aimed to provide safe and sustainable drinking water to all rural citizens. There was also the Jal Jeevan Mission in 2019, intending to provide Functional Household Tap Connection (FHTC) to every rural household (Kuzhivelil, 2021). Many other policies have been implemented at the national and state levels; however, the fact remains that they have much room for improvement when it comes to reliably providing safe water to people. This was primarily because most of the infrastructure that was created was designed and constructed by state governments, lacking participation from local communities, rendering them nonfunctional in most cases (Kuzhivelil, 2021). Since local communities are not actively involved there are many hindrances when it comes to overseeing the maintenance of water infrastructure over time. People who are the end users suffer because they come to realize that water policies at multiple levels lack proper implementation, forcing them to look for alternatives, such as borewells or private suppliers.

It also becomes clear that there can be no generalized policy for water security as even regions within the same state in India have unique geographical conditions and requirements. It makes more sense for state governments and local administrative bodies to take up the initiative as they will be able to recognize water scarcity problems and come up with solutions in a much easier manner. Telangana is one such state that has a major requirement of clean and safe drinking water, being a landlocked state, which is why the state government launched its flagship drinking water supply scheme Mission Bhagiratha in 2016. The primary objective of the project is to ensure safe and continuous piped drinking water by utilizing surface water sources at 100

LPCD (liters per capita per day) for rural areas, 135 LPCD for Municipalities, 150 LPCD for Municipal Corporations, and 10% for Industrial purposes (Rao, 2017). Effective water security policies must move beyond infrastructure targets and focus on tangible improvements in people's lives.

Telangana, being a landlocked state, has been subject to chronic drought conditions and drinking-water deficient rainfall in the past decade further exacerbating the water problems that the state faces (Rao, 2017). The project aims to provide water by making use of the two perennial rivers in the state – Krishna and Godavari. The Bharat Rashtra Samithi government, headed by the former chief minister Mr. K Chandrasekhar Rao, executed the project with a funding of Rs. 45,000 crores. Despite such a monumental investment and initiative, the scheme has mostly received mixed feedback from residents of the state. There were instances where many people in certain areas continued to face water shortage problems even after the scheme was implemented (Tomar, 2023). The lack of uniform availability of water has forced many individuals to resort to using bore wells for the extraction of water, which happens to have a high concentration of fluoride (Telangana Today, 2025). This directly pinpoints major gaps in the scheme that have ultimately led to it falling short of its required targets.

What is Design Thinking & Why It Matters

It becomes evident that most policies that deal with the provision of clean and safe water in India have a top-down approach, failing to account for many of the problems that end users face. This is where we can make use of design thinking as policymakers can move to drafting initiatives that have a human-centric approach. It also prevents us from fixating on the fiduciary problems of a policy and enables us to really understand where there are implementation

problems, showcasing a lack of empathy for the end user. In addition to this, traditional research methods have inherent biases towards the majority in a given location, resulting in disproportionate outcomes for people.

A conventional research approach to water security, for instance, would place a much bigger emphasis on data about financial feasibility, infrastructure costs or water availability at a macro level. While these factors are certainly important, they often tend to overlook the everyday struggles of citizens in getting clean and safe water. Most rural families end up having to walk long distances for clean water, urban households have to contend with erratic supply and farmers have to deal with quickly depleting groundwater levels.

Since the design thinking approach uses data grounded in empathy, iterative problem-solving methodologies and user co-creation, it sets the stage for creating a citizen-centric path that will further strengthen policy research. It helps to uncover the hidden cultural barriers, fosters stakeholder collaboration and ensures solutions that resonate with actual user needs (Lewis et al., 2019.). The design thinking approach undertakes a six-stage strategy, but not in linearity. It begins with defining the problem, understanding the pain points while empathizing and mapping the users. The problem statement is then refined based on insights from users, after which multiple innovation solutions are generated to address the identified challenges. These solutions are then tested with prototypes, which are tested out in the field.

A good example of where the design thinking approach has been inculcated to yield successful results is Thane's Municipal Corporation incorporation of Information and Communication Technology (ICT) to address water management challenges. They have utilised

Universal Smart Metering by installing Smart Water Meters across the city to reduce Non-Revenue Water significantly (Banerjee, 2022). This allows them to collect accurate billing data of water consumers to keep track of exactly how much water is being used by consumers. Here we can see how there is an emphasis on the end user by only charging them for their actual consumption. Moreover, the Smart Water Meter reduces illegal connections and improves billing efficiency and accuracy, also increasing revenue for the Municipal Corporation as well (Banerjee, 2022). The success in the case of Thane demonstrates how the tactful use of technology in a human-centric iterative design approach can help with sustainable water management and serves as a useful case study for other urban centers.

Objective

The main objective is to determine the impact of Mission Bhagiratha on rural areas using a Design Thinking perspective. We shall look at the case in Rudraram village in Patancheru Mandal in Sanga Reddy district, to understand how beneficiaries avail and perceive the benefits of the policy.

We seek to determine water supply and quality gaps. Assess the user experience for water tap connection, availability, and costs (e.g., pipeline connection payments or monthly charges). And subsequently use the Design Thinking process to suggest innovative, human-centered solutions that fill these gaps. We shall also contrast realities on the ground with policy ambitions, identify areas of success along with instances of implementation failure, and offer recommendations for policy correction that better harmonize with the needs of the users.

Literature Review

India being a developing nation recognized the important role that water has in its society. And so, there have been continuous efforts over the years by governments in water infrastructure (Kuzhivelil, 2021). Moreover, India has an overreliance on groundwater which is problematic. Approximately 30 percent of India's freshwater is stored as groundwater, which again exists only in aquifers, which are bodies of permeable rock and sediment beneath the Earth's surface (Chaudhary, 2024). The problems only begin there and a closer look at studies reveal that the problem with water security in India is multifaceted. According to Singh et al. (2025), the scarcity of usable water is not merely the lack of a physical water supply but is also the consequence of poor water quality and lack of efficiency in different use cases.

Policy formulation also becomes complicated because the Constitution allocates jurisdiction about water-related matters to State governments as per the Seventh Schedule, whereas the center holds authority over inter-state rivers and water disputes (Singh et al. 2025).

The National Water Policy, 2002 mentions non-conventional methods of water management such as inter-basin transfers, apart from rainwater harvesting. "Ecology" was mentioned explicitly to be a part of the water allocation priorities, apart from drinking, agriculture and industrial purposes. The policy also placed greater emphasis on environmental sustainability, participatory approaches, and maintenance of existing infrastructure. (Ministry of Water Resources et al., 2002). There were many problems with this policy, with the first one being a lack of reforms to address the problem of floods, bringing more areas under irrigation, and failing to increase water-use efficiency when it came to irrigation and ramping up food grain production (Paranjpye et al. 2014). There were also provisions to better address inter-state water disputes, which remain unfulfilled.

The National Water Policy of 2012 evolved to address the increasing water stress in India and the impacts of climate change more explicitly. It emphasizes treating water as a community resource under public trust and prioritizing ecological needs. A key focus is on demand management and water use efficiency and advocates for water pricing to ensure efficient use and equity. (Government of India & Ministry of Water Resources, 2021) However, it did not succeed much in implementation. This was primarily because inter-state water disputes persisted and there was also an over-optimistic estimation of India's annual water availability (Khambete, 2023). Even though the policy had a focus on giving more power to local bodies, it lacked clarity on prioritization and completely glossed over the varying geographic conditions throughout the country (Khambete, 2023).

Since it is much more feasible and practical for State governments to tackle issues of reliable provision of clean water, Water is a State subject in the Indian Constitution. While many states have their water policies, Telangana's Mission Bhagiratha stands out because of the sheer scale of the project and the funds that have been allocated to it. However, a look at all of the literature surrounding the project showcases a mixed bag of experiences among citizens of the state. On one hand, we witnessed how the Center conducted a study on the performance of the project in the state and the findings were so impressive that they were given an award for it. The organization shared that each household was getting 100 liters of per capita quality drinking water under the scheme and had set an example in the country. The review was done through the Jal Jeevan Mission and the inspection was carried out by a national-level independent organization in 320 randomly selected villages across Telangana (Press Trust of India, 2022). The results of the inspection were very promising and the state was recognized as the number one state in the 'Regularity Category' and was given the Jal Jeevan Mission Award in Delhi.

Tomar (2023) in his article on South First, ‘Mission Bhagiratha: Clean drinking water a boon for many, while others marooned in Telangana’ provides a detailed look at the varying responses that citizens have had towards the scheme. Many women revealed that the project alleviated their financial burden, especially those working in the agricultural sector. A more recent article by Srinivas (2025) in the Deccan Chronicle revealed how rural communities in the Adilabad district continued to rely on borewell water sources, reasoning that it was safer and pure. Villagers did not want to shift, stating that Mission Bhagiratha water had a bad taste, rustic smell, and sometimes even a muddy quality to it (Srinivas, 2025). It was also found that the water that was provided was used for almost everything except human consumption, which raises serious concerns about the quality of the water. Another issue is that the project’s failures have led to a drastic increase in the usage of bore wells for water extraction, even though there is a high concentration of fluoride in it (Telangana Today, 2025).

The project has also failed to address the increasingly worrying water problems in the capital city of Hyderabad. Just last year, city officials from the Hyderabad Metropolitan Water Supply and Sewerage Board approached Mission Bhagiratha to request an allocation of 50 million gallons of water per day to the city (Times of India, 2024). Being a major financial center, the needs of the city will only increase in the coming years. More recently, Chief Minister A Revanth Reddy held a review meeting to earmark 20 tmcft (instead of the proposed 15 tmcft) from the Mallannasagar project as the Godavari Phase-II project (The New Indian Express, 2025). There will also be new pipelines that will be laid parallel to the already existing ones from the Manjeera project. Manjeera and Singur have so far served as the major sources of Hyderabad’s drinking water requirements (Mahesh, 2024). The Manjeera project has also not

been able to regularly provide water to the city. A major water leak in the pipeline was reported on the 9th of March this year by the Deccan Chronicle (2025).

Taken together, these studies and on-the-ground observations underscore a multifaceted challenge. On one hand, many citizens have actively benefitted from Mission Bhagiratha, with rural households obtaining access to clean and potable piped water, solving a lot of financial and logistical issues. In this regard, the policy worked so well that it even earned Telangana national recognition through the Jal Jeevan Mission Award (Press Trust of India, 2022; Tomar, 2023). Others have cited serious doubts about using water from these pipelines because of smell, taste, and overall quality issues, as was seen in Adilabad (Srinivas, 2025). This duality is a sign of implementation problems and a disconnect between the policy ambition and practical outcomes.

In this paper, we review the existing challenges of this project through a design thinking lens and provide possible solutions to these problems using this approach.

Methodology

For the purposes of this study, we have utilized a mixed-methods approach. The first step involved the collection of comprehensive secondary data, which involved an extensive review of policy documents, government reports, academic articles and news coverage to have a holistic understanding of how well Mission Bhagiratha has performed. To complement this, primary data was also gathered by conducting in-depth discussion sessions in Rudraram village with 6 individuals, 4 women and 2 men, selected on the basis of convenience. They were asked to share their firsthand experiences and overall perception about the water supply in the area. Cue cards were utilized to facilitate the discussion and capture nuanced insights into pain points of the beneficiaries.

Design thinking methodology was also inculcated into the data collection and analysis process, with an aim to identify key issues and generate empathetic, innovative solutions to improve the policy outcomes. The study also acknowledges several limitations. To begin with, the small, localized sample that was conveniently selected may not be representative of the general population of Telangana. In addition to this, reliance on secondary data sources hinders the depth of policy performance evaluations. Furthermore, cultural stigmas and reluctance on the side of participants, coupled with limited demographic data, prevent a more granular analysis across different income and age groups within the state.

Stages in Design Thinking

Stages in Design Thinking

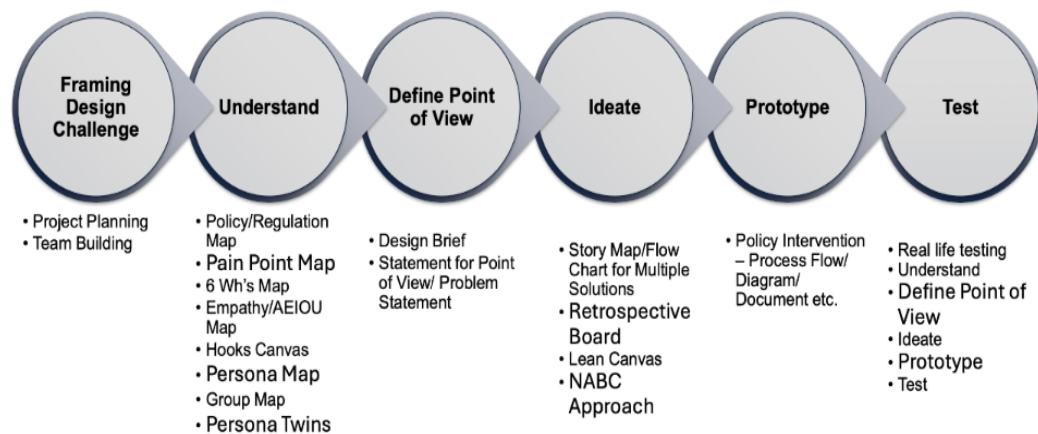


Figure 1 Stages in Design Thinking, Source: Google

Design Thinking Framework: We will analyze Mission Bhagirath's implementation issues using the six stages of Design Thinking; please note that these stages do not assume a strictly linear process.

Stage 1: Framing Design Challenge

Here, we will clarify the core problem that we initially identified and set a basic idea about the problem to be looked at. We are looking at the issues in implementation of Mission Bhagiratha. For that, we first start looking at the general policy implementation challenges, which we recognized through secondary research as well as discussion sessions with users.

Identified Policy Challenges

We looked at where the shoe was being pinched. We identified the issue as water not being provided at affordable cost, and the water supply not being reliable and consistent. Some of our respondents mentioned paying for pipe connection installation as a grievance, because they were under the impression that the policy would provide them water for free. This denotes information asymmetry between the citizens and the government.

Beneficiaries noted that the water supply is usually only for 1-2 hours a day, with some places having irregular delivery or depending on alternate sources like borewell water. This unreliability, along with variations in water quality, highlights the difficulty of providing a consistent and reliable supply of clean water. Uninterrupted supply of water is a problem yet to be resolved, during the summer months.

Fixing the Frame: Telangana as a whole is a wide state to cover, and for the scope of this project we will only be focusing on Rudraram village and Sanga Reddy District in the state to assess the implementation of Mission Bhagiratha. This localized focus enables us to explore the particular issues of residents in greater detail, giving us a clear microcosm of the larger issues involved in the implementation of Mission Bhagiratha.

Setting the Scope: Our analysis focuses on rural areas, where water scarcity is the most critical. The learnings from our in-depth discussions in Rudraram village forms a vital benchmark for appreciating the wider challenges of implementation.

Profiling the Team Canvas - visualization of the team

We have created a canvas for our team to understand each person's strengths to harness them effectively. This canvas outlines each member's personality, strengths, and the specific roles they play in the project.

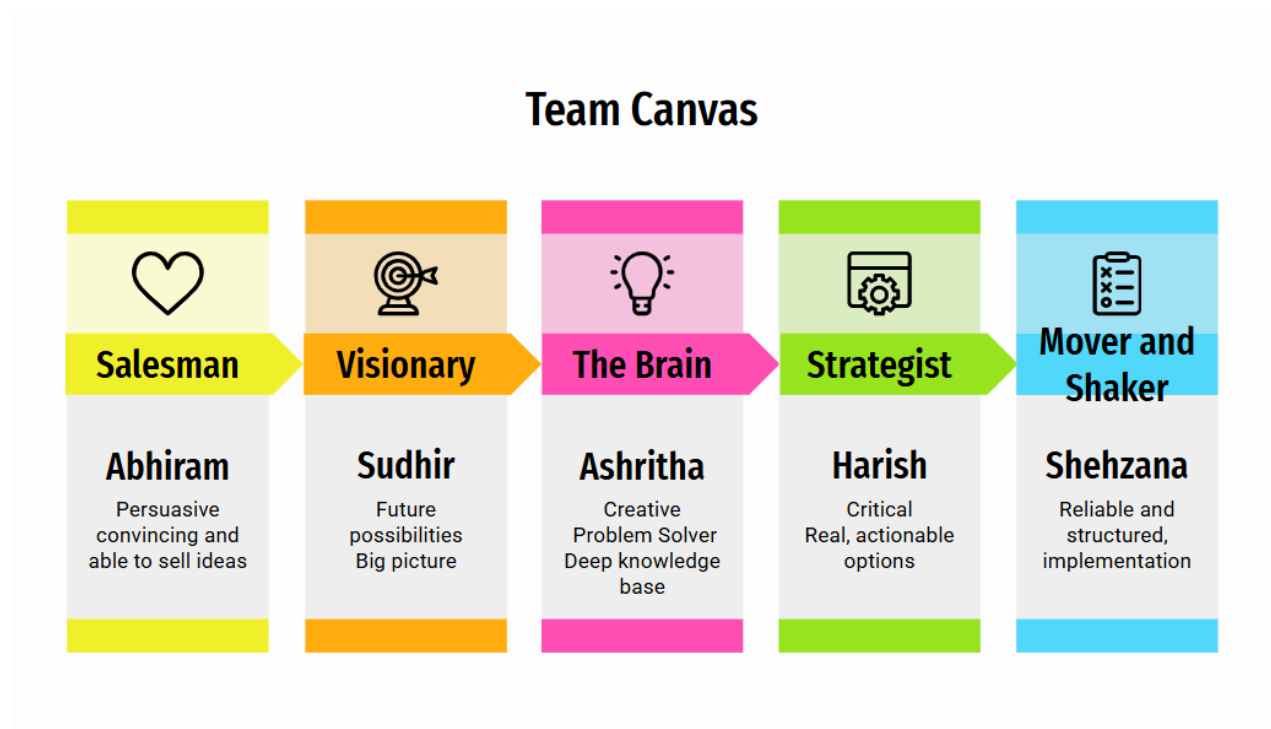


Figure 2 Team Canvas, Source: Authors

This team collectively brings together a balance of creativity, vision, strategy, persuasion, and structured execution—an ideal mix for tackling the water accessibility issues in Rudraram village under Mission Bhagiratha.

Stage 2: Understand

Under this, we will explore user experiences, policy details, and on-ground data to uncover real needs and constraints to better understand what the experiences of the target group of the policy are.

Policy Analysis

Policy Goals and Objectives:

Mission Bhagiratha was launched to ensure universal access to safe and clean drinking water across Telangana, particularly targeting rural and semi-urban areas. The project aimed to provide piped water to every household, reducing reliance on groundwater, and ensuring a sustainable long-term water supply solution. The project aims to provide continuous and assured access to safe drinking water, minimizing waterborne diseases and reducing the dependency on unreliable and unaffordable sources. The project envisions long-term security to well-planned infrastructure and water reservoirs, ensuring that even remote areas receive piped water access. By providing household tap connections, Mission Bhagiratha reduces the burden of women bearing the burden of water collection, which leads to better health, improved education, and economic productivity. Clean water access is directly linked to reducing incidence of waterborne diseases such as diarrhea and cholera. This project aims to incorporate increased water quality to ensure that the delivered water meets safety standards.

Mission Bhagiratha is not just a supply project. It is a comprehensive, iterative policy addressing Telangana's water crisis to sustainable infrastructure, equitable access, and improved public health outcomes. It aims to transform water accessibility across the state, ensuring long-term security for future generations.

Policy Type: Distributive Policy

Mission Bhagiratha fits the distributive type of policy, as it allocates water resources and infrastructure benefits to the whole society, without imposing direct costs on specific sections of the society. The Telangana government funds the project through public revenue and loans,

ensuring that water supply networks reach every village and household. Unlike regulatory or redistributive policies, which impose obligations or take from one group to benefit others, Mission Bhagiratha extends services universally, without excluding any specific section of the society. The project provides water connections and ensures equitable access to water without increasing direct financial burdens on underprivileged communities.

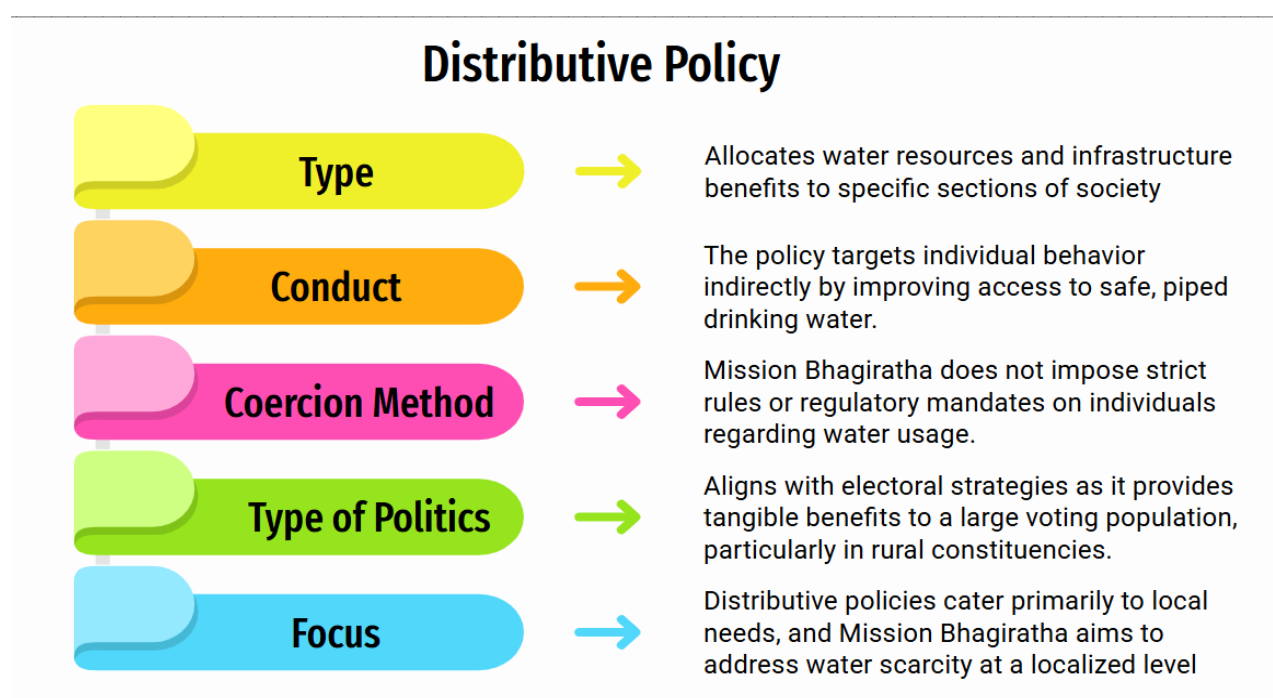


Figure 3 Policy Type, Source: Authors

Policy Model: Rational and Public Choice Model

Rational Model: Mission Bhagiratha aligns with the Rational Model as it was formulated with a clear goal of addressing the existing water scarcity problems.

Economic Rationality: The project is designed to maximize efficiency by providing piped drinking water to every household in the state through large-scale water infrastructure using a technology driven distribution system, which improves efficiency by reducing leakages. The use

of reservoirs and pipeline networks ensures that water is sourced, treated, and delivered efficiently.

Bureaucratic Rationality: The policy follows the Webinar Model of Structured Decision Making, where the state machinery ensures centralized planning and phased execution.

According to Thomas Dye, a policy is rational if the benefits outweigh the costs more than any alternative policy. Mission Bhagiratha adheres to these principles. It knows society's value preferences i.e. clean drinking water is a universal need and the government identified a strong demand for reliable sources of water access, especially in rural Telangana. It also considered all alternatives before launching the project. Policymakers evaluated alternative water supply models such as groundwater extraction, borewells, and tankers but found them unsustainable in the long run.

Assessing consequences of alternatives, borewells would cause groundwater depletion and water tankers would be costly and unreliable, making a centralized water grid the most viable option. The policy aimed to provide lifelong benefits in public health, sanitation, and economic productivity by reducing waterborne diseases, household water costs, and time spent on fetching water. Selecting the most effective alternative, the government chose to source water from Krishna and Godavari, to ensure a long-term sustainable supply instead of relying on scarce groundwater resources. While the policy is technically sound, real-world constraints such as budgetary limits, administrative delays, and unforeseen local resistance might hinder the implementation.

The mission started initially in 2016, but at the same time, but there are still administrative delays. Political factors such as electoral benefits and inter-party coordination

might also shape the implementation. While the blueprint is rational, ground-level execution might face bureaucratic inefficiencies and infrastructural challenges.

Public Choice Model: Mission Bhagiratha also aligns with the Public Choice Model as post-facto it reflects political incentives, voter behavior, and bureaucratic decision-making. The government's motivation in launching this large-scale initiative is partly political. It strengthens electoral support by addressing a key public concern. Participants then act as vote maximizers, using the scheme as a flagship welfare project to gain rural vote support. The Rural Party positioned this mission as governance success, showcasing its effective public service delivery. State-wide coverage ensures widespread political appeal, especially in areas where water scarcity has been a persistent issue. Bureaucrats overseeing the project act as budget maximizers, ensuring expansion of administrative control, increasing funding allocations for water infrastructure.

The large scale of the project justifies continued budget allocation and bureaucratic expansion. Many rural voters may not be fully informed about the financial sustainability and long-term costs of Mission Bhagiratha. Since voters focus on short-term visible benefits, they may overlook efficiency concerns, reinforcing electoral motives behind the policy. Infrastructure contracts and public spending on water supply networks have created opportunities for lobbying with private contractors and suppliers. Some vested interests may seek preferential contracts or subsidies, leading to potential rent-seeking behaviors. Local participation and political feedback are limited in nature. While the government is providing infrastructure for community engagement in water conservation, local maintenance is weak. Implementation gaps are still persistent as some villages struggle with last-mile connectivity and water quality monitoring.

Policy Framework: Multiple Streams Framework

The initiative of mission Bhagiratha lies in the convergence of three critical streams that are problems, politics, and policy within a “*window of opportunity*”.

This framework explains how alignment of pressing water issues enables the state to launch an initiative to address them:

A. Policy Streams:

1. Indicators and Statistics: Raising incidence of fluoride-induced health complications highlight the severe quality issues in groundwater.
2. Increasing water scarcity: particularly during dry and summer months, underscore the urgent need of a sustainable water supply.
3. Special Events and Crises: The state has experienced several water crises with widespread drinking water scarcity in both rural and urban areas.
4. Environmental degradation: including depleting groundwater levels and polluted safe water bodies, have increased the crisis levels.
5. Actors' Reactions: The government has historically responded to these crises by increasing health care infrastructure and launching projects like Manjira Project to supply water to Hyderabad and its surroundings.
6. Other Issues on the Agenda: Unregulated groundwater extraction is depleting water tables, and subsidized electricity for agriculture further strains the state's water resources. Remote communities, especially those whom women bear the burden of water collection, continue to face long journeys for water.

B. Politics Stream

Political Leadership and Historical Context Mission Bhagiratha was launched under the leadership of Chief Minister K. Chandrasekhar Rao, whose earliest success, Siddipet Comprehensive Design Thinking New Water Scheme, in 1996 set the stage for replicating this success on a larger scale.

The initiative emerged at a time when there was strong public demand for effective solutions due to persistent shortages and declining groundwater quality. Advocacy and Public Sentiment Advocacy groups and campaigns have continuously pledged for comprehensive water reform, emphasizing on both health and social justice aspects of it. The national mood in the state reflected growing impatience with water scarcity, with voters demanding sustainable and reliable water sources, which has been bolstered by the mandate for Mission Bhagiratha.

Administrative and Inter-Departmental Dynamics: The convergence of state, district, and local authorities alongside collaborations with technical expertise and financial institutes create a strong, unified political front. The political turnover and administrative changes have, at times, influenced the pace and direction of policy implementation, but the urgency of addressing the water crisis has maintained momentum.

C. Policy Stream

1. Adaptability and Feasibility: The policy is widely acceptable as it leverages perennial water sources from Krishna and Godavari. The innovators have used the gravity-based distribution for 98% of new infrastructure, which minimizes electricity dependency and can be termed as a significant technological advantage.
2. Cost and Technical Feasibility: With an allocated budget of approximately Rs. 44,000 to Rs. 45,000 crores funded through public revenues and low-interest loans from institutes

such as HUDCO and NABARD, the policy is economically viable as the government has also started repaying the loans. Advanced technologies including Geographic Information Systems, GIS, SCADA systems, and IoT-enabled sensors ensure precise monitoring and efficient management of extensive 1.5 lakh km pipeline networks.

3. **Stakeholders, Action and Integration:** The project exemplifies a centralized planning and decentralized implementation model, integrating efforts from state, district, and local authorities. The inter-structural collaboration spans past public health, water resource management, and infrastructure development, ensuring comprehensive policy execution.
4. **Scale and Impact:** The project is covering an area of 1.11 lakh km², benefiting 2.72 crores of people. It has established benchmarks in rural water supply. The initiative has significant public health impact by reducing waterborne diseases and fluorescence reduction, and a social impact can be identified by looking at empowering women as there is reduction in their water fetching burden.

Convergence: The Window of Opportunity

The convergence of the problems, politics, and policy stream enabled Mission Bhagiratha to come forward and address multiple crises simultaneously. Problems depleting and contaminating water sources, escalating public health issues and water scarcity in remote areas, leadership followed historical success models in his own district, and public pressure has provided the mandate and urgency needed. Policy, a robust policy which is technologically driven and sustainable, integrated comprehensive planning with localized implementation. Additionally, an emerging constraint, the need for equitable water pricing and access, further necessitates a solution not only to address the technical and financial aspects but also to ensure

social justice. With these streams aligned, Mission Bhagiratha aims to resolve the current water crisis but also set a similar model for national-wide initiatives.

Instruments Used To Implement The Project

Financial Instruments:

The Telangana government had taken a loan of approximately 32,000 crore rupees from the Housing and Urban Development Corporation Ltd. (HUDCO), a central government financing institution which works to provide financial and technical support to states' housing and urban development projects. Apart from this, loans from National Bank for Agriculture and Rural Development (NABARD), support from the Central Government under the National Water Quality Sub-Mission, under the National Rural Drinking Water Programme (Vadlapatla, 2023).

Infrastructure Instruments:

Water treatment plants, intake wells and pumping stations, extensive pipeline network amounting to approximately 1.5 lakh kilometers, overhead service reservoirs and tap connections act as the arteries of the project.

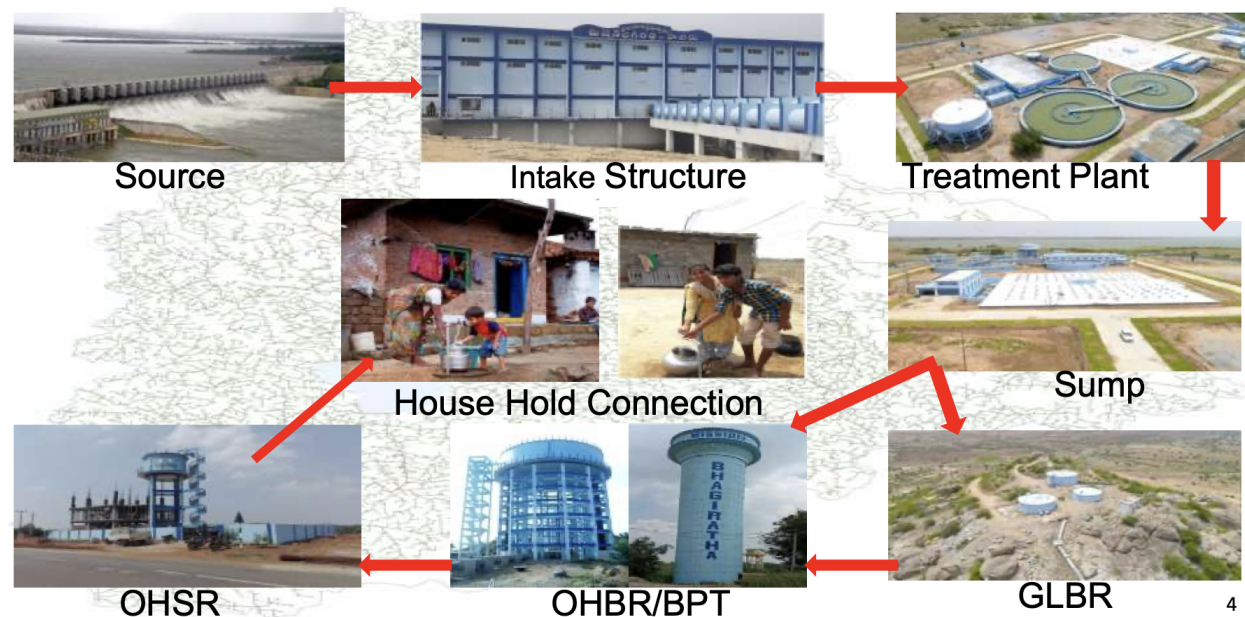


Figure 4 Infrastructure Instruments in Mission Bhagiratha, Source: GADE, 2021

Supervisory Control and Data Acquisition systems (SCADA) provides real-time data from the field devices regarding water flow, pressure and volume through pipelines, reservoirs and treatment plants, helping operators make informed decisions.

Geo tagging of the assets – pipelines, reservoirs, treatment plants and pumping stations – using Geographic Information System (GIS). This helped in real-time tracking and monitoring resulting in efficient management of water infrastructure associated with the project.

IoT (Internet of Things) enabled sensors used to detect leakages in flow within the pipelines will enable more quicker responses in maintenance and repairs. Solar pumps to pump up water to high altitude areas.

Differential Global Positioning System (DGPS) was used to map the difference in elevation of the topography to aid the gravity-based delivery system. Hydraulic Modelling

Software's such as Epanet, WaterGems and KY pipe were used to simulate water pressure and water flow, helping in real-time leak detection and demand forecasting.

Bheempur-OHSR-Table				
	Flow/Day (kL)	Flow Rate (LPM)	Design Flow Rate (LPM)	Design Flow/Day (KLD)
Bheempur OHBR	220.1	807.6	1435	1894.2
Bheempur OHSR	00.0	00.0	92	121.44
Pedda Chintharevula OHSR	00.0	00.0	42	55.44
Bheempur(250mm) header	00.0	00.0	1008	1330.56
Bheempur(160mm) header	00.0	00.0	251	331.32
Yemulonipally	00.0	00.0	42	55.44

Figure 5 Real-time data of the OHSR in Bheempur, Source: MySCADA HMI

Gadwal-WTP Mission Bhagiratha			
	Inlet	Outlet	Units
Flow Rate	3203.3	2665.3	m3/hr
pH	08.0	07.4	
Turbidity	09.0	00.0	NTU

Figure 6 SCADA interface showing real-time water flow monitoring in WTP in Gadwal, Source: MySCADA HMI

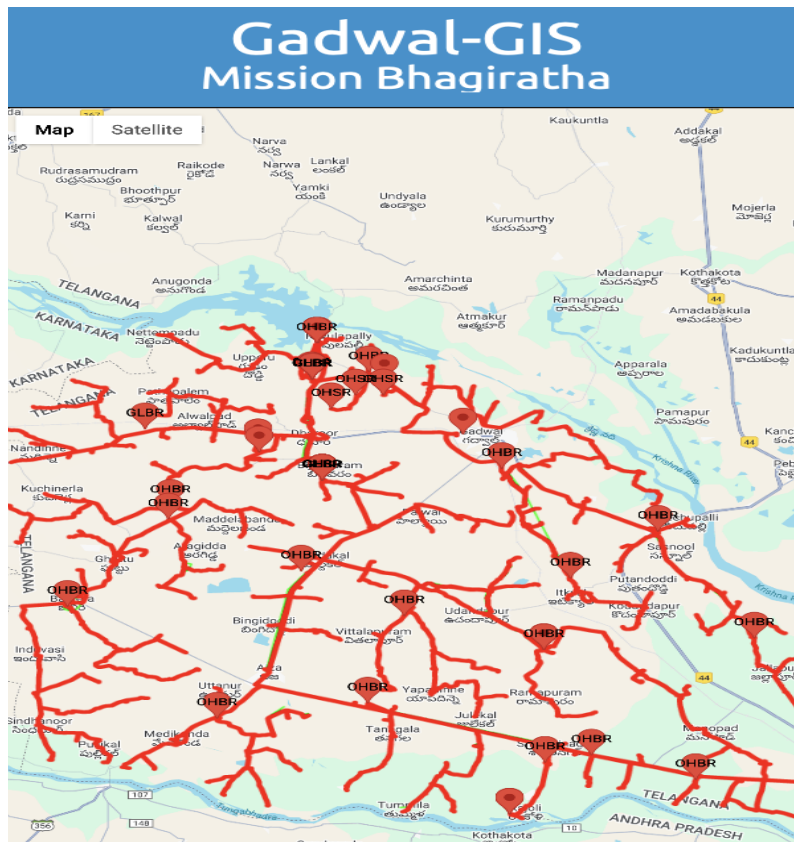


Figure 7 Geographical Information System showing the pipeline network in Gadwal MySCADA HMI

This tells us how the various instruments of the mission, the infrastructure aspect helps the implementation of policy.

Mapping the Actors

Mission Bhagiratha, initiated by the Government of Telangana, involves a diverse array of stakeholders categorized into official and unofficial actors. Here's a comprehensive mapping:

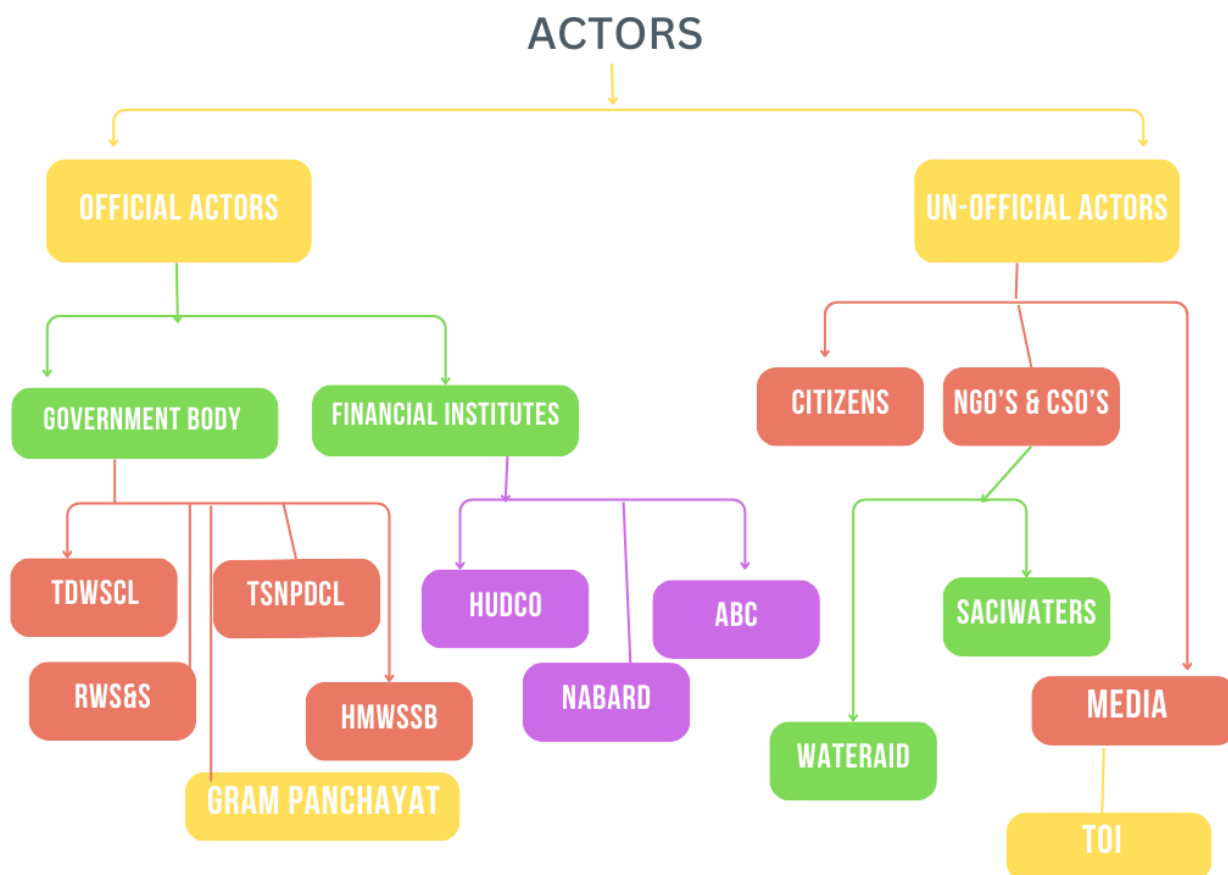


Figure 8 Mapping Actors, Source: Authors

Official actors:

Government Body:

1. Telangana Drinking Water Supply Corporation (TDWSCL) was established by the government to implement Mission Bhagiratha the Government of Telangana established TDWSCL as a Special Purpose Vehicle on February 26, 2015, under section 149(1)(a) of

the Companies Act 2013. This corporation serves as the primary implementation body for Mission Bhagiratha, with its registered office located in Hyderabad.

2. Department of Mission Bhagiratha under the Rural Water Supply and Sanitation Department, Government of Telangana: This department deals with water supply related works in Rural Habitations of the state. The Department executes the works like Constructions of OHSR's, Laying of Pipeline, Drilling of Borewells, fixing of Pump set and erection of RO plants.
3. Northern Power Distribution Company of Telangana Ltd (TSNPDCL) - is to carry out electricity distribution to all the people spread across hamlets, villages and towns of Nirmal District. Their services are crucial for the operation of pumping stations and water treatment facilities that form part of the Mission Bhagiratha infrastructure
4. Hyderabad Metro Water Supply and Sewerage Board: This board is involved in the implementation of Mission Bhagiratha components in the urban areas, particularly focusing on Hyderabad metropolitan region's water supply integration with the broader mission objectives.

Local Governance Bodies

1. Gram Panchayats: Local village councils have been assigned responsibility for taking over the maintenance of Mission Bhagiratha water supply systems at the village level. Maintenance works undertaken by gram panchayats are prepared by mandal intra-village Assistant Executive Engineers (AEEs) and Assistant Engineers (AEs) of Mission Bhagiratha, with execution occurring under their supervision. (Telangana Today, 2024)

Financial Institutions: Mission Bhagiratha has been funded through substantial loans from several financial institutions such as:

- Housing and Urban Development Corporation (HUDCO): Provided ₹4,740 crores
- NABARD (National Bank for Agriculture and Rural Development): Contributed ₹4,792 crores.
- Andhra Bank consortium (now Union Bank of India): Served as the largest lender with ₹7,135 crores.

The Telangana government has begun repayment of these loans, which were instrumental in achieving tap water connectivity for households across the state.

Unofficial Actors

Citizens and Community Residents

Rural and urban residents constitute the primary beneficiaries of Mission Bhagiratha. Their feedback, participation, and cooperation play a vital role in ensuring the project's success and sustainability. As end-users, their experience directly influences the assessment of the project's effectiveness.

Non-Governmental Organizations and Civil Society Organizations (CSOs)

1. WaterAid India - Telangana State Consortium on Water Conservation

This consortium focuses on water conservation efforts in Telangana and likely provides external perspective and expertise on sustainable water management practices that complement Mission Bhagiratha's objectives.

2. SaciWATERs (South Asian Consortium for Interdisciplinary Water Resources Studies)

SaciWATERs has engaged with Mission Bhagiratha through workshops and critical analysis. In March 2017, they organized an event examining water policies, highlighting both strengths and limitations of approaches that treat water as an economic commodity rather than a basic right.

Their discussions have explored conflicts emerging from privatization and government policies creating space for private sector involvement in water delivery processes.

Media and Information Disseminators

Media houses such as Telangana Today and Times of India would give active information about the project and information about updates via government such as putting out the press note on the report by the Central Ground Water Board that indicated that fluoride contamination is prevalent in certain isolated pockets across various districts, including those in Telangana. Their studies show that fluoride levels exceed permissible limits in 370 districts across 23 states, which includes regions like Adilabad (PBI,2022).

Elements of public policy

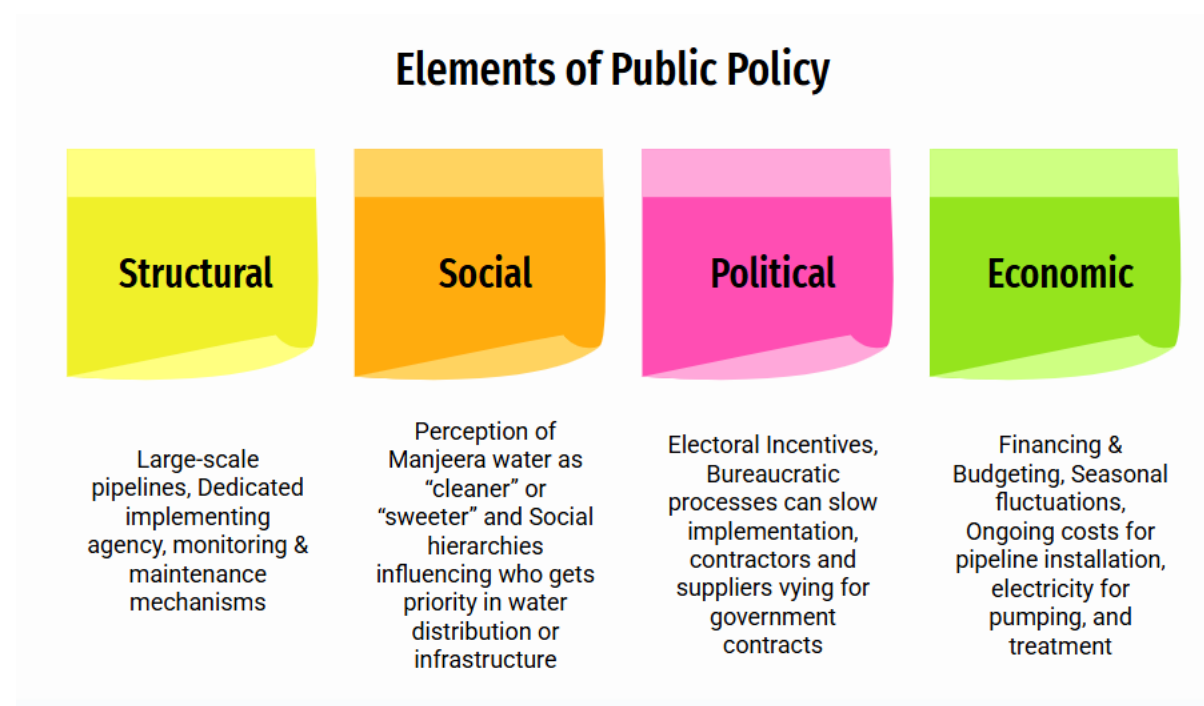


Figure 9 Elements of Public Policy, Source: Authors

By examining structural, social, political, and economic factors, policymakers gain a comprehensive view of the challenges and opportunities that may impact the policy's success.

Mapping the Extreme User Base

An ideal policy would be one where all the users of that policy receive the benefits equally and in a fair manner. However, due to a range of cultural, social, and economic biases, systematic barriers have emerged in Mission Bhagiratha that prevent certain groups from accessing its intended benefits, resulting in capability deprivations and active exclusion. This exclusion is not an inactive gap but an active outcome where, for instance, rural residents in distant rural areas—despite the policy's intention—cannot pay the initial connection charges or regular maintenance fees. As a result, these people are subject to active exclusion and still use alternative, frequently dangerous, water sources.

Capability Deprivation and Entitlement Failure:

Amartya Sen's capability deprivation theory brings forth the point that poverty occurs when people cannot access fundamental things like clean water, medical care, and education, and hence are restricted from exercising their social and political rights. In Mission Bhagiratha, such deprivation is seen when institutions do not provide services that they have committed to offering. If the entitlement to clean, free water (legal or normative right) does not align with the endowment—that is, the resources (such as adequate funds, suitable infrastructure, and connectivity) actually accessible to a person—*entitlement loss* happens. For example, city dwellers tend to have 24/7 access to water, but most rural homes, such as those in Rudraram village, get water only for one to two hours occasionally.

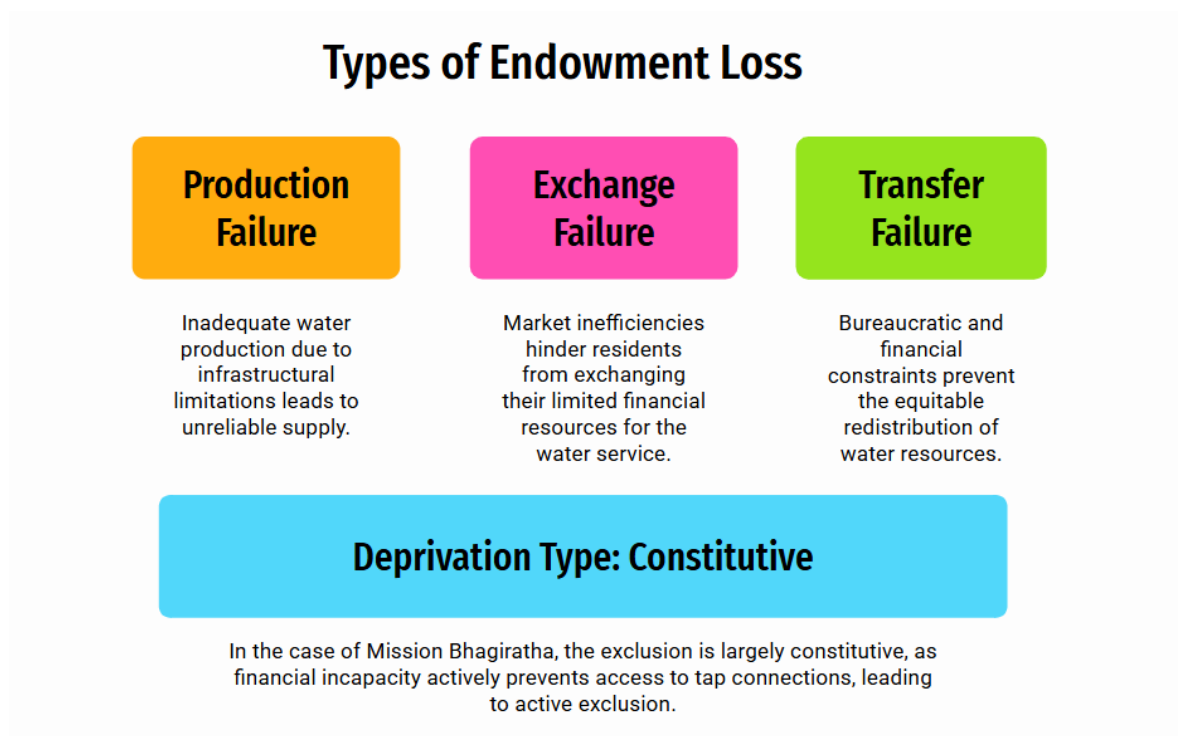


Figure 10 Types of Endowment Loss and Deprivation Type, Source: Authors

Mapping the Extreme User Base:

1. **By Awareness and Proximity:** People Unaware of the Project: Risk missing out on available benefits due to lack of information.
2. **Residents in Remote Areas:** Face greater challenges due to distance, poor connectivity, and less reliable power for pumps.
3. **By Access and Documentation:** People Without Any Water Source: Typically, in regions with low groundwater levels, no nearby water body, or no presence of private suppliers.
4. **People Without Adequate Documentation:** Including those from tribal areas, lacking land or property documents, which hinders their ability to claim benefits.
5. **Those Who Cannot Afford:** Unable to pay for initial connection costs and ongoing maintenance, thereby facing active exclusion.

6. **Residents in Areas with High Fluoride Levels:** For instance, regions like Adilabad and Nalgonda where groundwater quality is compromised, increasing the demand for reliable, treated water.

By mapping these users, we are able to identify the ones who are highly excluded from the policy.

Pain Point Mapping with 6Wh's

The 6Wh's framework functions as an assessment methodology supported by documentation, which segments extensive matters into separate components to help individuals grasp problems better when determining solutions. Through this structure, organizations discover critical group aspects by establishing issue definitions and determining stakeholder motivations and solution availability. Using this approach provides an organized summary of all factors, which enables better identification of problem areas and proper outcome improvement solutions.

Table 1 6Wh's, Source: Authors

WHAT	WHO	WHY	WHERE	WHEN	HOW
What is the problem? Mismatch between policy design and real-world implementation.	Who is involved? The state government of Telangana, local panchayats-municipalities, contractors, water supply authorities, and beneficiaries.	Why is the problem important? Access to clean water is essential for public health, economic development, and overall quality of life.	Where does the problem occur? Rural areas where infrastructure is less developed.	When did the problem begin? Since policy inception, but more noticeable when studies were conducted.	How could this problem be an opportunity? Building community awareness, local engagement, and monitoring to ensure sustainable water access.
What would we like to know? What are the real reasons behind lack of continuous water availability and financial exclusion for beneficiaries?	Who is affected by the situation? The extreme users are most negatively affected.	Why does it occur? Lack of Implementation Oversight, financial exclusion, and lack of proper maintenance, Infrastructure and Resource Limitations.	Where was it already resolved before? Well-connected rural clusters have successfully established consistent tap-based water supply.	When do people want to see results? Immediately.	How could it be solved? Upgrading infrastructure to handle seasonal fluctuations and reducing financial barriers.
What are the assumptions that are scrutinized? That all rural and urban households get continuous supply of water without financial or logistical constraints.	Who decides? The government, but real influence lies with gram panchayats.	Why was it not yet solved? Weak Monitoring, inefficient infrastructure, and inadequate funding have delayed the full implementation of solutions.	Where did similar situations exist? The areas that previously relied on tanker-based water supply, where irregular delivery and long queues were common.	When can the project be started? Once the stakeholders are informed of the implementation issues.	What has already been tried to resolve the problem? Infrastructure Development: comprehensive network of pipelines and reservoirs.

The evaluation of water supply effectiveness in Rudraram Village under Mission Bhagiratha depends on the implementation of the 6Wh's framework. The 6Wh's framework enables better analysis of the gap between water policies and their actual delivery to communities by revealing the implementation barriers to accessing sustained clean water. This evaluation method helped identify three main obstacles to successful program execution: inconsistent water delivery and associated financial requirements, along with accessibility hurdles. This framework provides specific solutions to address existing challenges so every resident of Rudraram Village can obtain equal access to water services.

2+1/Depth Conversation and Conversation Starters

A detailed conversation series with six villagers from Rudraram Village to understand the true water supply difficulties they experienced. The study group consisted of two male and four female employees at GITAM University. The primary purpose was to investigate personal thoughts, experiences, and genuine opinions about water issues and Mission Bhagiratha's implementation. The research aimed to reveal honest community problems that arose from the policy rollout by exploring barriers to accessibility, irregular water delivery, cost implications, and water purity concerns.

All participants confirmed their voluntary participation in the study by signing consent forms before the start of conversations to preserve ethical research norms. The establishment of trust and research transparency emerged as a direct result from this action. The research method involved open-ended qualitative inquiry, which permitted the responder to share their personal experiences and worries without restriction. Our methodology uncovered hidden patterns of problems that otherwise would have remained invisible because it revealed community experiences with water supply systems and their assessment of the policy's achievements.

Conversation Starters & Building Rapport

Our initial strategy involved basic icebreakers, which established comfort between participants during every dialogue. The participants needed a comfortable environment before moving into discussions about technical water supply matters. We asked open-ended questions like:

- "How are you today?"

- "Are you comfortable and ready for this conversation?"

The introduction allowed participants to establish trust with us and develop comfort until they opened up about their experiences with the water supply system during the following discussion. Creating a stress-free environment served as a vital condition to help water system residents openly discuss their authentic views about the water supply system.

Use of Cue Cards & Their Purpose

We incorporated cue cards in the discussion process to preserve attention to the subject matter of the discussion and receive expansive, detailed responses from participants. The cards had dual goals as well as tripartite objectives:

1. The cue cards established visual boundaries, which kept the discussion on track regarding water access, quality evaluation, and government policy applications. Through the use of cue cards, the participants managed to keep their focus on track while completing the necessary conversation topics.
2. The participants needed memory assistance because natural conversation repeatedly missed particular incidents and thoughts. The cue cards helped participants remember vital information, which led to better-detailed responses that contained accurate details.
3. Some participants who lacked experience in formal discussions showed signs of nervousness and doubt because of initial formality. The cue cards increased their confidence because they provided basic information, which helped participants avoid important points, so they spoke with more ease.

4. The participants could express themselves naturally using the cards, which revealed experiences that traditional scheduled questions would miss.

Sample Cue Card Questions

Each cue card had a prompt focused on a specific aspect of the water supply in Rudraram Village. Here are some of the questions we used:

- **Water Access & Availability:** "Have you ever faced something like this?"



Figure 11 Source: Google

- **Water Quality:** "What is the quality of water which you receive now?"



Figure 12 Source: Google

- **Alternative Water Sources:** "Where do you get water from when the tap supply is inconsistent?"



Figure 13 Source: Google

- **Impact on Daily Life:** "How does the water supply situation affect your daily routine or work?"

These prompts were designed to gather rich qualitative insights into residents' daily realities and interactions with the water supply system. Participants were encouraged to reflect on their experiences and share how these issues affected their everyday lives.

Field Notes:

The exposure on the field gave deeper insights into the actual target group. Some of the conversations are noted below:

- **Accessibility Challenges:** During one of our conversations with a resident living in Rudraram, candidly shared, “It’s really hard to get a water pipe connection, especially for families living far from the main road. When you’re on the periphery, the water service simply becomes less accessible.” This spatial barrier has resulted in tap connections not directly connecting households in more remote areas, significantly reducing water accessibility for those households.
- **Dependence on Alternate Sources:** Another resident shared that she purchases water cans of Rs 10 each, for drinking water. Since she lives in a rented house, she mentioned that her own house did not have a tap connection and she had to rely on her relative’s house tap which was also shared by other people from around the place. Her experience emphasizes extra financial burden and inconvenience faced by renters who are directly excluded from benefits of the project.

- **Quality and Reliability Issues:** While on the other hand, a resident who received the connection of water noted that it has not been clean all the time, she reported that the water was salty and also the pressure was very low along with it being yellowish/brownish sometimes, specifically when there was a construction going on in a nearby road. This inconsistency in quality forces residents to supplement their water needs with borewell or privately sourced water.
- Further deepening the narrative, another resident discussed multiple water sources available in the village: “Apart from the government-provided connection, we also get water from local borewells and the Manjeera pipeline. I even paid for my own pipeline connection and continue to pay a monthly fee. Despite this, I still purchase drinking water cans because the water from the mission sometimes isn’t up to standard.” This remark illustrates the fragmented nature of water supply.
- **Multiple Water Sources and Financial Burdens:** One of the interesting things that we found out was when we were talking to a resident who mentioned that the local government built borewells for them where they could get water from, he mentioned that apart from this they would get water from the Manjeera pipeline, Bhagiratha pipeline or the individual borewells. He mentioned that he paid some money for the pipe connections and also pays money every month for the same. Another point that he mentioned was about the quality of water that they were getting from the mission or from the overhead tanks that were built, he mentions that initially the water was fresh and was used, but eventually when the government changed in 2024, he believes that there is a change in the same. What was also important for us to note was that he pays for drinking cans till date.



Image: On field session with users, Source: Authors

Interface and Artifacts: The physical touchpoint of policy implementation

An interface represents the crucial point where the policy directly interacts with the end-users or beneficiaries and where the implementation occurs. As for Mission Bhagiratha, this interface is primarily physical. The government leverages an extensive water infrastructure network to channel water from major rivers such as Krishna and Godavari to local reservoirs and water heads ultimately to households via pipelines and taps.

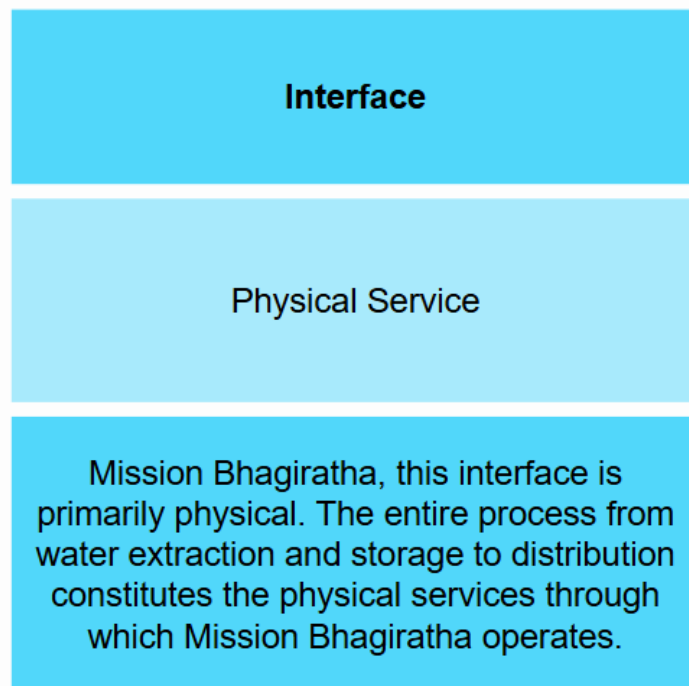


Figure 14 Interface, Source: Authors

This physical interface is a visible manifestation of the policy where recipients engage with the service offered via the government by accessing water through designated taps. The entire process from water extraction and storage to distribution constitutes the physical services through which Mission Bhagiratha operates. *The interface is physical services.*

Artefacts and their politics

In this context, artifacts are the tangible elements that facilitate the delivery of water, but also may hold a political significance. These include taps, pipelines and water heads. They not only represent the technological and engineering backbone of the project, but also serve as a symbol of the government's commitment to work towards public welfare. The quality of these infrastructures, their maintenance schedule and accessibility all directly affect the user and their

trust in the government. Talking about the political implication, we can take note of how well-maintained artifacts, i.e., the functional taps and properly constructed and maintained pipes are clear indicators of effective governance. Conversely, poorly maintained infrastructure can lead to dissatisfaction within the public and also serve as focal points for criticism.

Another important point to note is that artifacts are often used as benchmarks in political discourse. For example, a successful rollout of new taps can be focused on by government officers as a way to enhance their political capital. The way artifacts are distributed and the condition that they are in reflect policy priorities and the efficiency of the bureaucracy. Furthermore, any disparities in infrastructure quality can be indications of unequal resource allocation, influencing political debates around policy reform. In this context, the interface and the artifacts associated with it are not merely technical elements. They are central to how policy is experienced by the public and play a key role in shaping the political narrative around machine logarithm.

AEIOU Framework:

The structured observation tool called the AEIOU Framework analyzes complex systems through the examination of five main elements: activities, environments, interactions, objects, and users. The evaluation tool helps identify user behavior patterns within systems and recognizes all elements affecting system performance. Through this established framework, administrators can comprehend all tangible and intangible system components for more precise identification of system enhancement.

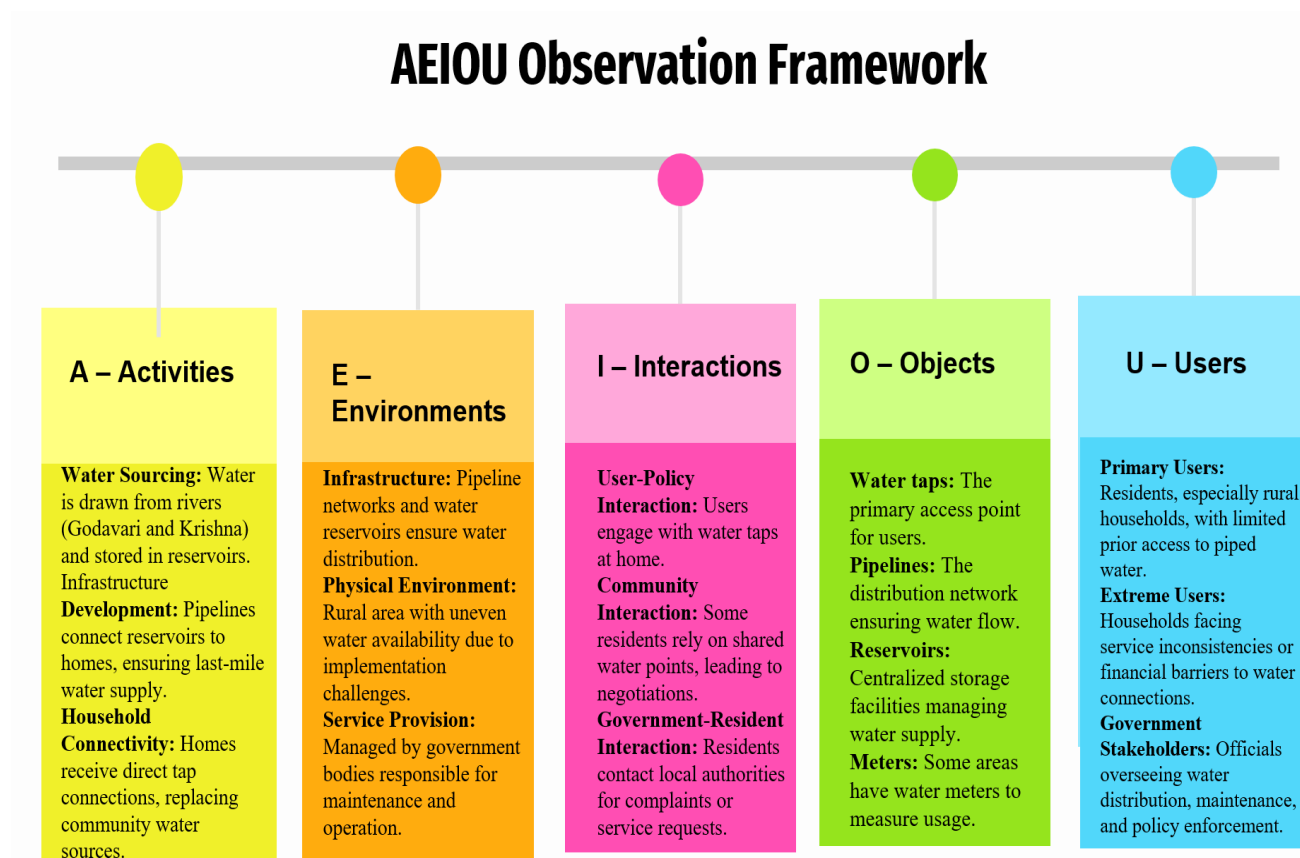


Figure 15 AEIOU Framework, Source: Authors

Under the AEIOU framework, we determine the actual water supply challenges faced by Rudraram Village residents through Mission Bhagiratha. This framework measures different parts of the water distribution system while revealing fundamental issues with erratic water availability, money challenges and service reach limitations. This approach enables us to examine the lived implementation of the policy, which allows us to acquire the necessary information to create more successful solutions that guarantee water access to all users.

Stage 3: Define Point of View

In this section we will distill insights into a precise problem statement, reflecting the perspectives of rural villagers and extreme users.

Creation of Retrospective Board

This simple grid or quadrant will help, categorize and reflect on what has been working and what has not worked out, what are the areas which can be improved and what can start new as well.

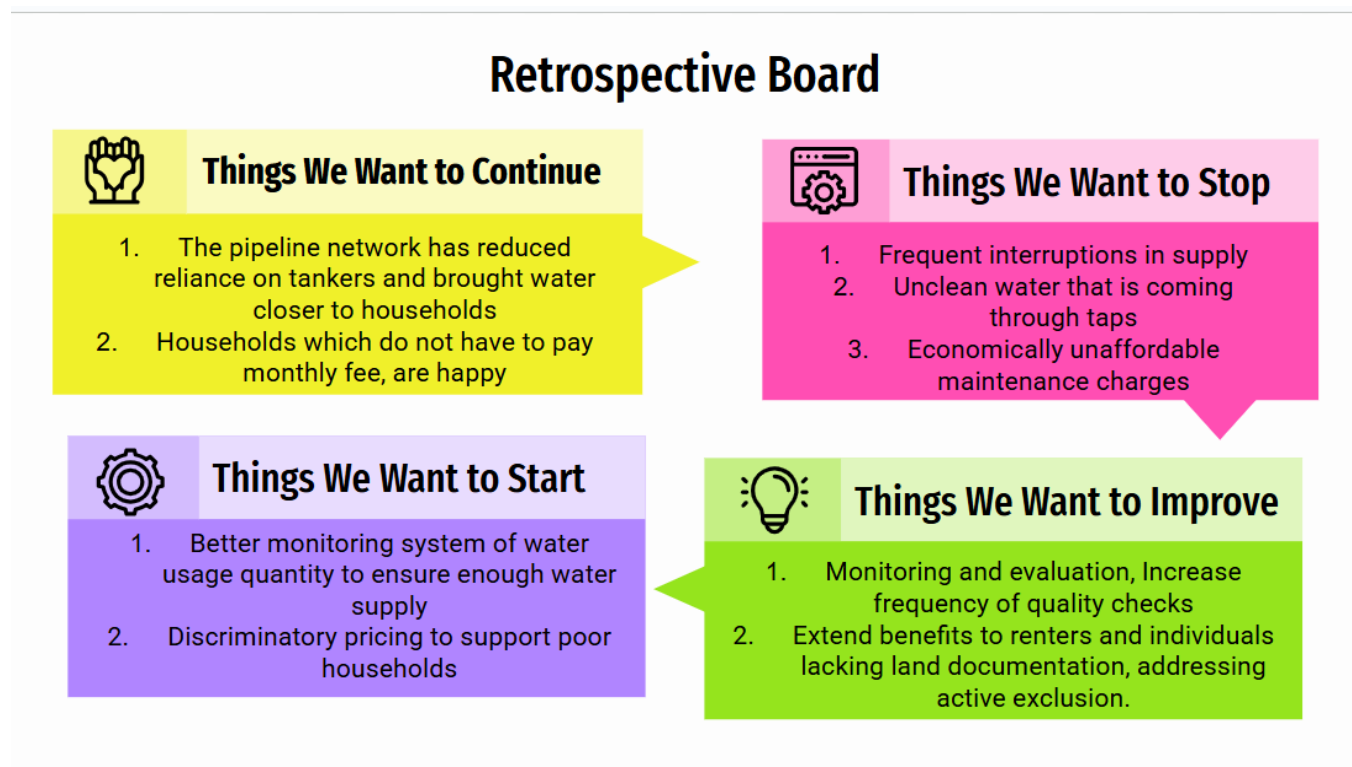


Figure 16 Retrospective Board, Source: Authors

Mapping Problem Statement

Problems can be categorized into a well-defined problem, an ill-defined problem and a wicked problem. Below we categorize our problem into an ill-defined problem.

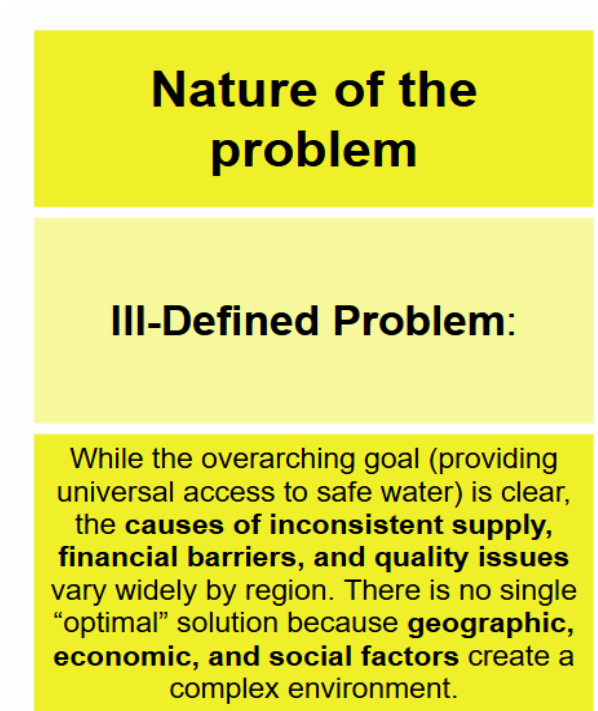


Figure 17 Nature of the problem: Ill-Defined, Source: Authors

Defining Point of View: Finalizing Problem Statement

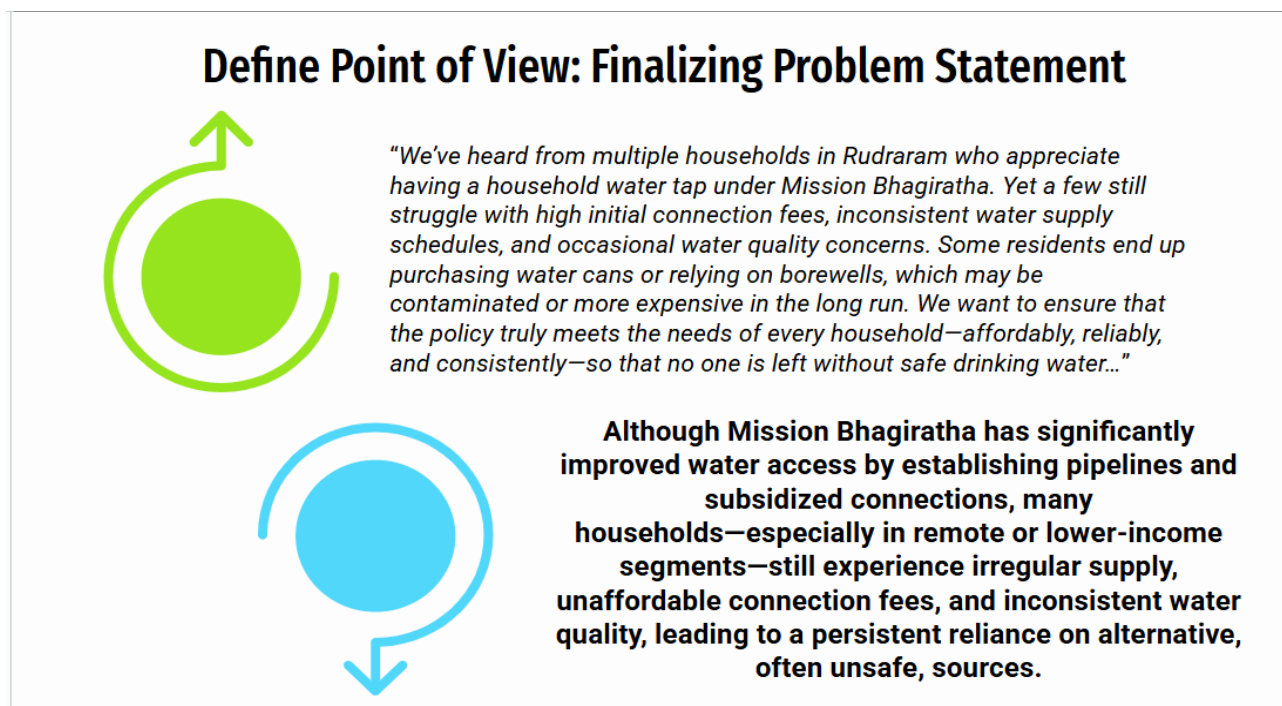


Figure 18 Defined the problem statement, Source: Authors

Having clearly defined our problem statement and user insights, we will move to stage 4, where we will brainstorm a range of possible solutions directly addressing the challenges identified in the 2nd stage.

Stage 4: Ideate

In this section, we brainstorm multiple creative solutions, while looking at the practicality of the solutions.

Story map/Flow for multiple Solutions

We will be giving a few solutions which aim to address various problems defined in the problem statement and then, check its viability.

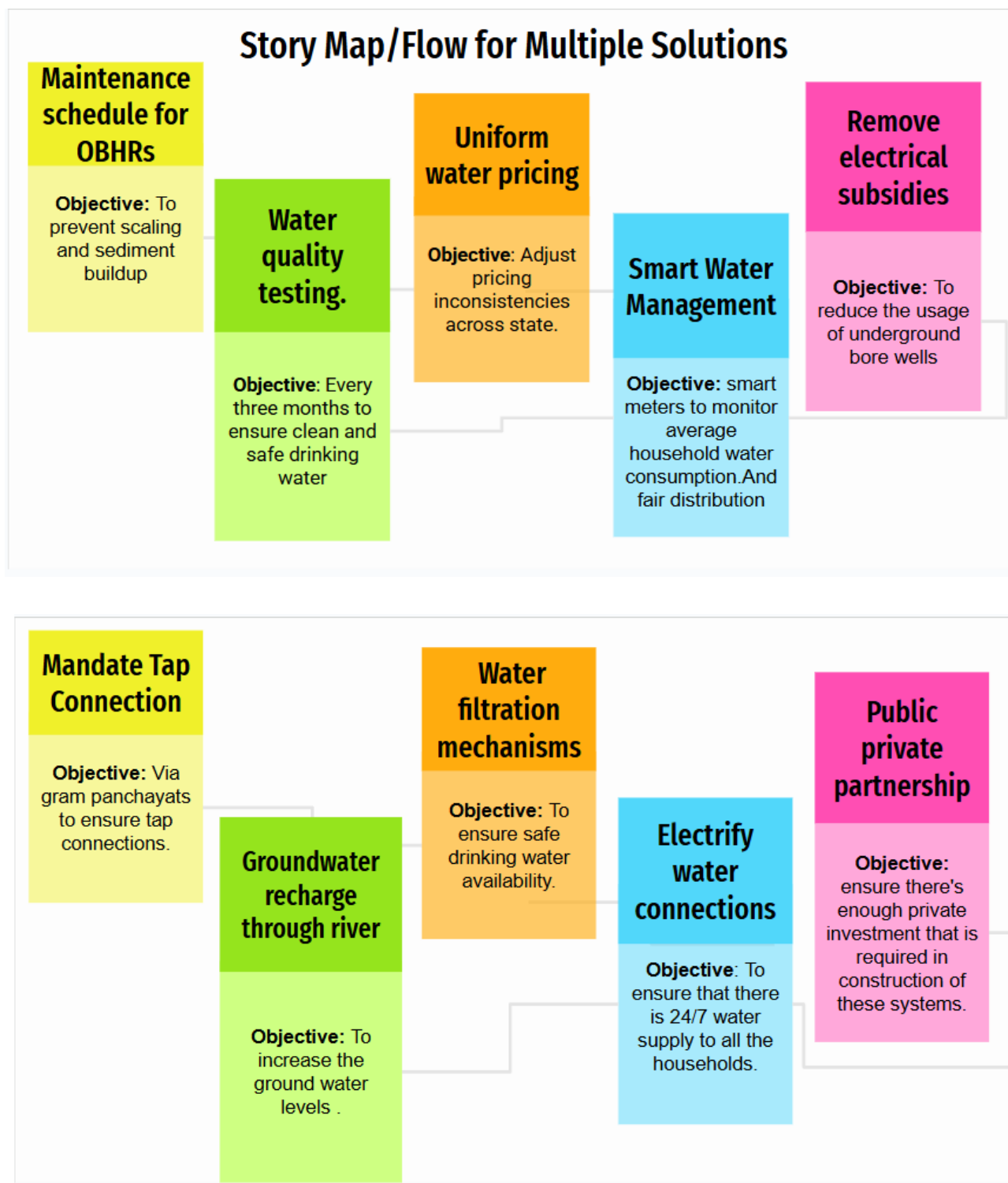


Figure 19 Story Map, Source: Authors

Explanation of each solution:

1. Implement a monthly maintenance schedule for OBHRs to prevent scaling and sediment buildup. Ensure proper cleaning and descaling to maintain optimal water quality and flow efficiency. Conduct regular cleaning and maintenance of pipelines to prevent blockages and deterioration. Establish a 24-hour repair response mandate for companies responsible for pipeline infrastructure. Any damage detected must be fixed within a day to minimize service disruption.
2. Comprehensive water quality testing: Implement a three-tier testing for all OBHRs i.e. before entering the OBHR, source quality check. Next, while stored in OBHR to detect contamination during storage. And after exiting OBHR, final check before distribution to households. Conduct these tests every three months to ensure clean and safe drinking water. Detect any health risks. And if detected, it should prompt immediate government intervention and corrective actions.
3. Uniform water pricing and subsidizing household connections for low-income families: Adjust pricing inconsistencies across Telangana by standardizing rates. Provide subsidized water connections for households below the poverty line to encourage a shift away from handpumps. And ensure access to piped water supply at least initially.
5. Ensure continuous water supply through smart water management: Utilize smart meters to monitor average household water consumption. Ensure OBHRs adequately replenish daily before diverting water for other uses. Prioritize household water needs first only after meeting daily OBHR quotas should water be redirected for other purposes.

6. Another potential solution to reduce the usage of underground bore wells is to remove the electrical subsidies that might be provided on the same as the removal of subsidies no longer makes these borewells to be an attractive option for usage of water.
7. Through the gram panchayats and other elements, it can be mandated that every household has a water tap connection. This ensures that there is reduced dependence on borewell, and every household has a water tap connection that is established from the mission.
8. The water that comes from the rivers, instead of being deposited in the tanks, can be directly used to recharge the groundwater in all the affected areas.
9. In order to ensure a clean supply of water to all the households that is considered to be safe for consumption, one key idea for the same can be the installation of water filtration mechanisms for each of the connections.
10. Since there could be issues in the water flowing from OBHR to all the households, one mechanism can be to electrify these water connections to ensure that there is 24/7 water supply to all the households.
11. In order to boost the infrastructure that helps in establishing water connections, one can explore the route of a public-private partnership or PPP as that will ensure that there's enough private investment that is required in construction of these systems.

This story map outlines different solutions which address the key barriers to the policy implementation. Each solution is structured to target a specific stage of the user journey—from initial awareness and access to long-term behavioral change and monitoring.

NABC Approach

We now select a few feasible solutions, and analyze their feasibility through the NABC framework.

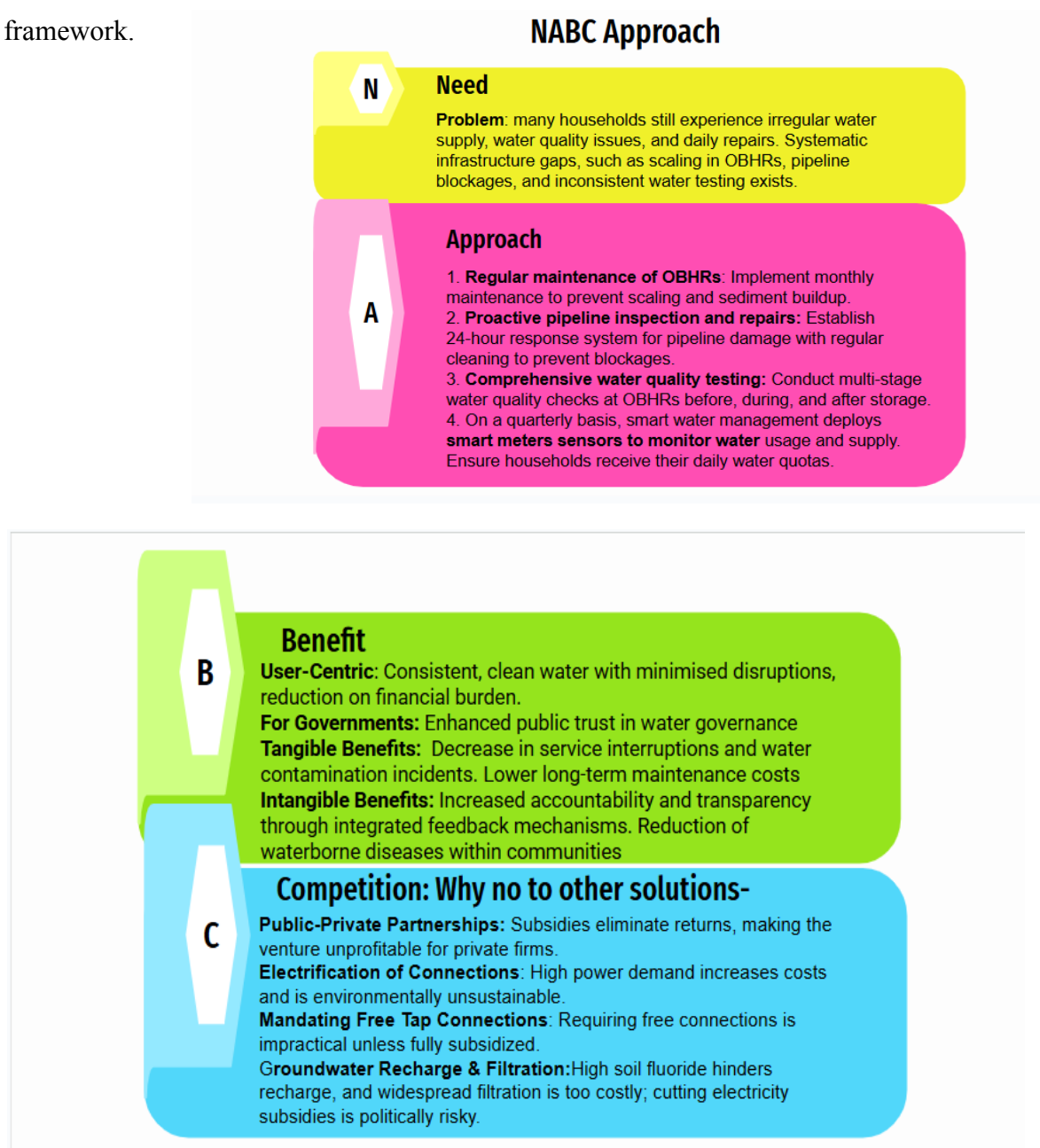


Figure 20 NABC Approach, Source: Authors

Problem: many households still experience irregular water supply, water quality issues, and daily repairs despite the mission's ambitious targets. Systematic infrastructure gaps, such as scaling in OBHRs, pipeline blockages, and inconsistent water testing, result in unmet needs for safe, reliable, and continuous water supply. Additionally, there is a lack of real-time community feedback and awareness, preventing effective demand-responsive adjustments in water distribution.

Approach: Integrated interventions

1. Regular maintenance of OBHRs. Implement monthly maintenance to prevent scaling and sediment buildup.

2. Proactive pipeline inspection and repairs. Establish 24-hour response system for pipeline damage with regular cleaning to prevent blockages.

3. Comprehensive water quality testing. Conduct multi-stage water quality checks at OBHRs before, during, and after storage.

4. On a quarterly basis, smart water management deploys smart meters and LOT sensors to monitor water usage and supply. Ensure households receive their daily water quotas.

Benefits

For citizens:

1. Consistent, clean water supply with minimized disruptions, reducing reliance on alternative sources.
2. Reduction of the financial burden and time burden due to proactive maintenance and real-time issues resolutions.

For government:

1. Enhanced public trust in water governance.
2. Decision-making that aligns supply with demand, ultimately reducing operational costs and waste.

Tangible Benefits:

1. Decrease in service interruptions and water contamination incidents.
2. Lower long-term repair and maintenance costs due to early intervention.

Intangible Benefits:

1. Increased accountability and transparency through integrated feedback mechanisms.
2. Reduction of waterborne diseases within communities

Challenges

While comparing the proposed solutions to other solutions that were also ideated, these solutions stand out for particular reasons. We must first ensure that the other solutions that are rejected are actually not feasible. The problem in exploring a public-private partnership approach over here is the idea that in the likelihood that the government subsidizes these connections and service fees, there will not be any return available on the investment, which makes it a non-lucrative venture for any private company. Hence, it is unfeasible as an option. Similarly, while speaking of electrification of these connections, one must understand that this would require an immense amount of power demand which would mean that the government will have to not only spend more money, making it economically less viable but at the same time, the huge energy demand makes it environmentally less sustainable. It is also not a good idea to mandate all these water connections until there's a consensus reached or a decision made by the

government that all the tap connections, etc. will be completely subsidized because any price, if levied, means that making it mandatory is impossible without the price of the connections being absolutely free. Recharging the groundwater is also an unviable idea, particularly because of the factors such as the high fluoride content already in the soil, making recharging of groundwater, and its use difficult. At the same time, it will only mean a waste of electricity, as there would still be a pump required to work and pull this water out. The bigger aim of the mission is to provide potable water to all households, and by recharging the groundwater, the same cannot be achieved. On similar lines, providing a water filtration mechanism to every connection is also not economically viable because so many connections are so many machine requirements, and the energy requirement for them will simply erode the very idea of this mission, and we'll make it almost impossible to implement. Finally, speaking of the removal of the subsidies on electricity charges is simply politically not viable, as it could lead to severe backlash, and the government might even be forced to take back their amendment. Hence, that kind of solution might not possibly be efficient for the government to implement and promote this scheme as the anger on the rollback of the electricity subsidy scheme could lead to counterproductive reactions to this mission.

After applying the NABC (Need, Approach, Benefit, Competition) framework and analyze social, political, and economic feasibility, along with challenges.

Feasibility and Challenges

Table 2 Feasibility and Challenges, Source: Authors

Aspect / Solution	Social Feasibility	Political Feasibility	Economic Feasibility	Challenges
Regular Maintenance & Proactive Pipeline Repairs	- Likely to gain community support as it directly improves water reliability and quality. - Residents value timely repairs and clear communication on service status.	- Politically attractive as a flagship project; improves public perception of governance. - May face bureaucratic delays or coordination issues among departments.	- Moderate upfront investment in maintenance programs and digital monitoring systems. - Long-term savings by reducing major repairs and service disruptions.	- Ensuring rapid response in remote areas. - Coordination among multiple agencies and managing administrative delays.

Comprehensive Water Quality Testing	- Increases trust among residents by ensuring health and safety. - Empowers communities with transparent quality data.	- Strong political support if linked to improved public health outcomes. - Potential resistance if tests uncover systemic issues that require costly fixes.	- Requires regular funding for laboratory testing and monitoring equipment. - Investment may be offset by reduced healthcare costs and higher public confidence.	- Maintaining a consistent testing schedule. - Ensuring data accuracy and timely government intervention on quality issues.
Smart Water Management & Community Engagement (Smart meters, Digital Feedback)	- High potential if residents see tangible benefits from data-driven water management.	- Modern, innovative approach that can be a political win if successfully implemented.	- High initial cost for technology integration and training. - Potential long-term savings from	- Integrating smart systems with legacy infrastructure. - Ensuring timely responses to real-time data insights and

			optimized water distribution and reduced wastage.	sustaining community engagement.
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After narrowing the ideas based on NABC approach we will craft a model for the idea to take place on-field, a prototype. It creates simple process flows or mock-ups to test how well these solutions might function in actual community settings.

Stage 5: Prototype

In this section we develop simple models or process flows to test how these ideas might work in real community settings.

Concept-level prototype: the given diagram shows how given solutions should be implemented, an on-paper model.

Prototype diagram:

IMPROVING MISSION BHAGIRATHA

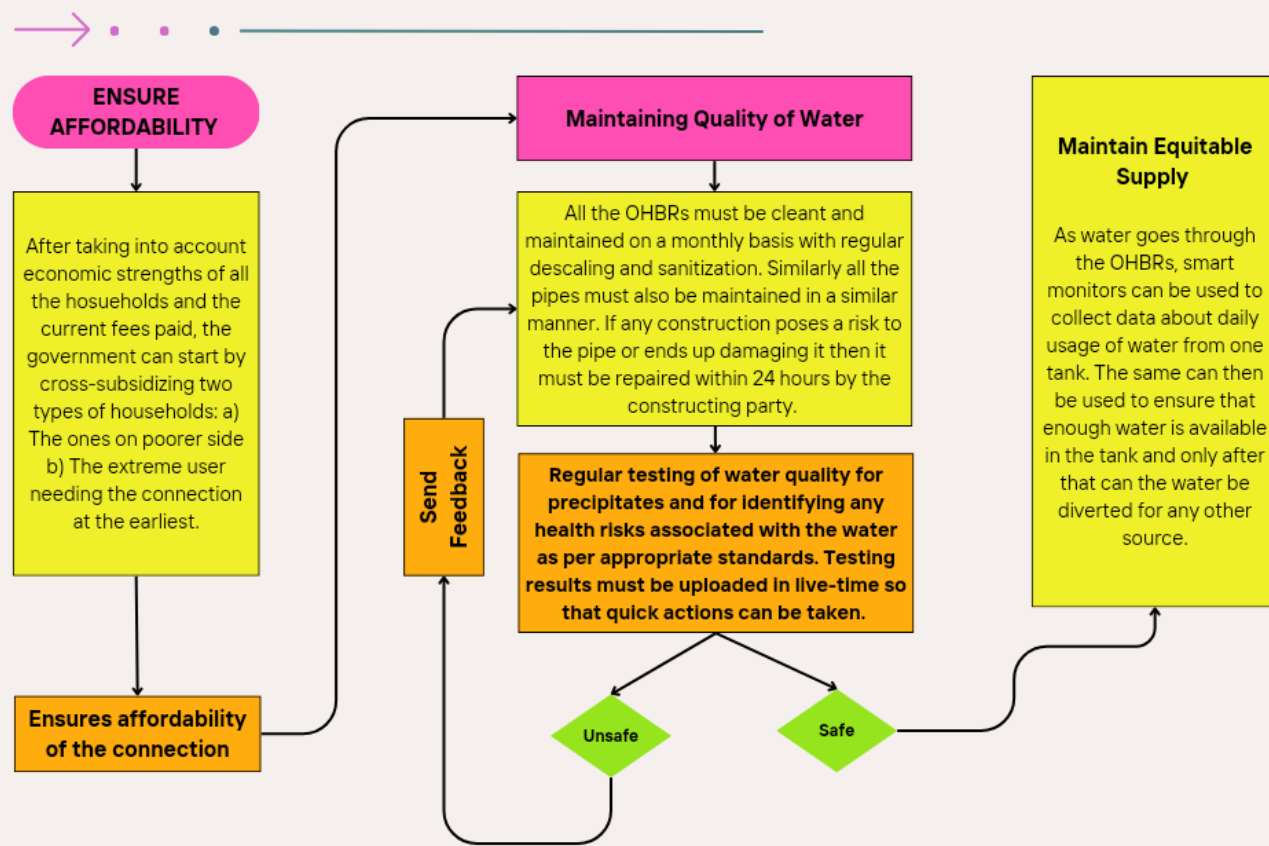


Figure 21 Prototype Flow, Source: Authors

This prototype can be categorized as a **program prototype** as it is related to a large set of government activities with particular long-term aim to increase the accessibility, availability of water and is supported by various stakeholders of the government. This prototype is letting us test and iterate on various program components which are core such as the pipes and overhead reservoirs. This also helped us to basically refine and adapt the existing model towards outcomes

which are more efficient rather than increasing the outreach rather than simply discontinuing the mission because it also has some good working aspects.

This is not a process prototype because it does not talk about changing sequences of steps to accomplish a goal nor is it a touchpoint prototype because it does not only deal with one particular point of interaction with the government interface.

Stage: 6 Testing

Through this stage, we will gather feedback on the prototype, refine solutions according to this and assess readiness for a large-scale rollout. For prototype testing, we propose a small-scale pilot project that can be implemented in at least two villages. These pilot villages will implement all components of the conceptual prototype, which includes regular OBHR maintenance, proactive pipeline repairs, comprehensive water quality testing and smart water management via community feedback loops.

The testing phase will involve “adopting” the villages that were selected and all the processes mentioned in the solutions—from infrastructure maintenance to digital monitoring—will be operational for a one-year period. Water supply, consistency, quality and user satisfaction will be evaluated before and after prototype implementation. Feedback will be obtained through surveys, group interviews and observations from daily usage, focusing on key metrics.

By tracking these key indicators and feedback from users, including any reduction in complaints and increase in water quality, we can further refine our approach. Although actual testing is beyond the current scope of this paper, this framework lays the foundation for potential

future real-world applications and ensures that our integrated solutions are ready for a rollout on a greater scale.

Conclusion

The analysis of Mission Bhagiratha through a design thinking lens reveals many potentials and challenges of fixing the problem of water scarcity in Telangana. This state-level initiative, aimed at providing safe and reliable drinking water to every household, reflects an ambitious policy amongst the many national level policies in the country that deals with water security. However, there was a clear gap between the intent of the policy and the on-ground reality, which highlights the need for a more innovative and human-centric approach to bridge the shortfalls in implementation.

This is where Design Thinking becomes extremely useful, with its iterative, empathy-driven methodology and offers a different approach to addressing water management issues. By directly engaging with beneficiaries, this study has been able to uncover pain points such as poor quality of water and unreliable infrastructure. There was a noticeable lack of empathy when it came to policy execution, leading to many individuals and groups being excluded from being able to benefit from this program. The six-stage design thinking process enables a shift from a top-down approach to one grounded in prioritizing lived experiences.

While Mission Bhagiratha's goal of 100 liters per person per day is ambitious, it falters when access and quality are absent. This study showcases how water management in India requires more than just infrastructure- it requires solutions that are co-created with local

communities. Design thinking highlights a path towards creating more inclusive and sustainable outcomes, to ultimately ensure that water is a right and not a privilege, for all.

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