PUNE INTERNATIONAL CENTRE

INTERIM REPORT

PROJECT JAL MULYA

JAL MULYA: Promoting sustainable and efficient use of water through a Cost-Price Approach

Water security for PMR: Costing, Pricings and Markets
April 2024

Pune International Centre, Pune Knowledge Cluster,
Centre for Sustainable Development, GIPE

PROJECT JAL MULYA

Promoting sustainable and efficient use of water through cost-price approach to achieve water security for Pune Metropolitan Region (PMR)

Implemented and supported by:

Pune International Centre (PIC)

Centre for Sustainable Development, Gokhale Institute of Politics and Economics

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PARTNER ORGANIZATIONS

S. No	Organization
1	Indian Plumbing Association (IPA) and similar consortium's like Indian Green Building Council (IGBC), CREDAI
2	Indian Waterworks Association (IWWA) and similar umbrella organizations
3	Startups and Companies in water usage statistics, water metering and technology, wastewater treatment and allied sectors
4	Water use intensive Industries like Paper, wood, textile, food, mining among others
5	Academic institutes for assistance on technical aspects of water management and wastewater treatment among others
6	NGO’s and CBO’s involved in water conservation and promotion of circular use of water
8	Consulting firms and other agencies involved in impact assessment and project management

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1. Context and Introduction

The rapid growth of economic opportunities in Pune has led to a rising influx of people from all across the country. The city's benign climate, public and educational facilities, and availability of good quality drinking water have helped in the growth of the industry that attracts migration. Fortunately, Pune is blessed with a huge supply of water, resulting from the high rainfall in the Sahyadri mountain range. However, the rising affluence of society is influencing changes in lifestyles and is leading to an increase in the per capita water consumption in the city.

However, the changing climate has not been helpful to the water resources of the city. In the last few years, the rainfall has become less dependable. The growing concern among civic administration is that unpredictable water availability could inevitably lead to a shortfall in the supply. Such a situation will affect not just life in the city but will also disrupt the thriving economy. It is thus imperative to pre-empt this problem and evaluate interventions before it occurs.

The study's rationale centres on the critical importance of ensuring adequate and high-quality water supply for all residents in cities or smart cities to enhance liveability. Insufficient access to good water not only poses risks to social well-being but also undermines long-term economic prospects, impacting livelihoods. A climate-resilient approach is crucial for ensuring sustainable water security over time.

Despite efforts by capable governments and administrations, water supply and treatment projects often operate at a loss due to lax revenue generation and enforcement of user charges. This results in substandard service delivery, leading to missed economic opportunities.

The project aims to test the hypothesis that citizens perceive water prices to be lower than the actual costs, considering economic externalities. It also seeks to establish the true cost of water services borne by administrative bodies, covering acquisition, treatment, distribution, and wastewater management.

The ultimate goal is to develop a standardized template for nationwide use in India. The analysis will inform evidence-based policymaking to rationalize water tariffs, promoting fairness, equity, efficiency, and sustainability. This necessitates an implementable and enforceable pricing policy,

which, coupled with the right pricing model, can stimulate the market for treated wastewater, reducing demand for fresh water.

1.1 Fundamental Social Concern

Inadequate water supply not only impacts social well-being but also hampers economic potential within communities. A lack of sufficient water undermines the quality of life for residents and poses challenges to various aspects of daily living. Additionally, sub-par delivery of water services, often stemming from ineffective revenue generation and lax enforcement, exacerbates the problem. This results in compromised access to clean water, hindering hygiene practices and increasing health risks. Moreover, the inefficiency in pricing structures leads to economic opportunity losses, as it fails to accurately reflect the true cost of water provision. Consequently, communities face financial strains and miss out on potential investments and economic growth opportunities.

Addressing these issues requires a comprehensive approach, including improving revenue generation mechanisms, strengthening enforcement of water regulations, and revising pricing structures to ensure they are fair, transparent, and reflective of the actual costs involved in water provision. By doing so, communities can enhance their resilience and promote sustainable development.

1.2 Objectives of the research

This research intends to establish evidence-based real costs of water that citizens bear and compare it with the perceived price that they pay. We will compute the true costs of urban water services borne by the administrative bodies in the Pune Metropolitan Region (PMR).

The central theme of Water Economics revolves around various key aspects. Firstly, it explores best practices globally in valuing water, particularly as a pseudo-public good, and the methods used to value ecological services. Additionally, the consideration of economic externalities is vital, as well as determining appropriate costing methods for water services by urban local bodies (ULBs) or governments, including those for bulk users. Another crucial aspect is identifying the right pricing model, whether operational expenditure (opex) or capital expenditure (capex), supported by evidence-backed data on who bears the full cost of water and its breakdown.

In terms of water metering, tariffs, and pricing, behavioural economics offers insights into incentivizing or nudging towards desirable behaviours. Challenges and best practices in metering, especially in India, and the utilization of technology are explored. Tariff models from successful

implementations worldwide are analysed, along with the pros and cons of cross-subsidization and dual pricing based on consumption limits. Furthermore, different pricing models for industrial, commercial, domestic, and agricultural sectors are compared, along with considerations for sewer charges and groundwater metering.

Lastly, implementation mechanisms and strategies are assessed, considering the political economy. Water markets are also explored, including mechanisms for water efficiency trading among bulk industrial and commercial consumers, as well as the development of treated wastewater markets for reuse/recycling, including associated costs, pricing, policies, and regulations.

1.3 Tentative Project Deliverables

- Report on the assessment of real costs of urban water services.
- A template for evaluating urban water supply costs.
- Policy guidelines for rationalising urban water tariffs, for efficient and fair distribution.and for urban water pricing structures to accurately reflect costs and promote equitable access to water resources.

1.4 Expected Outcome of the Project

Considering 100% water meters are being installed in many cities, this project is expected to benefit urban local bodies in estimating the real costs of water supply and in water pricing decisions. A fair and remunerative pricing, we believe, will:

a) Assist in improving the service levels of urban administration and quality of supplied water.
b) Encourage the reuse of grey water among high-volume consumers and citizens.

2. Conceptual Framework

The first step of this project is to align the project's objectives and methodologies. The Interim Report for the Jal Mulya Project sets a solid foundation by emphasizing the significance of water security in the Pune Metropolitan Region (PMR) and the need for evidence-based policy interventions. Here are a few pre-stakeholder meeting ideas based on the provided lines:

1. Contextualizing the interconnections of various issues: Framing the Jal Mulya Project within the broader context of water security and urban development. Highlight the social and

economic ramifications of inadequate water supply, emphasizing its impact on both individual well-being and economic growth.

2. Finalise the Objectives: Ensure clarity on the project's objectives, which include investigating the perception-versus-reality gap in water pricing and determining the true cost of water services. Emphasize the importance of evidence-based policymaking to address these discrepancies effectively.

3. Choosing appropriate Methodology: Provide an overview of the proposed methodologies, such as capacity studies, market research, technical assessments, and perception studies. Highlight the interdisciplinary approach involving economics, sociology, and technical expertise to comprehensively address the complexities of water management.

4. Identifying Key Themes relevant to the Project: Identify key themes for discussion, such as demand management, water circularity, policy and regulatory frameworks, and benchmarking analysis. These themes serve as focal points for stakeholder engagement and facilitate a deeper understanding of the project's scope and implications.

5. Setting Expectations: Manage expectations by outlining the anticipated timeframe for research, implementation, and impact assessment. Emphasize the need for scalability post-pilot testing and the iterative nature of policy development in complex socio-economic environments.

6. Formulating Research Questions: Encourage stakeholders to contribute to the formulation of research questions, fostering a collaborative approach towards addressing critical gaps in knowledge and understanding.

7. Promoting Stakeholder Engagement: Emphasize the importance of stakeholder engagement throughout the project lifecycle, from problem identification to solution implementation. Encourage active participation and feedback to ensure the relevance and effectiveness of proposed interventions.

By laying out these pre-stakeholder meeting ideas, the project team can effectively set the stage for meaningful collaboration and dialogue, ultimately contributing to the development of targeted policy interventions for water security **in PMR and beyond.**

The below figures give an overview of the concepts that give just cause to the urgency of implementation of the project based on literature.

Fig 1: Costing and pricing disconnect.

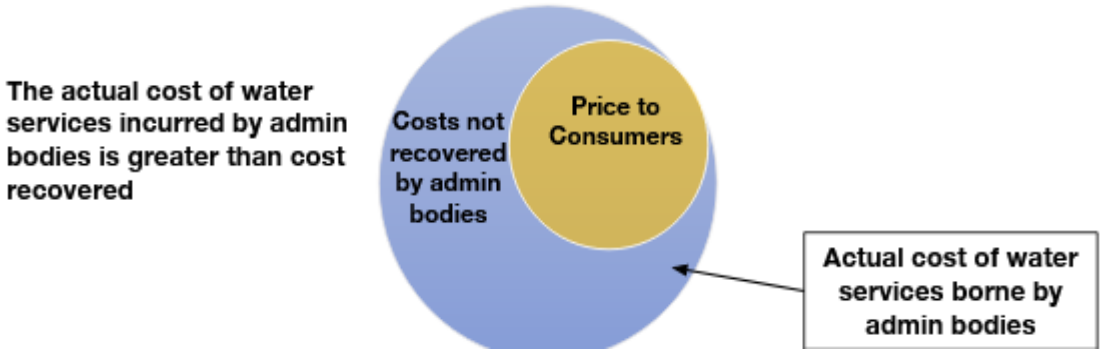
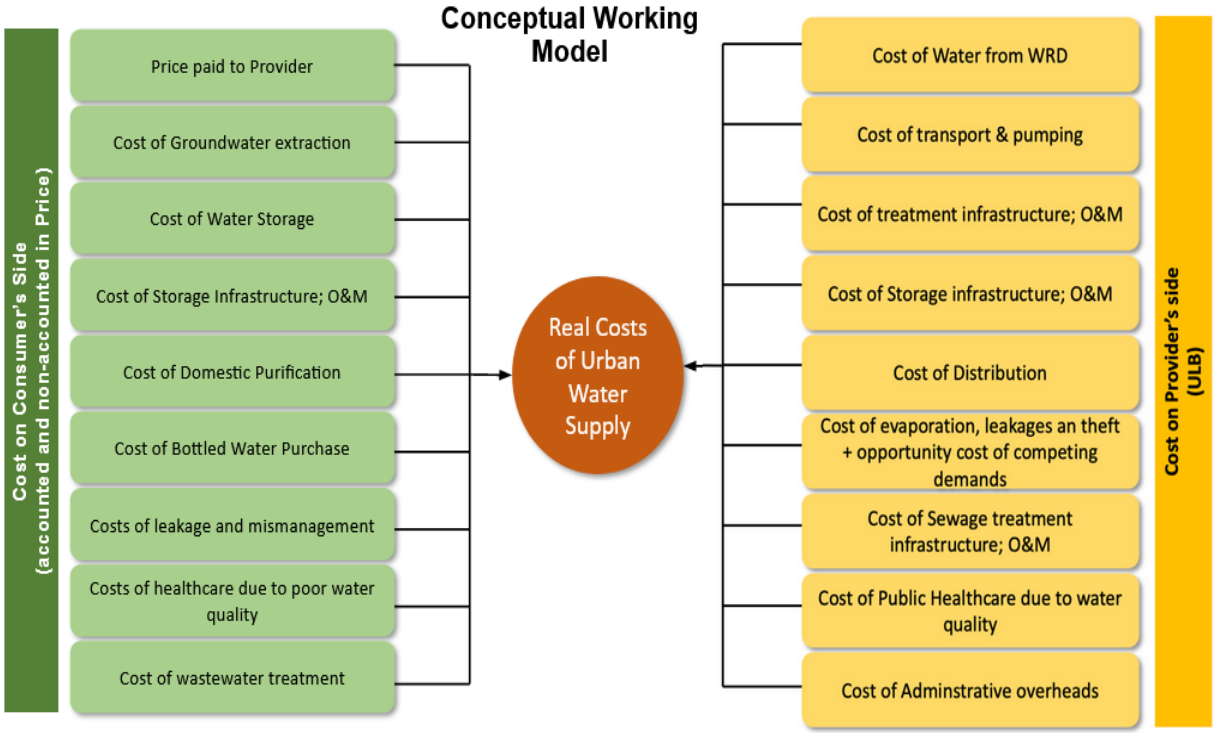


Fig2: Various components of cost and price



3. Methodology

Understanding the economic profiles of participants is fundamental for comprehending the factors influencing social mobility and water usage behaviours. The proposed methodology for the Jal Mulya Project encompasses various studies aimed at gathering comprehensive data to inform evidence-based policy interventions. Here's an outline of the proposed research methodologies:

1. Initial Study

- Objective: Assess the potential reduction in water usage and estimate the required funding for further initiatives.

- Methodology: Conduct surveys and interviews with households, businesses, and community leaders to gauge current water consumption patterns and identify opportunities for efficiency improvements. Utilize data analytics to extrapolate potential water savings and estimate associated costs.

2. Market Study and Research:

- Objective: Investigate the increasing demand for safe water supply and analyse existing tariffs' coverage of costs. Additionally, explore techno-economic feasibility and innovations in water management equipment.

- Methodology: Engage with stakeholders including water utility companies, manufacturers, and consumers through surveys, focus groups, and expert interviews. Evaluate market trends, pricing structures, and technological advancements to assess the feasibility of implementing cost-effective water management solutions.

3. Technical Study:

- Objective: Examine technical specifications through collaboration with architects, designers, consumers, and plumbing contractors.

- Methodology: Conduct site visits and technical assessments of water infrastructure, including distribution networks, treatment facilities, and plumbing systems. Collaborate with industry experts to identify opportunities for technological improvements and optimize resource utilization.

4. Perception Study:

- Objective: Evaluate the population's perception towards demand management measures.

- Methodology: Deploy qualitative research methods such as focus groups and in-depth interviews to understand public attitudes, beliefs, and behaviours related to water conservation. Partner with social workers or sociology-related institutions for data collection and analysis.

5. Policy and Regulatory Study:

- Objective: Map relevant laws and policies concerning water management regulations and quantifying associated risks like contamination and pollution.

- Methodology: Conduct a comprehensive review of existing legislation, regulations, and policies related to water management at local, regional, and national levels. Analyse enforcement

mechanisms, institutional frameworks, and stakeholder roles to identify gaps and opportunities for policy improvement.

6. Themes Exploration:
- Objective: Explore themes of land ownership, tenure, water rights, and regulations to mitigate land degradation.
- Methodology: Conduct literature reviews, case studies, and expert consultations to examine the interplay between land use practices, water resources management, and environmental sustainability. Identify policy recommendations and best practices for promoting land stewardship and water conservation.

7. Benchmarking Analysis:
- Objective: Conduct a comparative analysis of similar projects undertaken by Indian research institutes collaborating with municipalities.
- Methodology: Gather data from comparable initiatives across India, including project objectives, methodologies, outcomes, and lessons learned. Analyse key success factors and challenges to inform the design and implementation of the Jal Mulya Project.

3.1 Timeline, and Budget

The scope of the project will include data collection, analysis, and preparation of a template within a projected duration of 1 year. The budget will cover expenses related to research staff, data collection tools, travel, stakeholder engagement meetings and administrative costs. New business models for water circularity and reuse incentivization may emerge from the findings, contributing to innovative solutions for water management. Additionally, the project will benefit from lessons learned from similar initiatives, such as the Odisha Governments report and PCMC's efforts in water governance for metering.

4. Insights from the Round Table on Water Security in PMR conducted on 12 Jan, 2024

The insights were categorised as follows based on separate discussion question-wise. Additionally, insights from various other stakeholders and decision makers have been incorporated into the report as and when the inputs have been obtained post the formal Round Table discussion. These inputs cut across all questions and are summarised at the end of this section

4.1 Research Questions

S. No	Question
Q1	What does Efficiency in water usage mean by comparison with best practices and for various stakeholders?
Q2	What is a good water pricing strategy for capturing true economic and social cost of water?
Q3	How to develop a market for treated wastewater and incentivize the usage of treated wastewater?
Q4	What should be the governance and regulatory model for achieving water security?
Q5	What are the opportunities for introducing smartness and technology for better decision making in the water sector?

Question 1: Exploring the Significance of Water Usage Efficiency Across Different Stakeholders

The discourse delved into the critical aspect of water efficiency, examining its multifaceted implications for various stakeholders and user groups. One of the key themes underscored was the necessity for a holistic approach, recognizing the diverse perspectives and needs within the realm of water consumption. The dialogue unfolded with insights from different speakers, each shedding light on distinct strategies and perspectives. One speaker, for instance, emphasized the pivotal role of conducting realistic water assessments to curb losses and enhance efficiency. On a similar note, another speaker advocated for the adoption of household water metering systems as a means to track and optimize water usage at an individual level.

Another contributor to the discussion highlighted the importance of implementing water usage restrictions, drawing from successful global examples to support the argument. The need for a regulatory framework that promotes responsible water consumption practices was emphasized.

In a related vein, attention was brought to the behavioural aspects of water usage, suggesting that alongside installing water meters, initiatives aimed at fostering behavioural change among consumers could significantly impact overall water efficiency.
The political dimensions of water issues were also discussed, advocating for the implementation of periodic water budgeting and maintenance as a proactive measure. Additionally, strategies such as rainwater harvesting, efficient equipment usage, and the implementation of telescopic metering systems to mitigate water wastage were explored. These varied perspectives collectively underscored the complex yet interconnected nature of achieving water usage efficiency across different sectors and user groups.

Question 2: Exploring Water Valuation and Pricing Strategies (Water Tariffs)
The session commenced with an introduction to the discussion on water valuation and pricing, prompting reflections on defining the "real cost of water" for communities in specific regions. The discourse navigated through intricate considerations such as the cost dynamics associated with water extraction from natural sources. Factors influencing water pricing included the cost of removing insoluble salts and addressing the challenges posed by soluble solids in water bodies.

Furthermore, the role of government subsidies in mitigating complexities related to water pricing was discussed, emphasizing the need for a balanced approach that considers both economic and environmental sustainability. The conversation also touched upon the importance of individual water consumption management and the equitable distribution of water resources based on socio-economic considerations.

Participants collectively deliberated on the potential frameworks for water pricing, considering factors such as usage metrics and delivery mechanisms. Broader societal impacts, including the healthcare and environmental ramifications of unsafe water, were also highlighted, urging for a more comprehensive approach to water valuation.

Question 3: Examining Water Circulation and Wastewater Management Strategies
The dialogue extended to exploring innovative approaches to water circulation, with a particular focus on wastewater management as a potential water source. The discussion encapsulated strategies for sustainable circulation approaches, technology for recycling treated wastewater,

regulatory challenges, and quality control measures to prevent microbial contamination in recycled water sources.

Challenges such as regulatory compliance underscored the need for a nuanced approach to wastewater utilization. The discussion also emphasized the importance of ensuring the safety and reliability of recycled water sources. Summarizing the key takeaways included strategies for mapping wastewater sources, regulatory frameworks, and technological appropriateness, particularly in budget-constrained environments.

Question 4: Water Governance and Regulatory Frameworks

The conversation shifted towards governance models and regulatory frameworks governing water resources. Insights were provided into dedicated bodies managing water supply and distribution at a city level. The importance of watershed management, restoration of local water bodies, and the integration of ecosystem-based approaches were highlighted. Participants collectively echoed the sentiment of preserving water resources and ensuring equitable distribution across different river basins.

Question 5: Leveraging Smart Technologies for Enhanced Data Acquisition

The final segment of discussions revolved around leveraging technological advancements for data-driven decision-making in water management. The role of technology in fostering awareness and behavioural changes among stakeholders, comprehensive data collection for informed decision-making, and the affordability of technology were highlighted. Emphasis was placed on academic contributions to enhance understanding and address challenges in water security and management. The discussion emphasized traditional wisdom, data-driven decision-making, regulatory frameworks, and the role of remote sensing in monitoring water resources.

The meeting culminated with plans to synthesize stakeholder inputs, refine research objectives, and develop an actionable plan with clear timelines and responsibilities. The collaborative effort aimed to integrate diverse perspectives and expertise to foster sustainable water management practices. Further engagements were planned to build upon these discussions and translate them into tangible actions for water resource optimization and conservation.

5. Glimpses from the Round Table conducted on Friday, January 12th, 2024

Fig 3: The various stakeholders and volunteers involved in the Round Table meeting

6. Plan of Action and Conceptual Clarity post the Roundtable and stakeholder discussions After extensive and insightful discussions with various stakeholders, a comprehensive set of action plans has been devised to tackle the pressing water challenges faced by the burgeoning cities of Pune and Pimpri-Chinchwad in Maharashtra. These action plans encapsulate a holistic approach, encompassing multiple facets of water management and governance to ensure sustainable usage and equitable access for the growing population.

1. Efficiency in Water Usage To enhance efficiency in water usage, a multifaceted strategy is proposed. This includes advocating for a diverse range of perspectives from stakeholders to foster a comprehensive understanding of water needs. It involves implementing practical solutions such as realistic water assessments, installation of household metering systems, imposition of usage restrictions, initiation of behavioral change campaigns, and adoption of rainwater harvesting techniques. Innovative measures like telescopic metering and the utilization of efficient equipment are also emphasized to effectively mitigate water wastage.

2. Valuation/Pricing of Water Valuation and pricing of water are crucial aspects that demand attention. Defining the actual cost of water becomes imperative, considering factors like the cost of removing insoluble salts, technological advancements in water treatment, and the establishment of equitable distribution models. Addressing distribution equity, managing subsidies, and promoting individual water consumption management are essential steps towards ensuring fair access to water resources. The incorporation of socio-economic considerations further strengthens the pricing models to reflect the true value of water while maintaining affordability.

3. Circular Use of Water Promoting circular use of water is a sustainable approach that emphasizes resource optimization and reduced usage. It involves exploring the potential of treated wastewater for multiple purposes while upholding stringent water quality standards. Mapping wastewater sources, assessing technology suitability, and addressing budget constraints are integral steps towards implementing circular water solutions, especially in tier 2 and tier 3 cities where resource allocation may be constrained.

4. Water Resource Governance and Regulatory Model Establishing effective water resource governance and regulatory frameworks is essential. This may involve the creation of dedicated bodies for water supply and management, akin to successful models such as CMWSSB in Chennai. Prioritizing the protection and restoration of local water bodies is crucial to maintain ecosystem health and recharge aquifers. Vigilance against privatization ensures government oversight, safeguarding public access and equity in water distribution.

5. Harnessing Opportunities for Smart Technology and Data Acquisition Integrating smart technology and data acquisition tools into water management practices can significantly enhance decision-making processes. Combining traditional wisdom with modern technological advancements allows for efficient data analysis and informed decision-making. Utilizing diverse data sources like groundwater records, GIS technology, and academic research promotes awareness and facilitates the adoption of technological solutions for water security.

These comprehensive action plans aim to navigate the complexities of water management in rapidly growing urban areas. By fostering sustainable practices, promoting equitable access, and leveraging technological innovations, these initiatives strive to ensure a resilient water management system that meets the evolving needs of Pune, Pimpri-Chinchwad, and their growing populations, both now and in the future.

7. Conclusion and Way Forward

The interim report underscores the critical need for an extensive evidence-based analysis regarding water valuation. This analysis, coupled with the formulation of strategies aimed at establishing a practical, sustainable, and implementable water pricing and tariff policy, is deemed essential. It is envisioned as the cornerstone for achieving long-term water security for the Pune Metropolitan Region (PMR) and marks the inception of the transformative “Jal Mulya” project.

The comprehensive analysis entails several key components:

- The meticulous collection of primary and secondary data concerning water costs incurred by service providers. This includes considerations such as Operation and Maintenance (O&M) expenses, capital expenditure (capex) depreciation, and an in-depth examination of the actual costs borne by water users. Moreover, generating a comprehensive water balance for the PMR through primary and secondary data sources is deemed imperative.
- A thorough review of existing policies, encompassing pricing structures and tariffs, at the levels of city, state, and central governance.
- Drawing insights from global best practices and tailoring them to suit the unique context of the PMR.
- Engaging in extensive consultations with administrative bodies to gain insights into the challenges encountered in the collection of water charges.
- Soliciting input from diverse user segments to gain a nuanced understanding of their perspectives and considerations regarding water pricing.
- Exploring the potential contributions of the private sector and investigating new business models pertinent to water circulation and pricing mechanisms.

The overarching goal stemming from these analyses and consultations is to develop a robust set of strategies. These strategies are envisioned to facilitate a seamless transition towards a practical, sustainable, and implementable water tariff regime that aligns with the long-term goals of ensuring water security and equitable access within the PMR.

The "Jal Mulya" project, translating to "Water Value" in Sanskrit, stands as a ground-breaking initiative aimed at comprehensively understanding the exact costs associated with water, devising fair pricing mechanisms, and ensuring equitable distribution within the Pune Metropolitan Region (PMR). This project is not only about monetary valuation but also about recognizing the intrinsic value of water to communities, ecosystems, and future generations.

Moreover, the project delves into fostering a shift in behavioural attitudes towards water circularity and wastewater treatment and usage. By promoting a mindset of responsible water usage and highlighting the importance of water recycling and efficient treatment processes, "Jal Mulya" aims to instil a culture of sustainability and stewardship.

Through extensive data analysis, stakeholder consultations, and global best practice exploration, the project endeavours to pave the way for a sustainable and equitable water tariff regime. It seeks to address water scarcity challenges, promote circular water management practices, and ensure the longevity of water supplies for generations to come.

Ultimately, "Jal Mulya" signifies PMR's commitment to responsible water management, embodying the ethos of sustainability, conservation, and prudent resource stewardship.

Annexure
A) Experts Invited to the Round-table

S.No.	Organisation	Representative	Expertise
1	ACWADAM	Dr Himanshu Kulkarni	Groundwater Conservation and mgmt
2	CDSA	Dr Anita Beninger	Urban town planning
3	CWPRS - IEEE	Prof Khurjekar	Irrigation and water mgmt
4	Deshpande Foundation	Vishwas Kurundkar	Farm ponds and project management
5	Flame University	Dr Prasad Pathak	GIS
6	Former GSDA	Shashank Deshpande (Vaishali Patkar connect)	Ground water survey
7	Gokhale Institute (GIPE)	Dr Gurudas Nulkar, Dr. Abhay Pethe, Soomrit	Ecology, river rejuvenation, data
8	Govt of Maharashtra	GSDA Director, Shekhar Singh (PCMC), Sanjay Kulkarni, Poonam Mehta, Dr Kunal Khemnar, PMC Water, Pawaskar, Jagtap, VGK, Saurav Rao, Vikram Kumar	Administration
9	Gram Gaurav Pratishthan	Kalpana Tai Salunke, Prasad Sevekari	Water mgmt, crop patterns, irrigation
10	ISRO	Puneet Mishra	
11	JIVIT Nadi, NCL	Dr Pramod Moghe	River conservation and rejuvenation
12	MD Unity World Pvt Ltd	Mahesh Pathak	Water expert
13	NEERI	Dr Rakesh Kumar, Former Director	Environmental science, sustainability
14	NJS Engineers	Dr. Uday Kelkar	Wastewater treatment expert
15	Paani Foundation	Satyajit Bhatkal	Water conservation and program mgmt
16	PIC	Dinanath Kholkar, Dr Vishal Gaikwad	Data, AI, Tech Solutions; Track Lead PIC Research vertical
17	PKC	Dr Ashwini Keskar, Siddharth D., Dr Priya N.	Sustainability, PCMC project, Tech solutions, AI
18	Shirpur Pattern	Suresh Khanapurkar	Water harvesting, Aquifers
19	Symbiosis	Navendu Chaudhari	GIS
20	Tata Trusts (Tata Water Mission)	Divyang Vaghela, Ganesh	Program mgmt., water management
21	TCS	Jagdish Chaudhari, Anil Sharma, Shailesh Deshpande	Strategic CSR, Agriculture, DiSQ, Satellite Imagery
22	The Climate Reality Project	Col Shashikant Dalvi (retd) , Anirudha Todkar	Rain Water harvesting
23	Tor AI	Aditya Paranjape	IT and Tech
24	WALMI	Pradeep Purandare	Irrigation and water management
25	Tulsipatra Foundation	Sweta Jhunjunwala	Water management
26	Ram Nadi Rejuve	Vaishali Patkar	River rejuvenation

27	Smart city consultant	Sucheta Dhere	Social Enterpreneur
28	MIT ADT Univ	Dr Virendra Shete	Technology expert, academician
29	Bhujal Abhiyan	Ravindra Sinha	Water management
30	PIC Director	Abhay Vaidya	
31	PIC coordinator	Geeta Hosmane	
32	IEEE / ISRO	Puneet Mishra	Satellite imagery
33	Space Tech	Shirish Ravan	Satellite imagery
34	MP	Vandana Chavan	
35	Water Ethics Network	K J Joy	Author, water expert

Note: Some of these experts could not attend in person but contributed with their inputs offline. Some of them nominated their colleagues to attend.

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