Urban Waters

Pushing the boundaries of sustainable urban water management in Indian cities

Bengaluru | Pune | Chennai | Hyderabad

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Contents

Summary

The sustainability initiatives at Wipro began over two decades ago. Guided by the spirit of mutualism between corporations and society, the initiative was formalized in the year 2007-08 through the formation of Eco Eye.

Through the years, multiple performance milestones on resource efficiency, climate change, pollution and waste management, as well as ecological stewardship, have been achieved both within and outside of our campuses through this initiative.

A common phenomenon the world over, and especially in rapidly developing economies like India, is growth in its urban centres. This is largely because cities attract both people and industry, often at a pace that results in uneven and unplanned development.

This, in turn, leads to significant impacts on natural resources in the form of pollution, neglect and over-use, habitat loss, air quality and reduction in green spaces. Additionally, lack of access to these resources, especially for those living in low-income neighbourhoods, can lead to unintended outcomes.

Addressing such issues is a daunting endeavour. In 2007, we started by looking inward, working on sustainability and water conservation initiatives within our campuses. Since then we have invested in multiple sustainability and efficiency initiatives, such as tertiary water treatment, rainwater harvesting, e-waste management and paper recycling.

However, our assessment also revealed the interrelated issues of urban water in terms of sourcing of groundwater from proximate areas, and by extension, issues related to wastewater flows, surface water and its impact on communities. This prompted us to engage deeply on urban water issues through initiatives that have lasted over a decade and continue till date.

The problems around urban water are numerous. Cities, by design, consume large amounts of surface water (often sourced from a distance) and groundwater (locally sourced), involving both formal and informal supply agencies and networks.

Despite extensive investments in piped water supply, a study on water and wastewater in cities and towns has revealed that close to 48% of the water consumed comes from groundwater.

More recently, a NITI Aayog study revealed that average wastewater treatment in urban India remains at 33% while the rest goes untreated. Meanwhile, the budget for piped water supply programs in India as of 2019-20 has increased by 81% on a year-on-year basis.

As cities continue to grow and resources become scarce, an additional pressure comes in the form of unplanned growth, encroachment of wetlands, lakes and other ecologically critical spaces. These spaces come with a unique set of problems that require concerted and collective effort by individuals, communities, planners as well as the state.

From shallow aquifer rejuvenation and lake restoration initiatives, to understanding urban rivers and solving sanitation issues, we have aimed to broaden our scope of work in both urban and peri-urban spaces. Within such settings, it is important for stakeholders to bring together a deliberative and scientific approach to solutions. Such an approach is critical in the urban setting.

In such contexts, it is important that we develop approaches that help us mediate

competing uses and help in taking care of the resource as well.

We see our role as a catalyst to enable this shared effort, where we strategically support organizations in creating knowledge for action.

Going forward, we will continue to strengthen our work in the cities of Bengaluru, Pune, Chennai and Hyderabad, as well as work in other cities where we have operations. Learnings from this work will inform and catalyse our involvement in other larger metros like Mumbai, NCR and Kolkata, as well in smaller towns like Devanahalli and Tumakuru aimed to inform and integrate with local government projects and programs. We plan to continue supporting local, place-based initiatives with a strong community impact component that empower not just our partners to do good work but also enhance the capabilities of communities to act.

This document aims to provide an overview of our initiatives till date. We begin by speaking about our work with our partner Biome Environmental Trust in Bengaluru and the work that inspired us to support ACWADAM in Pune and other similar initiatives in the city expanding into river rejuvenation and spring-shed management. Our early forays into the cities of Chennai and Hyderabad have given us hope that we can make a difference in low-income neighbourhoods and in protecting vulnerable ecological resources in cities.

Over the years, the work that we have done along with our partners has been acknowledged by governments as well as city municipal bodies, who have supported the various causes that our partners work toward. We plan to keep this momentum going and wish for many more partners to come onboard on this journey of ours.

Sihineer Kere, Devanahalli, Bengaluru Rural. Photo: Biome

Overview

By 2050, it is estimated that two-thirds of the world's population will be residing in cities. A 2021 summary report on SDG-6 (Water and sanitation for all) notes that since the year 2000, rapid urban growth has led to a doubling of the number of urban residents lacking safe drinking water. Such a scenario will lead to an increased rate of withdrawal from freshwater sources including groundwater.

A significant increase in groundwater extraction, more than the actual recharge of aquifers has resulted in about 60% of the districts in India being affected by depleted or contaminated groundwater.

This is particularly true in the case of cities in the developing world. While economic progress and achieving developmental goals are necessary, many decades of unregulated use of freshwater have put immense pressure on existing infrastructure, and the future is bound to be marked by stronger caps on use and regulation.

Much of India's history of water use has concentrated on rivers while the immense reliance on groundwater is often forgotten, especially in cities. Despite the high level of investments in transport of surface water, storage, and distribution infrastructures, it is estimated that more than 50% of the total water supply in urban India is based on groundwater.

Some small towns in India almost entirely depend on groundwater for all their domestic needs. The reasons for such a reliance on groundwater in cities depends on conditions such as inequitable distribution and unplanned growth.

Low-income neighborhoods are often underserved, leaving communities to fend for themselves. This leads to issues of both adequacy and public health. Much of the water in these spaces is then sought from unregulated sources, which lead to a disproportionate increase in the cost of water. Competing claims over the same resource also make water a contentious resource.

The ecological impacts of such a change are also substantial. With built-up infrastructure growing, much of the aquifer material gets excavated, resulting in a reduction in shallow groundwater stocks. Furthermore, encroachment of natural drains or contamination of local lakes and ponds leads to undesirable outcomes.

A significant increase in groundwater extraction, more than the actual recharge of aquifers has resulted in about 60% of the districts in India being affected by depleted or contaminated groundwater. Such a problem of unsustainable levels of groundwater extraction is likely to increase, as cities in India grow. Groundwater and its proper stewardship are important factors in this equation of sustainable management and use of water in cities.

Much of India's history of water use has concentrated on rivers while the immense reliance on groundwater is often forgotten, especially in cities.

Issues around water access and resource conservation are complex. Nevertheless, corporate groups and industries, especially those proximate to urban settlements can contribute toward solving these by working with expert organizations, communities, and like-minded individuals.

An in-depth look at Bengaluru's water crisis

The growth and transformation of Bengaluru into India's Silicon Valley has happened very rapidly. Companies in the information technology (IT) space have thrived and new offices and residential blocks have kept pace with the sharp rise in the number of people living in Bengaluru and its neighbouring areas.

Today, Bengaluru is the third biggest Indian city by population, behind Mumbai and Delhi. For Bengaluru, this growth has put a strain on its natural resources and among them, especially on water.

Bengaluru has many lakes and water bodies, including open wells and private borewells. Most of these came up as irrigation bodies managed by agrarian communities that lived around the lakes. Inflow into Bengaluru's lakes is primarily through rainwater falling in their catchment areas. The city receives an average of 920-970 mm of rainwater during its monsoon season.

A network of storm water drains (raja kaluves in Kannada) bring water to the lakes. Streams and groundwater seepage also contribute to water inflow to the lakes. Bengaluru's lakes get a sizable amount of sewage as well. Wetlands, considered as the lungs of a lake, help absorb some of the nutrients present in the sewage. While many of the lakes have wetlands that breed aquatic life, sewage loads over the years have choked some of the city's lakes.

By the early 1990s, these networks began to shrink and get fragmented with the growth of Bengaluru city. Over time, many lake areas got encroached upon and some of them completely disappeared due to urban development. This is the story of many water bodies in urban areas.

In Bengaluru, until 1960, there were 262 lakes. According to Bengaluru Municipal Corporation, the primary custodian of these lakes, only 210 have survived. It took the record rainfall years of 2021 and 2022 to fill the lakes and city's tanks and stormwater drains to capacity, which also caused multiple flooding events across the city. Bengaluru's dependence on the river Cauvery (100 kms away with a gradient of 300 meters) and the collective focus on improving infrastructure efficiencies have led to the neglect of the importance of the regulation and use of groundwater in the city. While the city is a major consumer of the waters from the Cauvery, and most of the regulatory and engineering resources are devoted to fetching this water, this has come at the cost of a lack of attention required to conserve local rivers and aquifers.

Take, for instance, the river Dakshina Pinakini. This river rises in the nearby Nandi Hills and flows into the Bay of Bengal in Tamil Nadu. It is unique for having no major tributaries. Its relationship with Bengaluru has been historically strong. A series of lakes and check dams were built along the course of Dakshina Pinakini to conserve its water, a step that underscores the river's significance to local life and culture.

Currently, the river's condition is similar to that of other city rivers across India. Sections of the river passing through Bengaluru have been severely impacted because of accelerated urban growth and pollution. These stretches are in a state of decay due to unregulated inflows of wastewater and solid waste.

Shallow aquifers that lay beneath Bengaluru, on the other hand, have been tapped to varying degrees over the years. However, these still exist and continue to be replenished. These reservoirs exist mostly unseen and unheard. These are noticed only as water that emerges forth when the ground is dug or drilled deep enough.

Shallow aquifers in cities play an important role. They can be used to reduce the risks of urban flooding, can act as a repository of water for use and recharge, and in certain regions, are hydrologically connected to

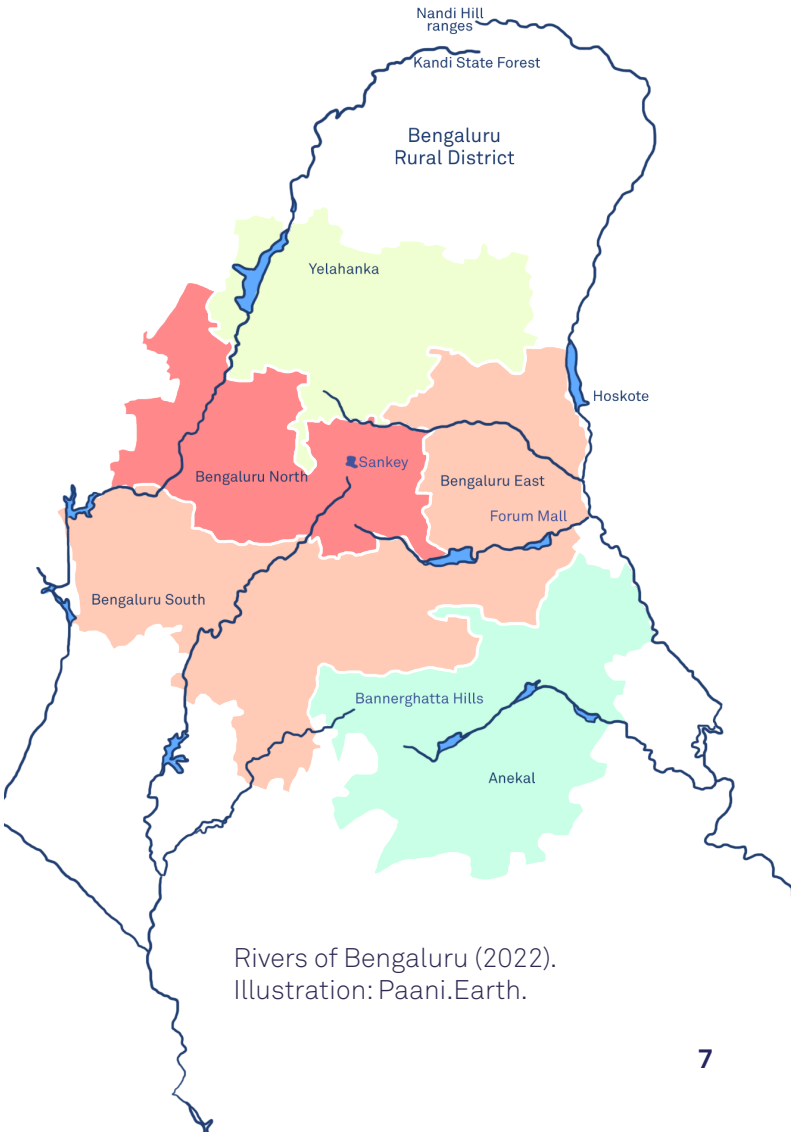
Open wells can still be found in some urban areas, but their quality remains a concern. Photo: Biome

lakes, and even springs and rivers, as we shall see in Pune's context. Much of this interconnectedness is hidden away from view right under our feet. In addition to this, high-investment projects bringing imported water to the city have pushed the relevance of groundwater and groundwater management away from the public eye.

While groundwater requires far lesser resources to extract and use and can be easily shaped and designed to serve hyperlocal needs, governmental interest in such ideas is disproportionally less, as compared to large-scale projects.

Unless effectively regulated, aquifers run the risk of over-extraction. In such a situation, facilitating local community-based aquifer management becomes important.

This task was taken up by Biome Environmental Trust in the city of Bengaluru. We have been associated with Biome since 2009. We have been collaborating on initiatives within our campus. We have also been subsequently implementing them in communities in the city of Bengaluru.



Rivers of Bengaluru (2022). Illustration: Paani.Earth.

Rainwater Club to Biome Environmental Trust

The Rainwater Club was an informal gathering of water conservation enthusiasts who got together on weekends to work on rainwater harvesting and other water conservation projects under the guidance of S. Vishwanath. As Rainwater Club was originally an unregistered platform, its change to Biome Environmental Trust, a more formal set-up, was required to receive grants and expand its activities. At present, Biome's areas of work broadly include – engagements with the state and policymakers, with schools, with urban and peri-urban communities and lake groups, creation and dissemination of communication and awareness material, research studies, training and internships.

Biome's "Million Wells for Bengaluru," a 10-year campaign started in July 2015, intends to increase the groundwater table via recharge wells in the city while providing livelihoods to the local community of traditional well-diggers (called Mannu Vaddars) in Karnataka. The implicit objective is to build a water culture in the city, where people value water availability and water structures, and also take responsibility for managing groundwater collectively. The goal is to help communities look at groundwater not just as a resource to be extracted, but also to be conserved and managed with community participation.

For their efforts, Biome was awarded the 2022 "Transformative Cities People's Choice Award," in the water category, for the Million Wells program.

Team Biome

Traditional well-diggers are the original barefoot hydrologists.

Team of well-diggers who have rejuvenated many wells across Bengaluru and its outskirts.

Murals on water stories made by the 'Art In Transit' team at the Cubbon Park metro station.
All photos by Biome.

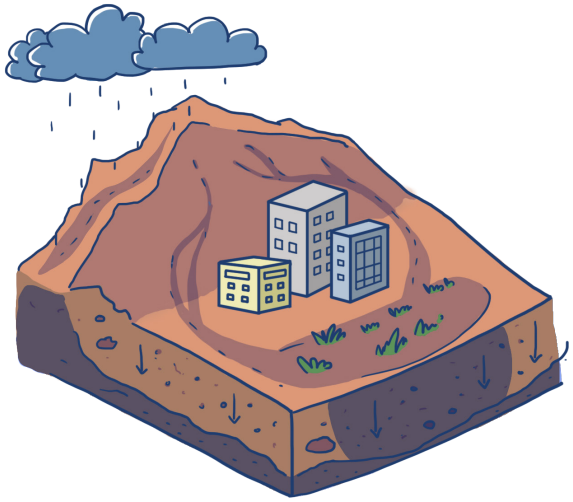
Timeline of water initiatives in Bengaluru

2009-2011

Defining and monitoring water responsibility

- Biome conducted an internal water audit of Wipro's Corporate campus to understand and define water responsibility (beyond water conservation) and created a water responsibility framework and a campus water sustainability metric.

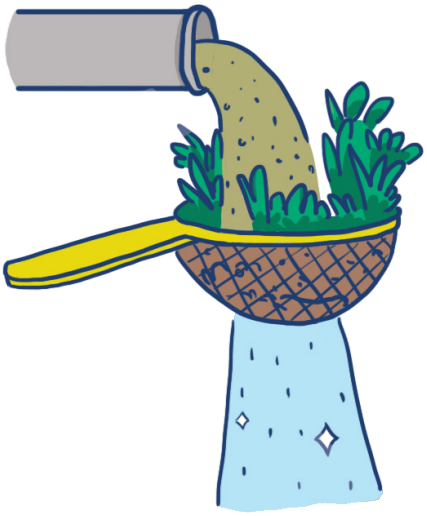
2012-2017



Groundwater management in the Upper Ponniyar watershed in Sarjapur

- A participatory aquifer management program to look at groundwater and surface water around the WIPRO campus (Upper Ponnaiyar watershed, with an area of 33 square kilometers) and to catalyze action to ensure community participation and management of water resources.

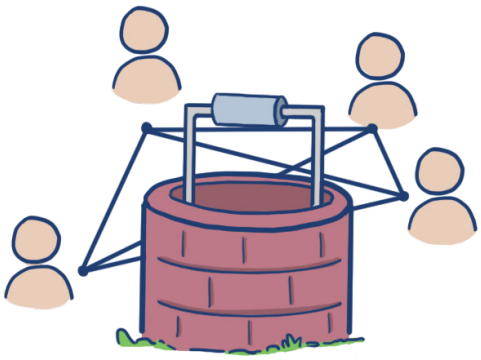
2014-2019



Wastewater, wetlands and lakes: Natural treatment

- As part of this program citizen groups visited various lakes with STPs, explored various nature-based STP technologies, and tried working with the KSPCB for the possible reuse of treated wastewater in lakes and the construction of engineered wetlands.

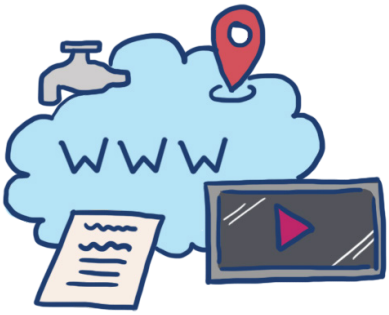
June 2015



My Well Our Water

- A workshop for sharing learnings from Biome's engagement with different stakeholders in Bengaluru.

Aug 2017



Participatory Aquifer Mapping workshop

- Creation of a website for each city to tell its water story as well as actionable information for its citizens. http://urbanwaters.in/ http://bengaluru.urbanwaters.in/ was launched during the workshop to share learnings from Biome's work in the city.

April 2019

National UW workshop at School of Ancient Wisdom.

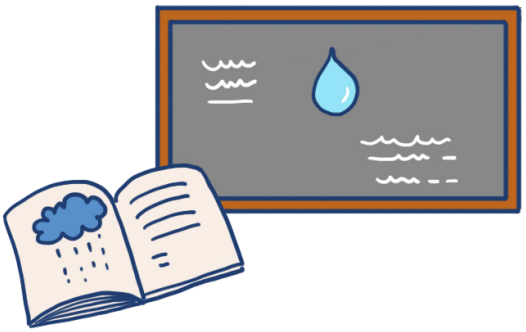
- A felt need to share learnings over the years with other cities. A two-day residential program was organized in Bengaluru for the mutual sharing of challenges and solutions for managing urban waters.

2017-2021

Participatory program to manage groundwater in Devanahalli

- A program to understand and manage groundwater in Devanahalli. This included working with the TMC, schools in the area, farmers and other citizens.

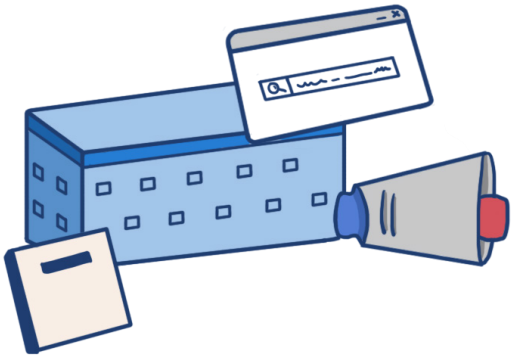
2016-2019



Water literacy in schools

- A program for improving water literacy in schools through the implementation of RWH in 10 Schools in Devanahallli was initiated.

2020 onward



The Million Wells Program

- With the understanding of the presence of the shallow aquifer, a campaign to further promote the learnings was felt. For this, the following activities are underway.
- Work with Bengaluru University and participating colleges for monitoring groundwater.
- Documentation and publication of success stories.
- Addition of other cities to the Urban Waters website.
- Further engagement with CSOs from other cities.

Bengaluru Sustainability Forum (BSF)

Set up in the year 2018 through a Memorandum of Understanding (MoU) with National Centre for Biological Sciences (NCBS-TIFR), BSF brings together civil society organizations (CSOs), academia, research institutions, and governmental bodies, with the broad goals of fostering curated interactions between different stakeholders on issues related to urban sustainability.

BSF undertakes broad public outreach and specific research-based analyses and dissemination of Bengaluru's sustainability issues. The forum is in its fifth year and has focused on four themes. These include, urban water, biodiversity, air pollution and climate change. Under BSF's small grants program, ten urban water projects have been undertaken successfully, with two currently ongoing ones. Topics for the projectes range from lake health, participatory management of water sources, tackling wastewater issues, and public engagement through art.

Over the years, BSF has also curated three retreats bringing together experts in the fields of Urban Water, Biodiversity, and Climate Change and has supported 30+ collaborative projects.

Karnataka State Water Network (KSWN)

Launched in 2014, Karnataka State Water Network (KSWN), convened by Wipro in partnership with the Karnataka Chapter of the Confederation of Indian Industry (CII), served as a multi-stakeholder platform to address water challenges in identified geographical clusters of Bengaluru. The network has curated multiple programs and four annual conferences to date.

This forum has also served as a useful space in getting industry, government and citizens together to undertake some key interventions related to rejuvenation of lakes in industrial areas and initial work on setting up a common industry effluent treatment plant, among others.

Urban Waters 2023 retreat organized by Biome in Bengaluru.

The genesis of Wipro's interventions in groundwater management

Sarjapur, Bengaluru, home to Wipro's corporate headquarters, is part of a large Special Economic Zone (SEZ) with more than 10,000 employees. The Outer Ring Road (ORR)-Sarjapur area is a microcosm of the larger Bengaluru story of rapid growth and the inability of core infrastructure facilities like water supply to keep pace.

The area continues to be entirely dependent on a large number of private borewells and private supply using water tankers. Our annual water consumption was estimated at 250 million liters. Of this, 75-80 million – or a third – was treated, recycled water. We had also been steadily improved the efficiency of our freshwater usage.

In 2010, when an integrated assessment of emerging water risks at locations across India was done, we discovered excess risk at two places hosting the company's operations – Sarjapur and Chennai. This resulted in the introduction of the Integrated Water Management Program at Sarjapur, founded on two pillars: an internally focused responsible water program and an externally oriented participatory aquifer mapping (PAQM) program.

Setting the stage for this was an internal exercise that we did in partnership with Biome in 2011, recalibrating the company's water metrics according to a more holistic approach. This approach featured concepts like water debt that measures freshwater consumption weighed against rainfall endowment and normative entitlement norms. The total amount of water that is received in the form of rainfall over an area is called the rainwater endowment of that area. It was found that in the Sarjapur campus, our net freshwater consumption was more than twice the rainfall endowment. There was an overdraft of more than 125 percent. It was clear that conventional approaches to water management like focusing only on water use and reuse efficiency are a good beginning, but are not enough. Viewing water as a larger shared and commonly owned resource was imperative. A decentralized model of citizen-led governance of groundwater was mooted, giving rise to PAQM.

The partnership between Biome and us also featured two other agencies. ACWADAM, which provided its expertise in the area of hydrogeology, and MapUnity, an organization specializing in providing mapping solutions.

Advanced Center for Water Resources Development and Management (ACWADAM)

Academic research aspires to improve the understanding of a subject and provide deeper insights into the subject and its applications. However, society in general appreciates research that resolves real-world problems and addresses challenges presented on the ground. This was ACWADAM's point of departure from conventional approaches in water management and research.

Seven geologists from Savitribai Phule Pune University felt that research should not remain confined to the lecture halls of academia and founded ACWADAM in 1998. They believed that education and research programs on groundwater should be strategically designed to enable community-level decisions on managing the resources. Managing common pool resources – particularly groundwater – requires the demystification of science.

The organization feels the need to emphasize a participatory approach in applying the science of hydrogeology to understand aquifers. This is envisaged to facilitate community decisions and action on groundwater management and governance, which it feels are equally important. This vision became the foundation of ACWADAM's work and continues to drive all of ACWADAM's efforts even today.

ACWADAM's mission has been considerably aligned with the uniqueness of India's groundwater dependency. Strategies for its management have been developed based on a hydrogeological understanding of the groundwater resources in the context of communities and livelihoods. ACWADAM has partnered with a wide range of organizations, and with both Central and State governments across the Indian sub-continent.

ACWADAM's involvement as a technical partner in the Urban Waters Initiative emerged from their years of experience in understanding India's aquifers systems. Their approach involves understanding how an aquifer is mapped and how it is dictated by the patterns of community use of that resource. This unique approach also goes beyond the need to create a conventional mapping exercise and imagines a foundation on which community action, collective decision, and the governance of aquifers could be based.

Participatory Aquifer Mapping (PAQM) Program

Under the PAQM, a detailed mapping of the 34 km^2 Yamalur aquifer, which Sarjapur sits on, was undertaken. It brought in the granularity in maps to make informed decisions. Proper mapping answers questions related to the locations of aquifer recharge and discharge points and how the underground reservoir is linked to sources of surface water like lakes. In turn, this allows us to understand and deal with water risks at a macro level.

PAQM also roped in ordinary citizens into the program. It envisioned them as active partners in the management of a common resource. Before our involvement in the whole water scenario, a handful of citizens had already engaged themselves in understanding groundwater. However, it was at an individual level and lacked overall coordination. As a consequence of which the borewells of Sarjapur ran deep and the practices of `abandon and shift' were rampant.

PAQM sought to change that by providing a bird's eye view of resource layout and coordination on what is needed to be done. It resulted in pioneering initiatives, in Rainbow Drive, for instance, banning private borewells, installation of more than 350 recharge wells at the community level, comprehensive harvesting of rainwater, phytoremediation-based sewage treatment, and extensive use of wastewater for landscaping. These initiatives and the community in which they happened were also digitally networked to enable conversation between stakeholders and sharing of ideas. A part of this challenge was also to convince communities of the relevance of recharge wells and the science behind such an initiative.

A community member measuring borewell depth.

Installing/collecting data from HOBO sensors.

Recharge well in common areas.

PAQM: Upper Ponniyar/Yemalur Watershed

- Eight micro-watersheds spread across 33.81 km^2 studied over three years.
- Led by WIPRO Ltd, Biome Environmental Trust, ACWADAM, and MapUnity.
- Ably supported by Residents Welfare Associations of Rainbow Drive, Adarsh Palm Retreat, and MAPSAS, a citizen-driven trust.
- A cluster-based study for a granular understanding of groundwater aquifers
- Three clusters studied in detail:
  - Rainbow Drive Cluster
  - Adarsh Palm Retreat Cluster
  - Kaikondrahalli Lake Cluster
- More than 28 recharge wells, 25 borewells, and 2 dugwells monitored

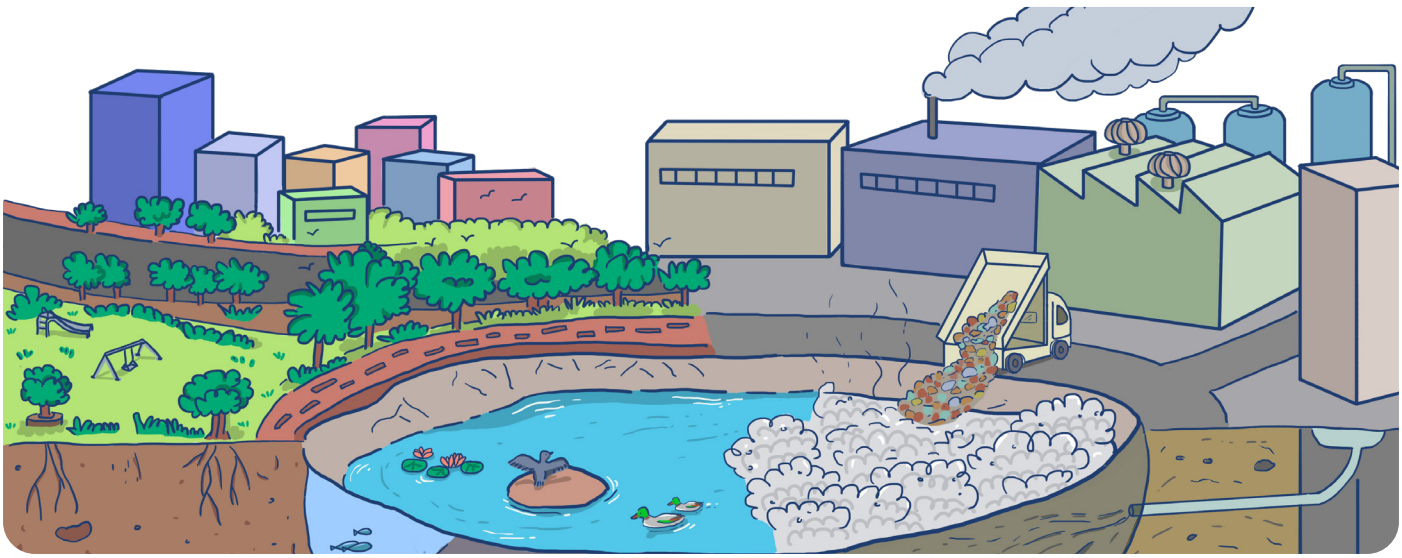
Fostering collaborative solutions for effective water management in Bengaluru

Revitalizing, restoring and rejuvenating lakes

Lakes offer several social and environmental benefits. They provide water to the communities living around them. They also help in flood control, among multiple other benefits. Over time, the mismanagement of these public resources have become a source of concern, mainly because of the lack of accountability and ownership, absence of monitoring, and encroachments. Some of them have even became dumping spots for garbage, industrial effluents and construction debris.As lakes and open water bodies started to die, borewells began to gain popularity, adding to Bengaluru's water woes. Efforts have been made to revive and conserve some of Bengaluru's lakes. At the Puttenahalli and Kaikondrahalli lakes, traditional communities and urban users came together to work with government agencies for the purpose. Community-based organizations have taken up the formal maintenance of these lakes.

Revival efforts have not always been on the right track. Often these efforts have focused on the recreational values of the lakes and not on their aspects as water bodies that support and foster communities' need for water and livelihood, and ecological purposes like flood control. In the process of involving the community, it is critical to pin the responsibility for water bodies on an organization that will work for their upkeep. For many lakes, the custodian agency - the agency on which the responsibility for its upkeep rests - is the Bruhat Bengaluru Mahanagara Palike (BBMP), the local municipal corporation. The custodian agency mandated with the responsibility of managing lakes may be assisted by citizen groups. Involvement can range from building awareness to advocacy.

Friends of Lakes is one such informal group that has been helping in the rejuvenation of lakes at Vidyaranyapura and Doddabommasandra. It is a pan-Bengaluru citizen-led advocacy group, which engages with local government institutions. BBMP has entered into partnerships with a few lake groups through MoUs. Karnataka State Pollution Control Board (KSPCB) has set up watchdog committees for water quality. Karnataka Lake Conservation and Development Authority has created the post of Lake Wardens. BBMP also works with local trusts for the revival of lakes. Puttenahalli Neighbourhood Lake Improvement Trust



(PNLIT) was one of the first trusts to which a lake was handed over for management. PNLIT is engaged in tackling issues such as local governance, and environmental protection and fostering initiatives that help improve the neighborhood. MAPSAS (Mahadevpura Parisara Samarakshane Mattu Abhivrudhi Samiti) and Jalaposhan are other groups doing collaborative work on the rejuvenation of lakes.

The revival of lakes has become a catalyst to rejuvenate entire neighborhoods around their local water bodies. Core rejuvenation work entails activities such as lake administration, creating awareness about the environmental benefits of water bodies, and regulatory aspects. At the secondary level, there are efforts in promoting local economies, taking up recycling efforts and focusing on waste disposal, among others. PNLIT has also entered into a formal agreement with KSPCB and BBMP to use treated water.

MAPSAS, set up in 2011, works towards reviving and rejuvenating lakes in the Bellandur-ORR, Sarjapur Road, and Harlur Road areas. MAPSAS is involved in the maintenance of Kaikondrahalli Kere, Kasavanahalli Lake, and Lower Ambalipura Lake. It is also involved in the revival of Soul Kere, Dodda Ambalipura Kere, Haralur Lake, and Iblur Lake. Similarly, Jalaposhan was set up by the people living around Jakkur Lake. It tracks sewage inflow, and water quality and works on securing institutional interventions.

Rainbow Drive: a citizen-led initiative

Of all the water conservation efforts in Bengaluru, perhaps the most reported one has been the story of Rainbow Drive, an upmarket residential complex in Sarjapur. For a locality that faces both intense flooding and water scarcity, the efforts by the residents of the complex to tackle the latter are commendable even as collective floodwater management efforts in and around the community are ongoing.
The decade-long conservation campaign led by the residents at Rainbow Drive saw water consumption at the household level reduce with the construction of recharge wells and the implementation of an efficient wastewater management system.

For a residential complex entirely dependent on borewells, some of the residents suspected that such a situation could lead to unsustainable outcomes, especially since private borewells were also being drilled in addition to the ones commonly owned. Seeking support from a committed residents' welfare association, inputs from experts in the field, and strong regulations, were some of the first major steps taken by Rainbow Drive.

The next thing the residents did was to install meters to monitor water consumption which indicated high water consumption in individual households and found that the cost of sourcing water was higher than the cost of consuming it. This brought in a sense of accountability and subsequently a sense of ownership of the aquifer that the community drew from.

The residents evolved revised slabs of price for water, whereby the needless exploitation of water was sought to be disincentivized. To address the issue of borewells running dry, recharge wells were sunk so that the locality's aquifers got progressively replenished. The complex came to have one of the highest concentrations of recharge wells.

The recharge wells which collect rainwater and direct them deeper into the earth also helped keep a check on flooding. Over time, thanks to the new metering system and revised tariffs, the household consumption of water dropped to sustainable levels. The recharge wells assisted in improving groundwater availability.

The story of Rainbow Drive is a model for water conservation in Bengaluru. The story shows how simple architecture and general awareness around water conservation can bring together a bunch of residents and achieve sustainable water use.

Reviving water ecosystems

Over the years, efforts of Wipro, Biome Environmental Trust and ACWADAM, and engagements with urban communities, institutions, well-diggers, wells, and lakes have led to several revival initiatives of both water resources and those that help conserve them.

Participatory Aquifer Mapping (PAQM) Program's work in south-east Bengaluru with communities has helped garner information about shallow aquifer pockets that feed some of the open wells in these regions.

This helped direct the action and efforts to revive some of the open wells. An indication that digging of recharge wells has helped recharge shallow aquifers, has prompted increased tapping of shallow aquifers. Communities around Sarjapur have incorporated this practice.

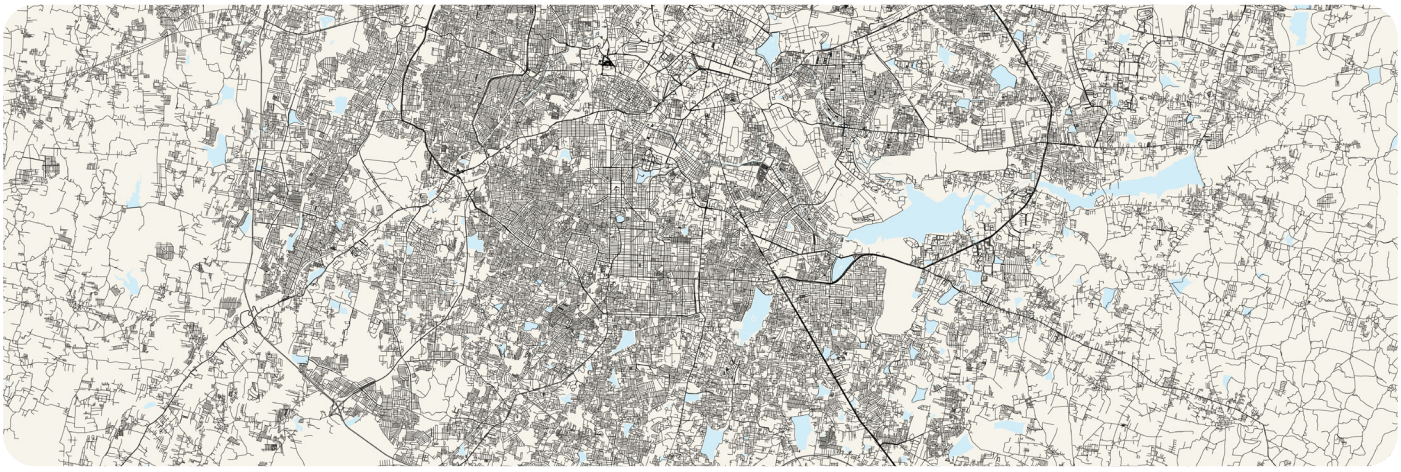
Through a process of participatory, citizen-led initiatives, the partnership has been able to identify and successfully help communities manage shallow aquifers within the limits of the Upper Ponnaiyar watershed (and its eight micro-watersheds) in southeast Bengaluru.

From helping change collective behavior towards an aquifer, supporting the installation of recharge wells, and reviving old and defunct open wells that communicate the status of a shallow aquifer in real-time, the initiative has been able to approach the problem of groundwater management from multiple angles.

A ritual initiated by a member of the well-digger community before work begins. Photo: Biome.

Interventions in societies such as Rainbow Drive, Adarsh Palm Retreat, and at local lakes such as Kaikondrahalli Lake, have resulted in multiple benefits of efficient shallow aquifer recharge, flood control, reduced dependence on external sources of water, and allowed for the revival of old open wells around the lake.

The revival of open wells and the construction of new recharge structures have also ensured that the livelihood of the members of the Mannu Waddars, a traditional community of well-diggers, has been revived and revitalized. Their role is integral to the urban imagination of groundwater management in a growing city.



Topographic map of Bengaluru. Graphic: iStock.com/lasagnaforone

An old well being rejuvenated in Devanahalli. Photo: Biome

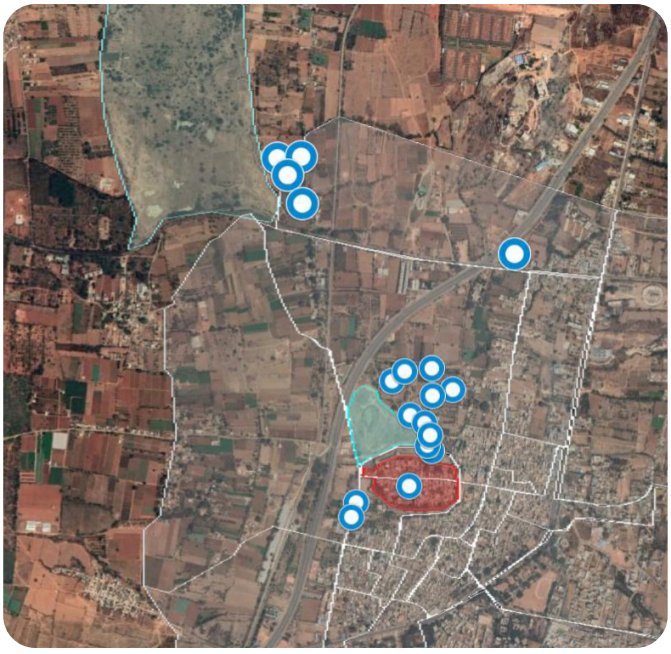
Devanahalli: a case study

Devanahalli, a town within the Bengaluru district, has a history dating back several centuries. Of late, it is more popularly known as the home to Bengaluru's Kempegowda International Airport. It is also the site for the multi-billion-dollar Devanahalli Business Park. An aerospace park and a financial city have also been proposed in this region. Devanahalli is an example of an agrarian area getting urbanized rapidly and evolving into a commercial and residential hotspot.

The resultant impact has been disruption of the groundwater table and draining of water tanks. With the exponential increase in urbanization, water use in Devanahalli has risen substantially. The area, which is still largely dependent on groundwater, has had to take measures to ensure continued and seamless suply of water. In Devanahalli, farming is done mainly with water from open wells and borewells.

With open wells drying up, filter borewells are fitted within these wells in some cases. Open wells do not have sufficient water throughout the year, prompting farmers to depend on deep borewells or filter borewells for irrigation needs. The scarce water situation in Devanahalli has mandated that industries use treated water as their primary source. The water requirement of Aerospace SEZ, a major commercial hub within Devanahalli, when occupied fully is estimated to be 5700 KLD (kilolitres per day), as per data from Karnataka State Pollution Control Board.

Notwithstanding the challenges faced by Devanahalli, it is one place where the interconnectedness in a groundwater ecosystem may be easily understood. Close to the Devanahalli fort is the local lake, Devanahalli Kere. To the side of this lake is a modestly big open well. Although separate structures by themselves, the water in the lake and the well are interconnected. When the lake has adequate water, the availability of water in the well is also good.



Identified open wells in Devanahalli.
Photo: Biome

Today, the water from this well, and from a couple of filter borewells nearby, is drawn, treated and supplied to the town nearby, thus reducing the town's dependence on external and deep aquifer sources.

In 2024, we are supporting Biome to rejuvenate another stepwell at a larger lake nearby called Doddakere, upstream of Sihineerkere and add a few more filter borewells. Water from here will then be treated and added to the existing supply, just like the waters from Sihineerkere. The plan is to increase the town dependence on a much more sustainable source of water going forward. An interpretation centre called the Devanahalli Living Lab will be created at Sihineerkere which hopes to educate other local towns to take up such innovative solutions in the future.

Places like Devanahalli work as an example to showcase how underappreciated the role of shallow aquifers is. These more easily accessed groundwater sources have been increasingly ignored in the craze for borewells. Some feel that restoring the right level of importance to shallow aquifers and their recharge may solve Bengaluru's water crisis to a great extent, even as water deeper down in the Earth is allowed to rejuvenate thereby.

Devanahalli watershed – Participatory Groundwater Management (PGWM) Program

- A mix of agrarian, industrial and residential areas spread across 48 km^2 or around 11,861 acres
- Current daily water demand of 16.2 million liters (MLD)
- Future daily water demand of 67.8 million liters (MLD)
- Ranges across the Devanahalli Town Municipal Corporation, Anneshwara, and Bettakote Panchayats
- Large-scale residential developments with existing Bengaluru International Airport and the Aerospace SEZ
- Depth of borewells in these regions ranges from 800 feet to 1,200 feet, with high levels of TDS and salinity
- Best practices proposed for each of the stakeholders to implement

What is a filter borewell?

Compared to a regular borewell, filter borewells are small borewells that do not go very deep. They are dug to a maximum of 200 feet and only tap into the shallow aquifer.

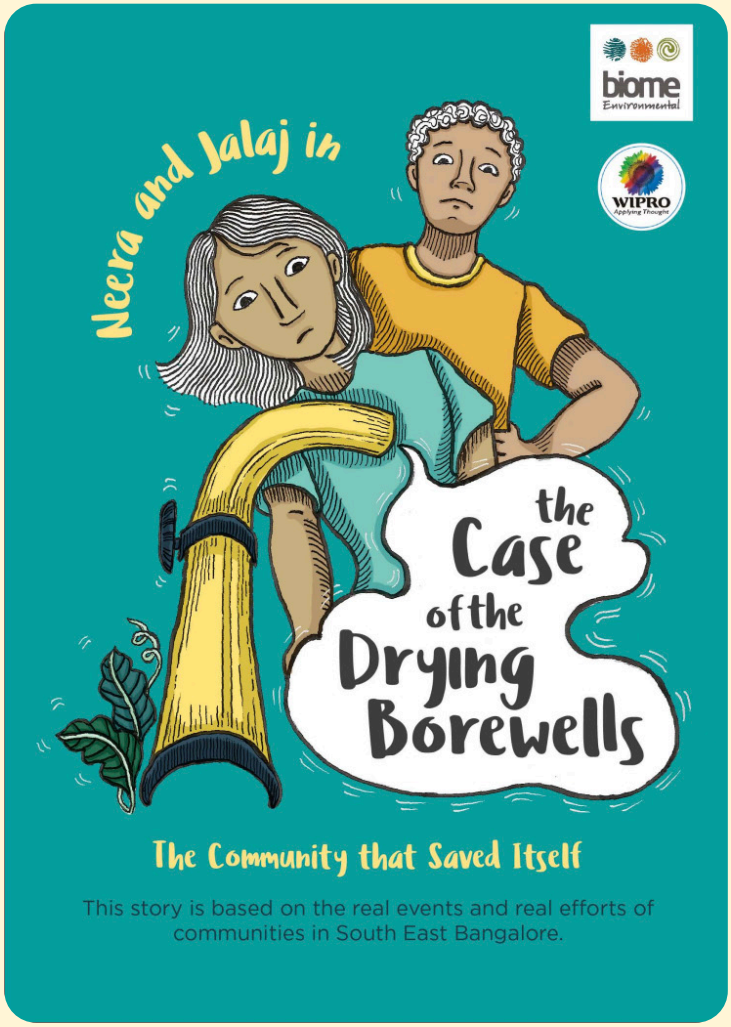
They have a slotted casing to allow the phreatic, unconfined aquifer water, which is annually replenished by rains, to come into them.

Small-capacity pumps are used to draw this water. Filter borewells draw less water, but are less costly and can be easily recharged.

Online resources

www.urbanwaters.in

The urban waters website is a great resource for communities, government functionaries, corporates and children to learn more about the ideas and practices related to integrated urban water management, aquifers and their recharge, and all the projects mentioned in this report. Information is organized city-wise and more information is being added each month.



Written and illustrated by Ladyfingers Co.

Neera and Jalaj, an illustrated storybook for children produced by Biome Environmental Trust which is available on urbanwaters.in

Pune's efforts for better water management

Pune city is drained by Mula and Mutha rivers and their tributaries. Mulshi dam is the major dam on Mula river, while the Temghar and Khadakwasala dams have been built on the Mutha river. Khadakwasla dam, which was constructed in 1880, is one of the main sources of water for Pune city and its suburbs. Khadakwasla dam is fed by two upstream dams, Panshet and Varasgaon.

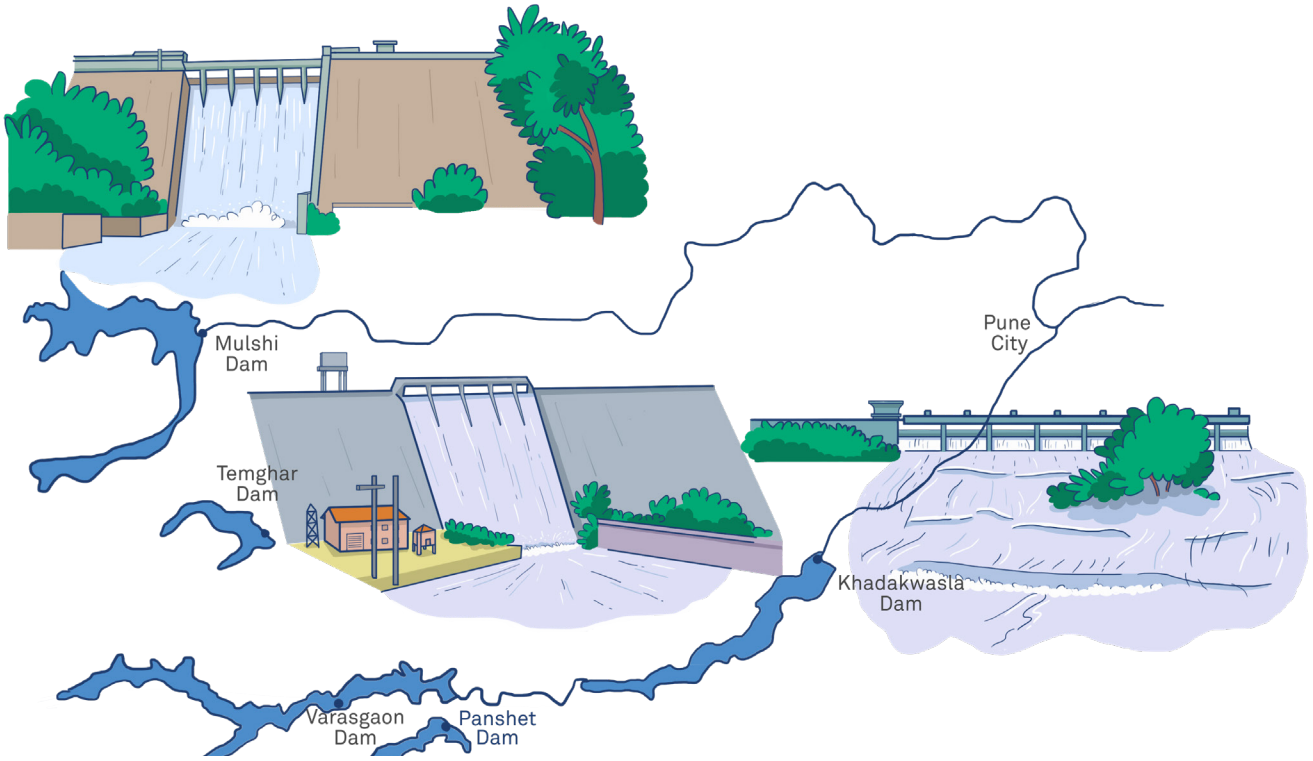
A jackwell, with a pumphouse having the capacity to lift 125 million liters of water per day, is constructed at Khadakwasla, it pumps water to three pumphouses located at Parvati, Padmavati, and cantonment area, from where water gets distributed to the entire Pune city. As per estimates done by various agencies, Pune's net water requirement has crossed over 18 TMC. In addition to this, there are many lakes located in Pune city. Some of these are Katraj Lake, Pashan Lake, Mastani Talav, etc.

It may seem surprising as to why a study of groundwater resources has been undertaken within the Pune district and that too in the core city of Pune, where there are several rivers draining the district and the city and having many large surface water structures on them.

First, urban water management approaches in India have often underplayed the important component of groundwater resources at the expense of focusing on surface water hydrology, with an even greater focus on developing surface water resources and the water delivery system through 'mega projects.'

Despite many surface-water structures, large parts of the district and the city of Pune, which are underlain by basalt rocks of the Deccan Valley Plateau, are dependent on groundwater resources. Most of the habitations, including settlements in the core city, have dugwells with large diameters and/or borewells, the surface water provisions notwithstanding.

As per ACWADAM's latest estimates, nearly five to six TMC of groundwater is extracted annually in Pune city. Fifty seven small and large watersheds constitute the catchments within Pune city. The city's aquifer system is made up of eight main aquifers.

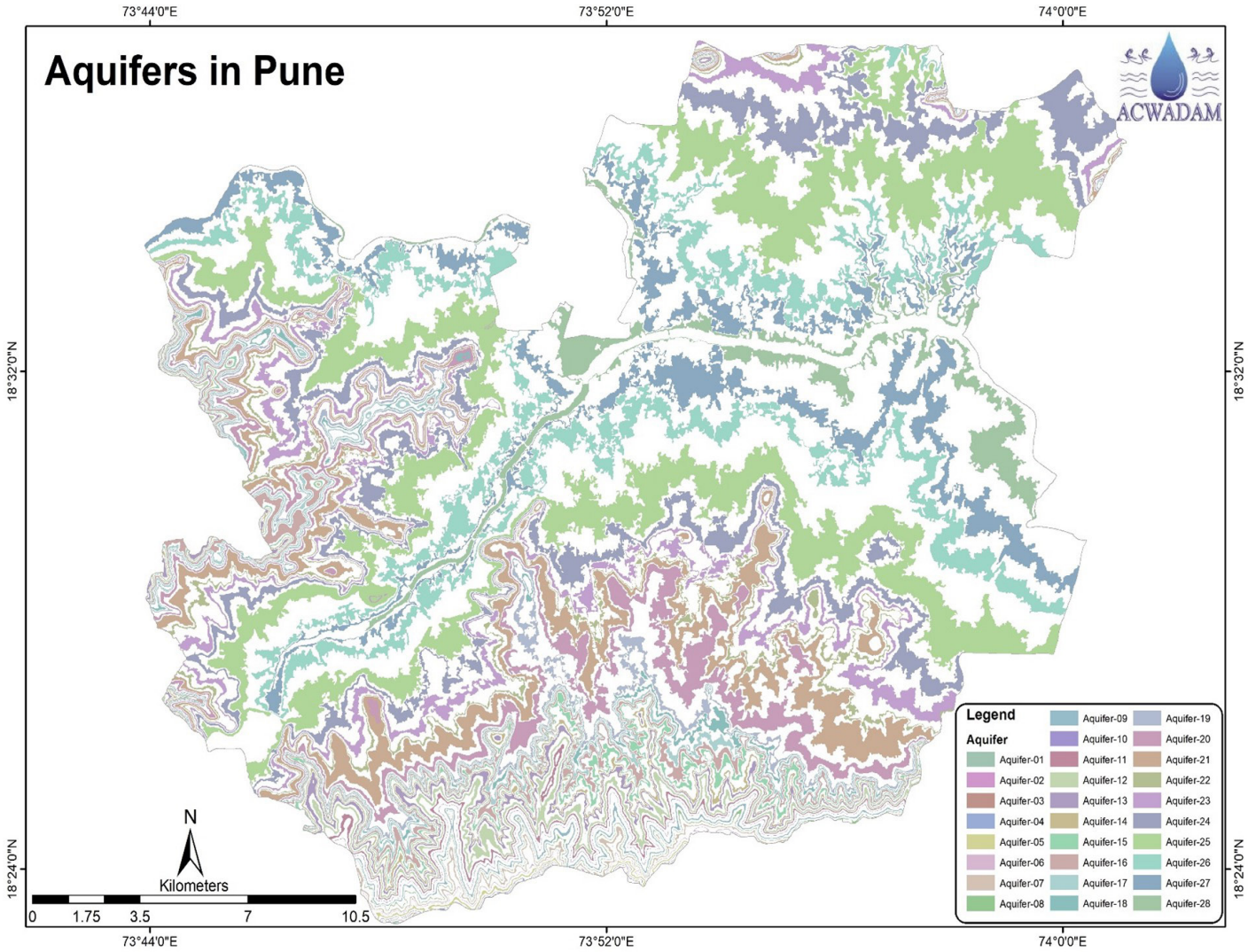


At present, most parts of the city face acute water scarcity, especially during the summer months. During these deficit periods, areas that receive less water than their requirement often rely on dug wells and bore wells. This has resulted in an increased and unsustainable dependence on groundwater in the city.

On the other hand, areas that have regular municipal water supply have seen a reduced dependency on groundwater, and hence many wells have either been demolished or are in very bad shape in the city under the guise of urbanization.

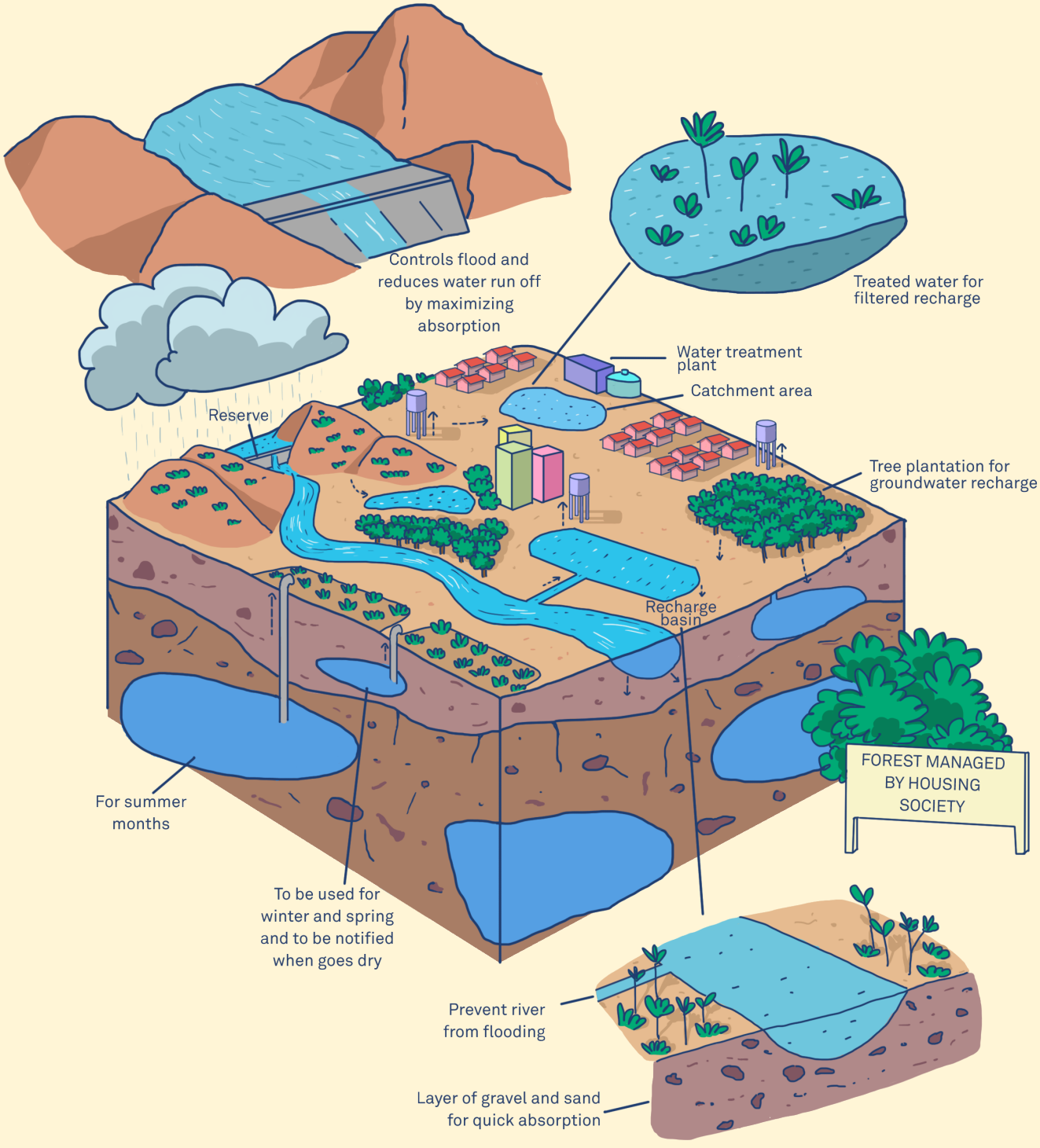
In the case of Pune city, groundwater has remained as a silent supplement to Pune's civic water supplies for many years.

As the city has grown, urbanization has eaten away at most of Pune's groundwater sources – the shallow unconfined aquifers. Therefore, it is important to gain knowledge and information about this hidden source to rejuvenate this source and to ensure future water security and sustainability.



Pune city's aquifer systems.
Graphic: ACWADAM

Integrated surface and groundwater management



Challenges of groundwater and surface water contamination in Pune and the need for integrated urban water management

Contaminated groundwater, possibly due to leakages from sewage lines, is one of the important factors pushing Punekars to close the groundwater sources such as dug wells and borewells or refrain from using the water from these sources. Groundwater contamination has been detected in several groundwater sources such as springs and dugwells across the city. Surface water sources such as rivers and streams are not behind, in terms of bacteriological contamination. Integrated urban water management is the key to address the thirst of increasingly urbanizing Pune wherein surface water and groundwater should be placed into one paradigm.

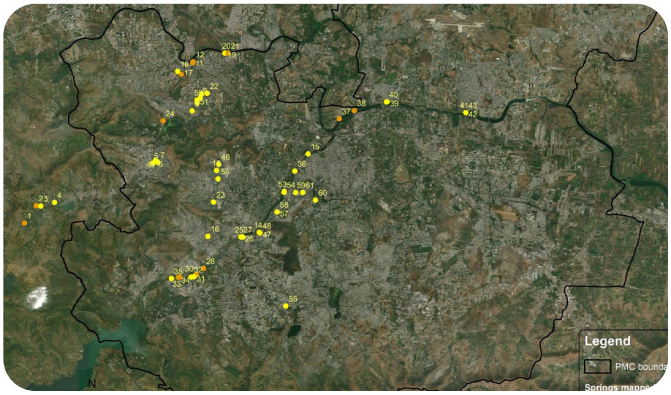
An abandoned dug-well in Sahakahar Nagar, Pune. Municipal supply has reduced people's dependency on open-dug wells in the city in recent years. Photo: ACWADAM.

Exploring Pune's hidden springs

The lion's share of the world's groundwater ends up in streams and springs. A natural discharge area for groundwater is physically evident in the form of a spring or even wetlands. However, the presence and usage of spring water in urban centers such as Pune is largely ignored, perhaps being hidden under the more 'visible' water, i.e., rivers, ponds, lakes and wells. The amount of water that flows from springs depends on multiple natural and anthropogenic factors. Human activities can influence the volume of water that discharges from a spring. For example, high levels of withdrawals from an aquifer can cause water levels in that system to drop, which in turn results in decreased flow from an associated spring. The use of wells and borewells to supplement civic supplies is common in cities. However, the use of spring water as part of Pune's water supply has largely gone unnoticed, whether as actual, direct usage, or as contribution to base flows in its river systems. This is primarily because spring water has been outside the public discourse on water in India. ACWADAM's study also brings out the fact that Punekars are not averse to using spring water to fulfill the gap between municipal water supply and the growing demand across the city.

ACWADAM started its spring survey in August 2018. Upon request from the residents of the Bhugaon area, ACWADAM mapped around seven springs in the Bhugaon- Bhukum region. Subsequently, the Pune spring inventory has yielded data on 61 springs so far. While doing so, spring discharge and in-situ water quality of various springs were recorded, wherever it was feasible. Bacteriological contamination was also recorded for many of these springs.

The study has shed light on springs previously unknown to the residents of Pune. For example, it was found that springs in the Mutha river stretch constitute a relatively important freshwater discharge to the river. At these points, a somewhat unique ecosystem in the form of an in-channel groundwater discharge zone rich in biodiversity was found.



Springs mapped in the city of Pune. Photo: ACWADAM.

Out of the 61 springs that have been mapped, 45 are perennial springs and 16 are seasonal. Twenty-three springs were tested for biological contamination, with nineteen springs testing positive for biological contamination, a real cause for concern. The map in the previous page shows the locations of some of these springs in the city of Pune.

A perennial spring in the Baner area of Pune. ACWADAM collects samples regularly from such springs to understand the impact they can have on ecology and public health. Photo: ACWADAM.

Advocating sustainable groundwater management

Although awareness of the groundwater ecosystem is still far short of what is needed, the extraction of groundwater has increased substantially due to the proliferation of borewells. It raises the question: how do we help replenish the resources we exploit?

Bhujal Abhayan Trust is another Wipro Foundation partner in Pune working in the area of groundwater recharge. The organization has worked in the city in improving water availability and water quality, first as a group of like-minded individuals and later formalized into a trust. Bhujal Abhiyan's focus in the area of groundwater conservation is primarily on creating awareness and advocacy. Their work has been in conjunction with individual groups, housing societies, industries, municipal bodies, gram panchayats, government departments, and other NGOs.

The organization conceptualizes groundwater recharge projects, carries out scientific studies, and follows up with the authorities for the implementation of these projects. Identifying recharge zones and surface water sites, and then seeking to restore them for better groundwater management are also a part of the organization's scope of work.

The Urban Community Groundwater Recharge Project at Baner, Pashan and Balewadi areas of Pune was led by Bhujal Abhiyan along with citizen groups and other NGOs. Under this project, nearly 100 residential societies implemented groundwater recharge structures. These recharge filtration pits with borewell shafts, help in improving groundwater reserves.

Jal Sanjeevan is another participative urban groundwater recharge project at Tarawadi Vasti, Mohammedwadi, Pune. It is an initiative of Pune Municipal Corporation (PMC), Bhujal Abhiyan, and ACWADAM.

Protecting and restoring natural recharge zones

Groundwater recharge or deep drainage or deep percolation is the hydrological process whereby water moves downward from the surface to the aquifers. Recharge is the primary method through which water enters an aquifer. It typically occurs in the vadose zone, located below plant roots. Recharge occurs both naturally (via the water cycle) and through human interventions (artificial groundwater recharge) wherein rainwater and reclaimed water are routed to the subsurface.

Managed Aquifer Recharge (MAR) or groundwater replenishment entails the purposeful recharge of water to aquifers. The MAR strategy for Pune must involve three components, a study by ACWADAM showed. These are the protection and restoration of existing natural recharge zones; alignment of public recharge systems to recharge zones, and integration

of strategic point source recharge with rainwater harvesting. In Pune, protecting the recharge zones would entail protecting catchments of three main watershed clusters – Kothrud-Vetal hill-Chaturshringi-Pashan-Bavdhan range; Vishrantwadi-Viman Nagar highland zone; and Dhankawadi-Yewalewadi-Katraj ranges.
These are part of the recharge zones for the main aquifer system in Pune. They are the catchment areas for the main watersheds that drain through the city as well.

The next step is to develop a groundwater management protocol for the city. The mapping of aquifers in Pune began with a seven-step approach. This aligns with the central government's aquifer mapping plan. Five major aquifer recharge areas for Pune are covered by a variety of land-cover and land-use elements. Nearly half the area is covered by multi-storeyed apartment blocks. The other half is a mixed set of open plots, parks, gardens, private residences, commercial infrastructure, institutions, and government offices. MAR can be taken up at institutions and government offices.

Pune Municipal Corporation has agreed to set up a groundwater cell and a few advisory panels to help it to function effectively. This institutionalization of groundwater governance is probably the first of its kind in India. The processes of groundwater management and governance entail three phases: mapping of groundwater sources; groundwater management; and governance.

Preserving and and protecting rivers

Like the interventions in the Dakshina Pinakini River system in Bengaluru, Jeevitnadi in Pune is focusing on preserving and protecting the Mula-Mutha river, which has contributed to the city's culture, ecological balance, and growth. The institution, founded by the late ecologist, economist and ornithologist Prakash Gole, conducts courses on sustainable management of natural resources and nature conservation.

Formed by the confluence of the Mula and Mutha rivers, the Mula-Mutha river system has been a silent witness to Pune's growth. It has been a thriving riverine ecosystem rich in biodiversity.

However, it has also been impacted by rapid urbanization. The river flows right in the center of the city. The Mula-Mutha River joins the Bhima, which later joins the Krishna River and empties into the Bay of Bengal.

Of particular interest to Jeevitnadi was that few organizations around were studying rivers in urban India. Recognizing a niche, the group took up the Mula-Mutha river as a topic of study. Back in the 1980s, Gole's efforts to study a stretch of the river and the anticipation of a riverfront activity resulted in a report with recommendations submitted to the municipal authorities which unfortunately went unaddressed.

Years later, Jeevitnadi's study in the same stretches revealed that the growth of the city had been such that even access to the river had become difficult. It was also polluted, and in the case of the Mutha river, channelized. With the expansion of the city, the impacts of urbanization on the river had also intensified.

Dada Gujar High School Percolation Pond, Mohammadwadi. Photo: ACWADAM.

Factoring in all these new realities, it was decided to map afresh relevant sections of the river, to document the extent and intensity of human impact, biodiversity, and the scope for conservation, protection and restoration of the river. This was the context that birthed Jeevitnadi.

Today its work is carried on by teams of volunteers backed by subject experts like entomologists, ornithologists and botanists. The agency's approach is participative. It invites citizens for river walks and nature walks. Those becoming interested thereafter, and feeling motivated to do something for the river, are encouraged to adopt stretches of the river. Wipro Foundation helps Jeevitnadi with the documentation work. According to Shailaja Deshpande of Jeevitnadi, even as the organization works in the stretches of the Mula-Mutha river, it is also documenting the processes of intervention.

Jeevitnadi's unique contribution to our collective understanding of urban rivers involves the connections it has made between groundwater and the rivers of Pune. Groundwater occurs in aquifers which receive water through recharge from the surface of the earth.

Springs and seeps are locations of natural groundwater discharge. While we know that portions of streams and rivers may also act as avenues of groundwater recharge, the reverse is also true.

Through Jeevitnadi's work in Pune, our understanding of how city aquifers discharge groundwater into the Mula-Mutha river, mostly where the water table intersects the river channel has improved considerably. Jeevitnadi has been able to locate areas where springs meet the river and create regions rich in biodiversity. These places are worthy of special attention for conservation.

The connections also shed light on how river conservation starts not just at its banks, but at the level of a springshed as well.

Aerial view of Mulshi Lake, Pune. Photo: iStock.com/DineshHukmani

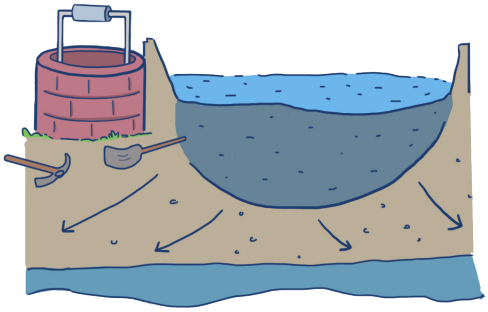
Timeline of water initiatives in Pune

2019

A strategic hydrological appraisal report

- In collaboration with Bhujal Abhiyan and Centre for Environment and Education (CEE), ACWADAM came out with a Strategic Hydrogeological Appraisal of Pune city's aquifers. A comprehensive application of the practice of Managed Aquifer Recharge (MAR) in the city was produced.

2020-Ongoing



Formal engagement with ACWADAM

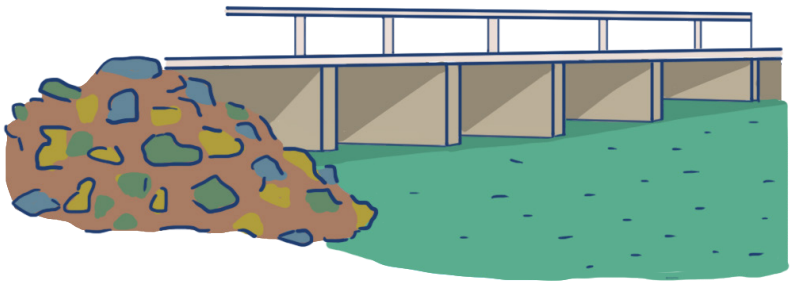
- ACWADAM began its urban groundwater management and governance project in Pune city to establish a monitoring network of confined and unconfined aquifers, review and preparation of maps, systematic mapping of springs in the city, and awareness building within citizens.

2020

Formal engagement with Bhujal Abhiyan

- Began supporting a group of committed individuals engaged in training and capacity building of communities, municipal corporations, and educational institutions.

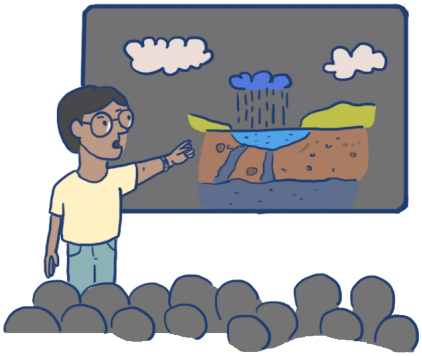
2020-Ongoing



Advocacy with the Ministry of Home and Urban Affairs (MoHUA) and Additional Commissioner, Pune Municipal Corporation (PMC)

- In continuation of the MAR strategy for Pune, a joint project between the MoHUA and PMC 5 dugwells and percolation tanks in Pune have been identified and work has begun.

2021



KT Weir revival at Mohammedwadi

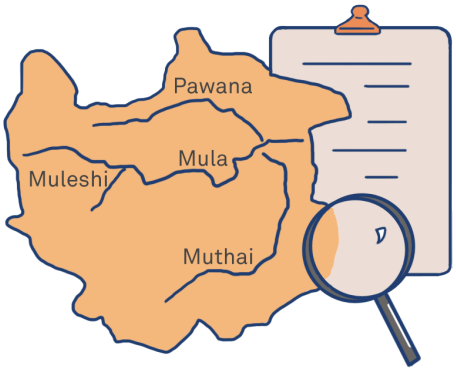
- Revival of British-era KT-weir in Mohammadwadi and removing garbage and other waste from the stream was started by ACWADAM, Bhujal Abhiyan, and the PMC.

2021-Ongoing

Sampling of Pune's groundwater by ACWADAM

- Water samples from strategically selected water sources including dugwells, springs, and surface water sources covering the entire Pune city have been collected and detailed water quality testing has been done by ACWADAM.

2021-Ongoing



Formal engagement with Jeevitnadi

- A rapid ecological assessment of the Mula, Pawana, and Mula-Mutha river systems in the urban limits of Pune city was started.

2022

Pune groundwater cell

- At a multi-stakeholder workshop on Pune's groundwater by the coalition of organizations working on groundwater, rivers and springs in Pune, the Additional Municipal Commissioner (E), PMC, declared that a groundwater cell will be established in the city.

Capacity building for Chennai's water sustainability organizations

We have joined hands with the Care Earth Trust (CET) in Chennai, which functions as our Water Secretariat. CET provides scientific services in the areas of biodiversity and wetland conservation. The organization also provides need-based mentoring. It has extensive experience in capacity building and collaborative engagement with multiple stakeholders including civil society, government and academia.

Our engagement with CET began in 2021 with a grant towards the formation of a water secretariat, which helped us ideate, conceptualize and develop a grants program on urban waters in Chennai and its suburbs.

The secretariat identifies grantees through a rigorous process of screening proposals. Currently we support six (6) organizations committed to implementing on-ground community initiatives in the areas of wetland management, groundwater recharge, flood mitigation, in-situ wastewater treatment, and wetland literacy.

In our first call in the year 2021, we selected three projects. These have worked on lake rejuvenation, flooding mitigation through runoff recharge and addressing water quality through wastewater treatment along the banks of the Buckingham canal.

More recently, three more projects have been selected that aim to promote community gardening and allied initiatives through active citizen engagement, pilot a deep aquifer recharge to prevent urban flooding and introduce committed youth groups to the impacts of climate and development in North Chennai by conducting toxic tours.

In 2023, we conducted the third round of the Urban Waters boot camp. It introduced organizations in Chennai to issues around urban water systems through a series of online lectures. The topics that were covered ranged from understanding wetland hydrology, ecology and management, reuse and recycling of water, to basics of urban hydrology.

Our partner in the city of Hyderabad is the Hyderabad Urban Lab Foundation (HULF). The organization is an interdisciplinary research and action initiative based in Hyderabad. It carries out a series of action research and community work projects in the city.

Chennai city. Photo: iStock.com/muneesmariappan

Improving water access in Hyderabad

We began our collaboration with a roundtable on the theme of "Building perspectives on water and the metropolis" and a one-day mela in September 2019. These helped the participating organizations in building a preliminary understanding of the diversity of perspectives on water in metropolitan regions of India.

Subsequently, in 2020 we built a more ambitious partnership to generate knowledge of the water pathways in the city and also to implement specific local interventions. This led us to support a series of knowledge production projects titled "Water Stories of Hyderabad", along with micro-level design interventions, which began in September 2020 and ended in March 2022. These were particularly useful to build networks in the city to develop useful mechanisms for producing knowledge and to intervene in particular neighborhoods.

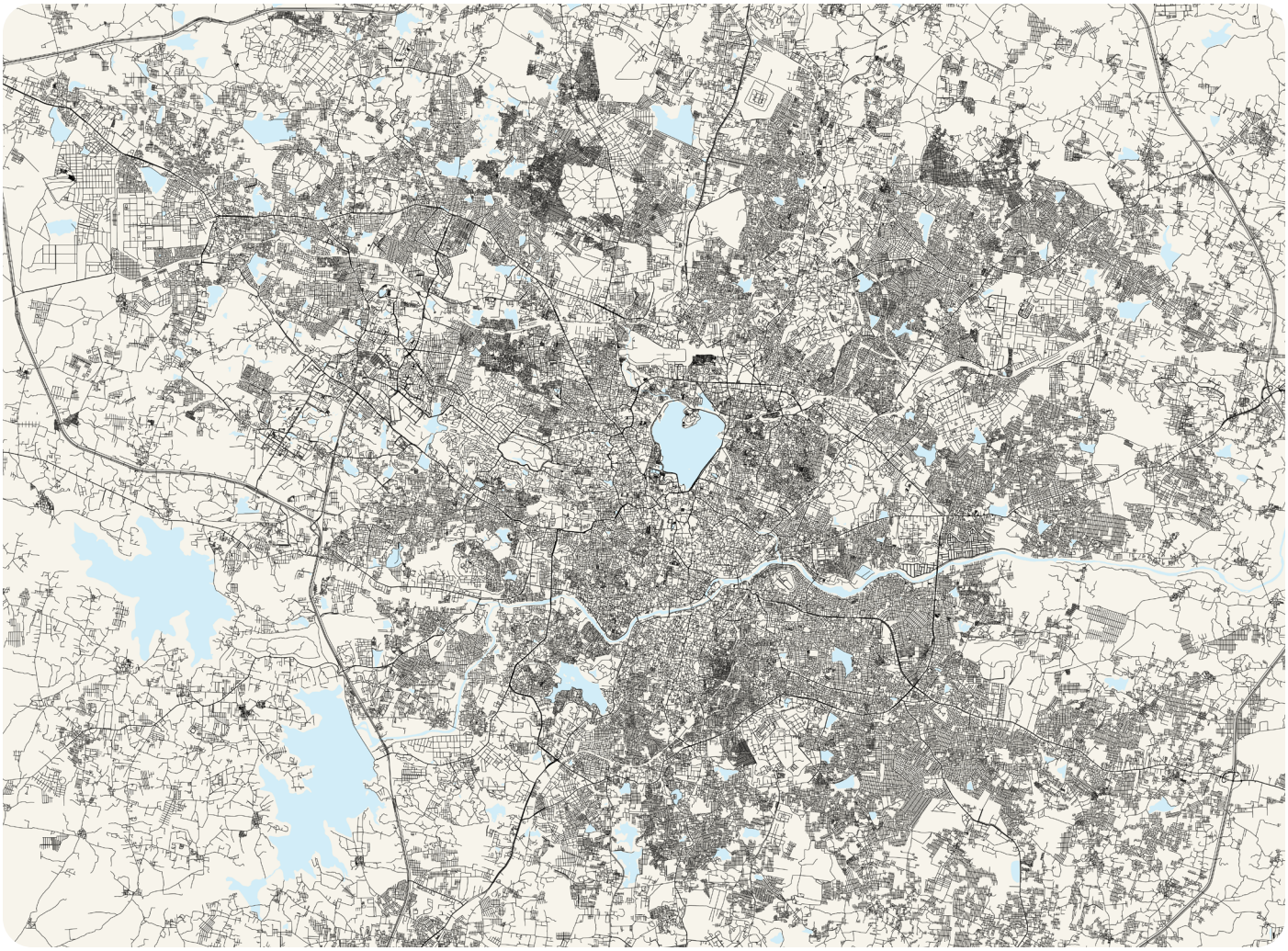
There were a total of eight submissions. Out of these, we selected and mentored the Jalam team through the next few months to develop the physical intervention in Mahendra Hills. The selected team - Team Jalam, was a group of architecture students from Aurora Design Institute. They transformed a steep slope in Hill Top Colony into a flight of staircases for ease of navigation. Then they built a channel for the network of pipelines and connected it to a common storage area so water runoff could be stored and used for plants.

Finally, the team painted the adjacent walls of the staircase. The project has now become a model for how students of professional courses, colleges, non-profit organizations, and local communities can get together to solve tough real-life problems through design thinking.

Going forward, we plan to support more such interventions in Hyderabad, learning from our experience of working with the Jalam Team. Wipro's and HULF's renewed commitment will see more projects launched in the future.

These will take material and social changes in a community hand-in-hand. These will aim to create healthier spaces for residents. The approach will involve multiple stakeholders in the decision-making process, to directly impact their everyday lives.

Hussain Sagar lake, Hyderabad. Photo: iStock.com/architectureandmonumentsphotography



Topographic map of Hyderabad. Graphic: iStock.com/lasagnaforone

The Hill Top colony project by the Jalam team.

S Vishwanath from Biome engaging with the participants during a field trip. Photo: Biome

Reaching the people: transforming the message into a movement

Two important challenges stand out in the groundwater story. The first relates to how India's urban sprawl hides the increasing dependence on groundwater, despite a proliferation of its use through borewells. The second is how cities are increasingly looking to draw water from sources farther and farther away. The solutions that can tie these two problems together must involve an endeavour to better understand the behavior of aquifers in cities and the actions we can undertake to mainstream sustainable groundwater management in processes related to natural resources planning in urban areas.

A good starting point is to look for ways to engage with communities and take them along on the journey to understand water better. On the walls of the Cubbon Park metro station in Bengaluru is a unique mural that tells the story of the city's relationship with water. Its narrative is told in mostly earthy shades, particularly varying tones of mud brown. The mural uses the mud from the park to create the paints to tell a larger urban story, including that of the region's traditional well-diggers. It is part of Art in Transit, a project by students and faculty of Shrishti Manipal Institute of Art, Design & Technology. The project seeks to stimulate dialogues between people and the urban spaces they inhabit.

Cubbon park itself has its own water stories. It hosts many recharge wells. Tucked away in a corner is an open well. Close to the well, there is a small shrine that is wound up with a festival linked to water. Just across the road, the Kanteerava Stadium was built on the site of a waterbody. It all sums up a predicament, which is a classic urban one. Our relationship with water has now been transformed. However, nature's resource-replenishing network still survives and is present beneath our feet, despite the pressures of human impact.

Very different from Art in Transit, and rooted in the exigencies of daily existence, is the work at the government school in Sonnappanahalli. Apart from the work itself, it would seem a potential primer to teach the water ecosystem to younger generations.

In late April 2022, people were at work digging a second recharge well on the school's premises. The school harvests rainwater, which is stored in an underground tank. The excess water from the sump, some of the water harvested from the school's roof, and rainwater directly incident on the surrounding soil, flow into the recharge wells, which feed the shallow aquifer.

In the clutch of residences near the school there is an open well. It has been revived and is now in working order. This completes the picture of that micro water ecosystem. Thanks to the agencies doing the work, and a teacher who is passionately committed to the project, the students have shown curiosity about how the system works and even pose their own questions.

Across the road from the school, in the distance, is an old quarry with a deep pond. That water isn't used by the local community. Some of the students have asked why it should go waste, and why it shouldn't be used. Can schools and students, indeed a whole young generation growing up out there, serve as drivers of change in water habits, a shift that Bengaluru (and other Indian cities) sorely need?

Water literacy program led by Biome in a government school in Bengaluru. Photo: Biome.

Wipro's urban water journey: looking ahead

The journey of Wipro's urban water initiatives, in the last decade, has been one of learning and exploration. It has involved attempts to understand the sector and its problems and challenges, the actors, potential solutions, and new approaches to problem solving.

From our experience of the last few years, it is evident that there are some white spaces in the urban water sector that need urgent attention. These relate to the management of urban water resources, involving both surface water and groundwater. There has been little attention given to conserving and augmenting our existing water resources. The emphasis of the government has hitherto been on water supply through large water transfer schemes and wastewater management through sewerage networks. However, we are happy to note that recent policies, as reflected in AMRUT 2.0 and Swachh Bharat Mission 2.0, have started recognizing this lacuna. They have embarked on a path of Integrated Urban Water Management, which includes rejuvenation and restoration of depleting and polluted urban water resources.

At Wipro, we have gained valuable experience and insights on both surface and groundwater management. We have also developed a good network of actors in this sector through our work in partnership with specific organizations and through the Urban Waters Forum. We intend to continue with our focus on urban water resources, both surface water and groundwater. We plan to take these initiatives forward by continuing to work on real world pilot projects that can further inform larger government initiatives and programs. We will continue to generate valuable knowledge in this area and disseminate the same to communities, CBOs, NGOs, private sector and the government.

In this journey, we have also learnt that communities are eager to engage. Given sufficient stewardship and support, CBOs, NGOs and community members are eager to contribute.

We believe that CSR can play a useful role in mobilizing community involvement and action to solve local problem in the urban water sector. Community initiatives and governmental interventions can go hand in hand and reinforce each other. There would be greater sustainability of initiatives at the local level, when there is greater community participation and ownership.

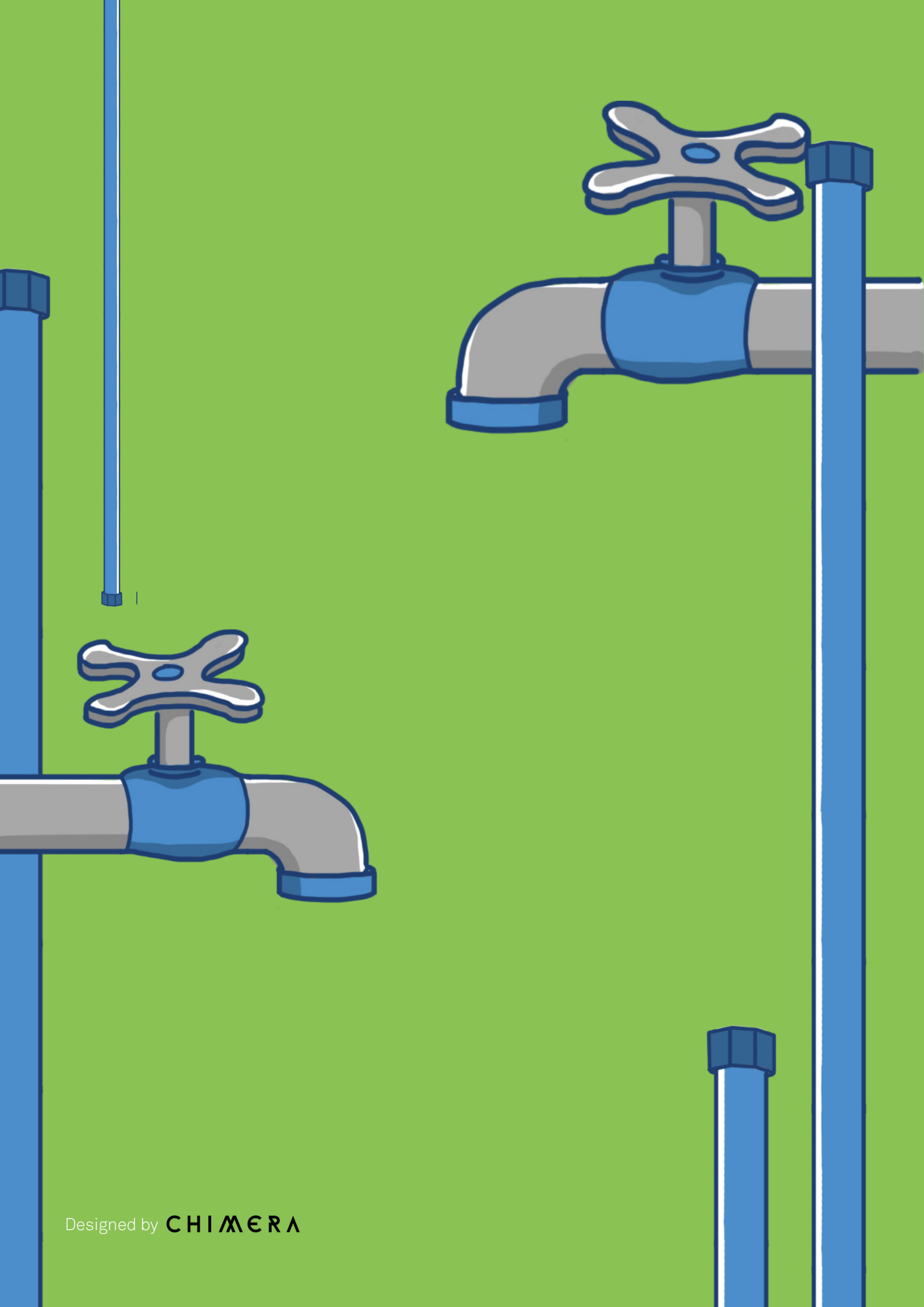
In the next decade, we expect our efforts to pivot from a learning and exploration phase to a more result-oriented 'action on the ground' journey. We plan to do this by continuing to work with communities through our partners, while also supplementing and complementing governmental initiatives. We will continue to generate knowledge from on-ground projects and disseminate the same to wider networks. The goal would be to potentially inform initiatives at the level of cities, states and the nation.

In summary, community-led urban water resources management will continue to be our focus in urban water management. We will explore adjacencies in wastewater management, onsite sanitation, solid waste management and flooding, especially where vulnerable communities are benefitted.

Improving water quality from a water resources perspective, as well as from the angle of drinking water (especially in the context of the urban poor), will also be a future area of work. We will support decentralized and nature-based solutions, while also exploring hybrid solutions to urban water problems.

We will keep refining our approach and focus areas as we learn. However, one thing will not change – we, at Wipro, are committed to water.

Wipro Foundation is a public charitable trust set up for corporate citizenship and Corporate Social Responsibility (CSR) initiatives of Wipro.



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