Sanitation Capacity Building Platform

National Institute of Urban Affairs

Webinar Report

24th June 2021

Formal and Informal Sanitation Practices:
Learnings from Indian Cities

New Delhi

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Webinar Report

Formal and Informal Sanitation Practices: Learnings from Indian Cities

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CONTENT

Introduction

Sanitation Capacity Building Platform (SCBP) is an initiative of the National Institute of Urban Affairs (NIUA) for addressing urban sanitation challenges in India and it is supported by a Bill & Melinda Gates Foundation grant. It is aimed at promoting non-sewered sanitation solutions for septage and wastewater management in India.

The Platform is an organic and growing collaboration of credible national and international organisations, universities, training and resource centers, non-governmental organisations, academia, consultants and experts, and works in close collaboration with the National Faecal Sludge and Septage Management (NFSSM) Alliance.

Alongside its stated goal of building capacity of city officials and other stakeholders working in urban sanitation to ensure improved delivery of sanitation services through implementation of non-sewered sanitation including Faecal Sludge & Septage Management (FSSM), the Platform also commissions research studies under NIUA with an aim to inform its advocacy work and build evidence for key policy recommendations.

In this regard, NIUA has commissioned a field-based research study to Biome Environmental Trust and its partner organisations (People in Centre, Socio-economic Unit Foundation, Megh Pyne Abhiyan) and independent researchers across nine Indian towns and cities to understand the prevailing formal and informal sanitation practices. The purpose of the research study is to gain an understanding of on-ground end service of sanitation and document answers to questions such as what happens to the faecal sludge on emptying of a pit and to wastewater when it leaves a city, among others. The study also aims to understand how people engage with issues around sanitation, and the informal sanitation practices prevalent alongside formal practices promoted by the government. The study covers faecal sludge as well as wastewater in gaining a detailed understanding of these issues.

The key observations and preliminary learnings from this study were shared in a webinar entitled ‘Formal and Informal Sanitation Practices: Learnings from Indian Cities’ hosted by NIUA as part of the its 45th Foundation Day events. The webinar was attended by 75+ participants across different countries and was live streamed at different NIUA social media platforms. The webinar recording has been uploaded on NIUA's YouTube channel: https://youtu.be/_s213e82Nf8

The agenda of the webinar and the speaker details are provided as annexures to this report.

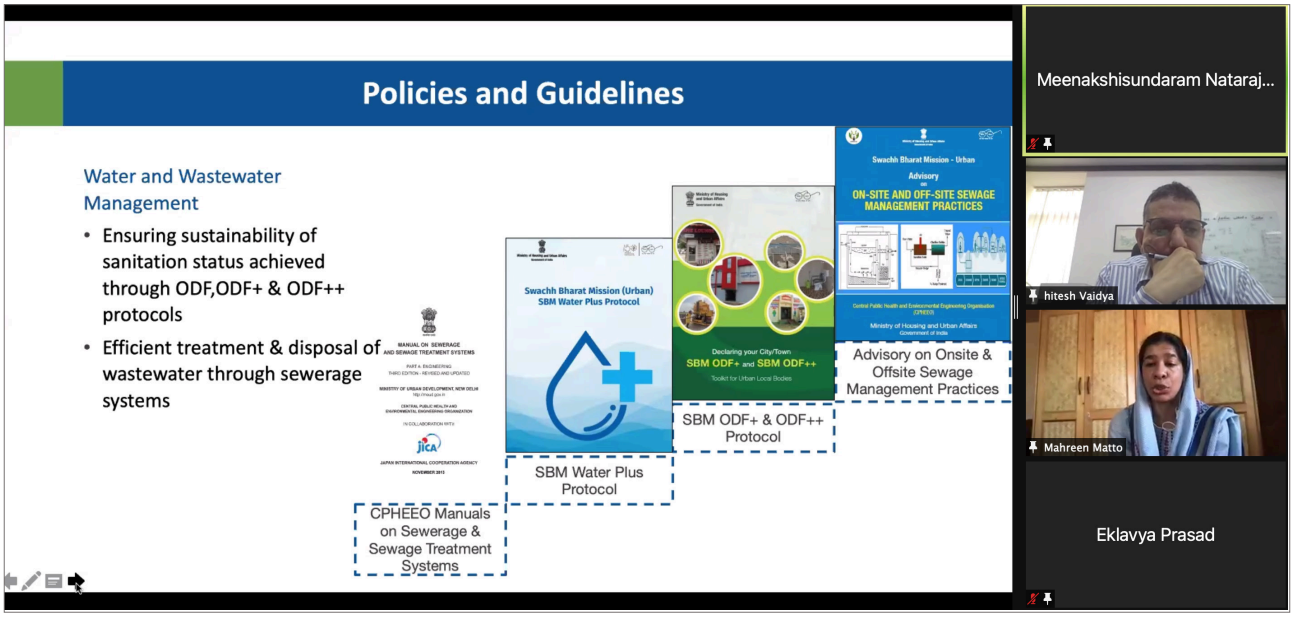
Key discussion points:

- Understand the priorities of national missions on wastewater and septage management
- Opportunities and interventions to improve wastewater and septage management at city level
- Key drivers of prevalent practices and innovative approaches in urban sanitation
- Safe reuse of wastewater and septage for water augmentation and use in other sectors

Webinar Details

1. Setting the Context

Dr. Mahreen Matto, Program Manager, SCBP, set the context of the webinar with regard to the research study commissioned by NIUA, in light of the national urban sanitation missions, namely Swachh Bharat Mission (Urban) and Jal Jeevan Mission (Urban), and the priority accorded to urban sanitation by the 15th Finance Commission. With almost 100% of the population now having access to toilets, the narrative has now shifted to transport of waste generated, its treatment across the country and ultimately it is recycled and reused to fit into the principles of circular economy. This has seen a major shift from the erstwhile focus on centralised systems, to non-sewered sanitation and decentralised systems such as faecal sludge and septage management. In this endeavour, she also briefly touched upon the role played by SCBP in advocating for decentralised solutions and supporting cities and states to move beyond ODF, since 2016. Emphasis was also laid on SCBPs action and field-based research in the area of non-sewered sanitation under which the proposed research has been initiated.



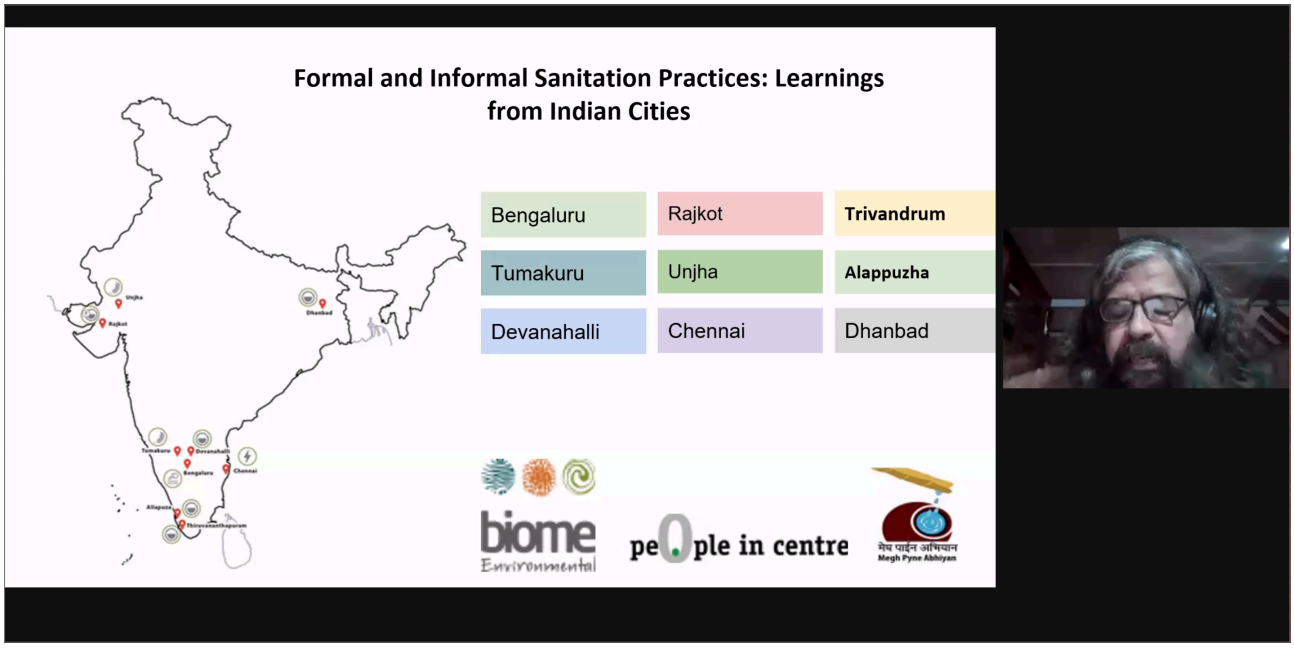
2. Keynote Address

The keynote address was delivered by Mr. Hitesh Vaidya, Director, NIUA, appreciating the timely nature of this research study in recognising how to shape and informing India's ongoing and future sanitation policies. Recognising the many and varying practices which exist on-ground, he said such research initiatives also work towards supporting the Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI), in framing appropriate guidelines and advisories for states and cities to follow. He emphasised the role of NIUA in working with cities and states for technical assistance and capacity building efforts, and in making India move towards the New Urban Agenda and fulfilling the objectives of the Sustainable Development Goals 2030.

3. Introductory Remarks

Mr. S. Vishwanath from Biome Environmental Trust shared his introductory remarks, explaining that the study's focus is on end-of-the-pipe space of sanitation, attempting to answer questions around what happens to faecal waste and wastewater generated across Indian cities. The study covers nine cities across the country, covering a wide geographic area across 5 states: Karnataka (Bengaluru, Devanahalli, Tumukuru), Kerala (Alappuzha, Thiruvananthapuram), Tamil Nadu (Chennai), Gujarat (Unjha, Rajkot) and Jharkhand (Dhanbad). The cities chosen for the study included a mix of metropolises such as Bengaluru and Chennai, as well as small towns such as Dhanbad and Unjha. Further, the chosen cities were in different climatic and hydrogeological settings.

The selected cities and towns are visible in the following screenshot from the webinar.



The broad observation from the study was that sanitation in a city is mainly affected by its typology. For example, a coastal city such as Alappuzha, Thiruvananthapuram or Chennai with a propensity for high groundwater table and heavy rainfall is distinctly different from inland towns such as Devanahalli or Unjha which are semi-arid/arid and wastewater is a prized commodity. Cities with water supply issues give more importance to wastewater treatment and view faecal sludge and wastewater as valuable commodities as opposed to cities with abundant water supply.

In the course of the webinar, the following key questions stood out for different city contexts:

- Dhanbad is completely dependent on on-site sanitation systems currently, however, the city authorities aspire to making it completely covered by a networked sewerage system. In such a case, how should the town address its interim sanitation issues, and whether faecal sludge and septage management should be taken as an interim solution?
- Bengaluru appears to have abundant water supply. In such a case, can the city become a net provider of water instead of a net consumer of water? If so, what should be the quality of treatment in such a scenario?
- Chennai currently practices recovering energy from wastewater. What does the future of wastewater treatment look like in terms of treatment, energy impacts, nutrients recovery, etc.?
- In Alappuzha (called as Venice of East), what are the challenges faced in terms of wastewater management where groundwater table is high?

4. Preliminary Observations from Cities

Mr. S. Vishwanath's introductory remarks were followed by city-specific presentations as outlined below, which detailed out the formal and informal practices prevalent in the city, city-level data on faecal sludge and wastewater generation and recommendations based on interim observations and analysis. The details of these will be presented by the team in their final research report.

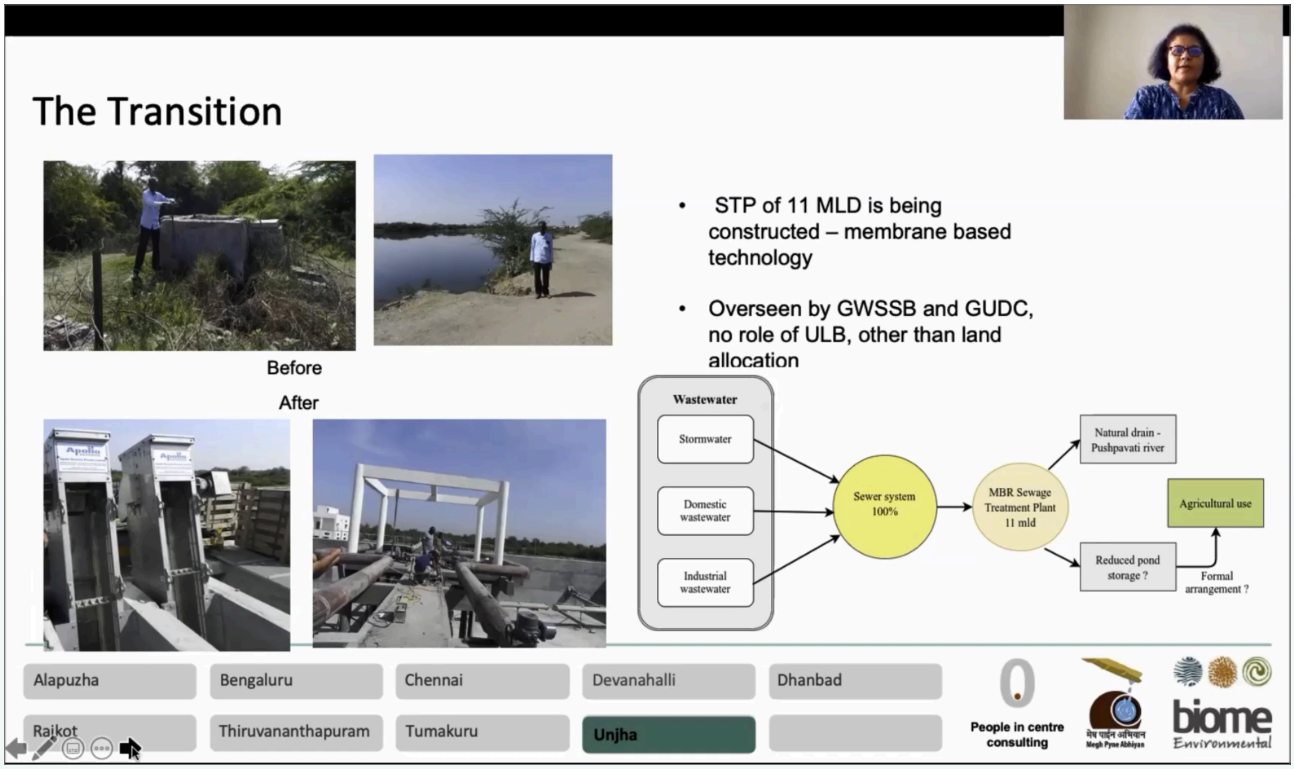
1. Unjha Nagar Palika (Gujarat) – Ms. Alka Palrecha

Unjha has arid to semi-arid zones and has over-exploited ground water with high fluoride content in it. It experiences an average 590 mm of rainfall annually. Total water supply is 9 MLD and generated wastewater is 7 MLD here.

The city treats its wastewater through a stabilization-pond based water system. Unjha has developed a Formal Wastewater Bazaar System to reuse the treated water. 95% of wastewater is collected, treated and is auctioned annually by the ULB via tendering process for past 40 years. The contractor/ private agency who procures the treated water then in-turn sells the wastewater to the local farmers. Irrigation charge is Rs. 1,000 to 1,500 per ha per watering. The funds generated by ULB through auctioning process is sufficient for desilting every three years. Various crops like tobacco, jowar, alfa alfa, wheat, bajra and castor is grown by the farmers using this treated wastewater. Bajra and wheat are mostly grown for self-consumption. No disease or health impact has been reported due to the consumption of these crops grown with wastewater.

A new MBR STP of 11 MLD capacity is being constructed by Gujarat Water Supply and Sewerage Board and GUDC. Role of the municipality is limited to land allocation. Land is allocated in the same pond where oxidation pond is located currently. It is not yet decided whether the existing system of wastewater supply to farmers will continue or not as storage of wastewater is essential for reuse and distribution.

Preliminary recommendations include continuation of existing robust institutional mechanisms in line with reuse goals post upgradation of treatment technologies, and to limit upgradation of technology to where required and not where standards are 'fit for purpose'.



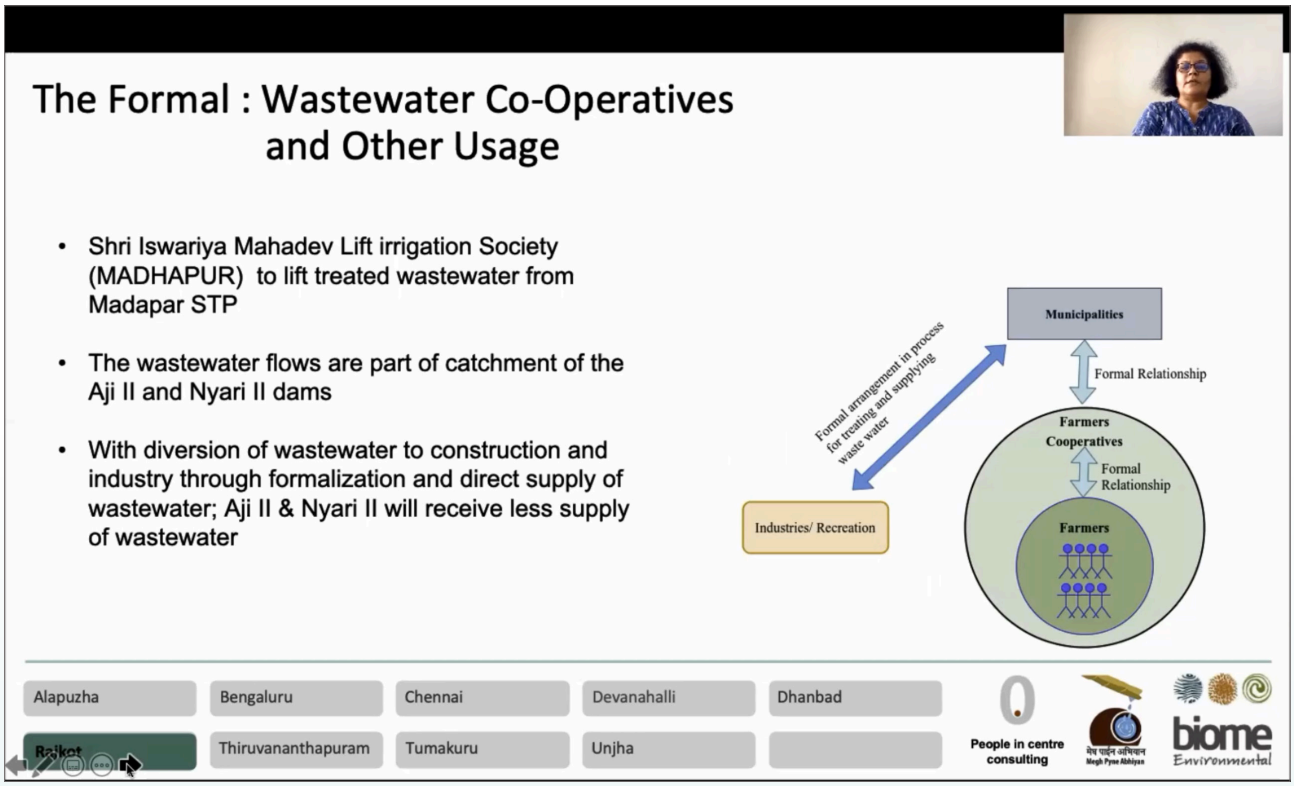
2. Rajkot Municipal Corporation (Gujarat) – Ms. Alka Palrecha

Rajkot has arid to semi-arid zones and is drought prone. It experiences 676 mm of average rainfall annually. Current water supply is 280 to 300 MLD and total wastewater generated is 215 MLD. Further, the city's dependency on Narmada water is increasing over the years. Historically, farmers using fresh water from Lalpari and Randedra lakes for irrigation were offered wastewater of Rajkot as swap formally in 1962. This was done to generate funding through a contract.

Currently, there are 6 functional STPs with a total capacity of 216.5 MLD and total utilized capacity of 170 MLD. Two more STPs are under-construction in the city. Other than this freshwater-wastewater swap, Rajkot Municipal Cooperation (RMC) entered into a contract with a farmers' cooperative in 2014 for supply of treated wastewater. The wastewater flows are part of catchment of Aji II and Nyari II dams. RMC is also in process to formalize supply of treated wastewater to industries and for recreational purposes. This will reduce the supply of wastewater in these dams. Formal wastewater supply for irrigation is in place for many decades and it is increasing very slowly.

However, informally, almost all the wastewater generated is used in the vicinity of the city. Sixteen villages irrigate 3,252 ha of land using treated wastewater, and 50% of agricultural area is irrigated with wastewater. Farmers claim that productivity is 2 to 2.5 times higher when irrigated with wastewater. More than 60% (416.79 sq km) of area in the periphery of Rajkot is still agricultural. This informal use is 30 times more than the formal use.

Preliminary recommendations are to recognize informal reuse of wastewater in order to promote the practice, and to take into account the risk of farmers in command area of Aji II and Nyari II dams currently relying on wastewater of lesser wastewater supply in case of diversion to other sectors or uses.



3. Dhanbad Municipal Corporation (Jharkhand) – Mr. Eklavya Prasad

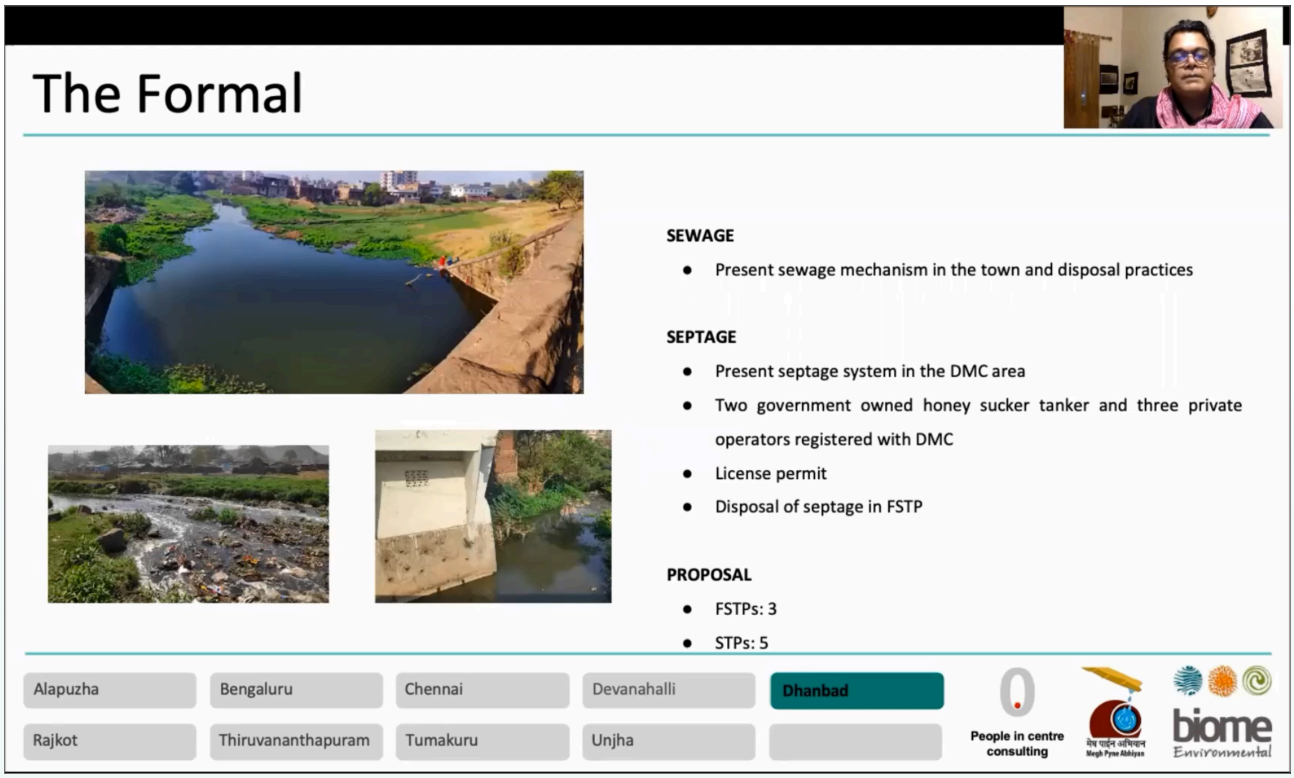
Dhanbad is a municipal corporation covering an area of 272 sq. km and has a population of 1.16 million. The urban governance falls in the ambit of Dhanbad Municipal Corporation (DMC) and other actors such as PHED.

It is to be highlighted that for understanding and compiling water and sanitation related data in the course of this study, a lot of referencing of multiple secondary sources and back calculations had to be done. This was basically because of unavailability of structured and referenced data. As such, there is an estimated wastewater generation of 162.9 MLD (water supply is 110.5 MLD) and an estimated water consumption is 203.6 MLD while the service level of 98 lpcd in the city. The tributaries of River Damodar which flow through the city limits, are carriers of domestic sewage and a source of waste disposal.

There is no formal system of sewage (sewer lines) and septage management in Dhanbad. Since 2016, DMC has been issuing license to private honeysucker operators that is renewed on annual basis. This is being done to streamline disposal of domestic sewage. There are two government honeysuckers and three registered private operators. At present, they dispose the collected waste at the plant in Indian Institute of Technology-Indian School of Mines (IIT-ISM). There are proposals for 3 FSTPs, work on one has begun by identification of land. Additionally, there are also 5 STPs proposed with a combined capacity of 234 MLD.

The informal sector are the actual custodians of sanitation system within DMC and hence extremely critical in case of Dhanbad. Individual household latrines are the only substantive step towards securing safe sanitation at the municipal level (household with septic tanks – 105,974; households without septic tanks – 114,809). However, household wastewater being disposed unchecked into the tributaries of River Damodar posing a health and sanitation problem, and is also used in horticulture to cultivate vegetables and water chestnuts. The three private, unregistered honeysuckers have reported that they either are dumping the collected septage in open drains or outside city limits in an ad-hoc manner. There is also an informal economy that employs wastewater.

Preliminary recommendations include conducting a comprehensive documentation of structured and triangulated data on water and sanitation in the city, to promote wastewater-based livelihoods such as floriculture, and to take steps to increase awareness about present sanitation scenario, challenges and strategies etc. among citizens of Dhanbad.

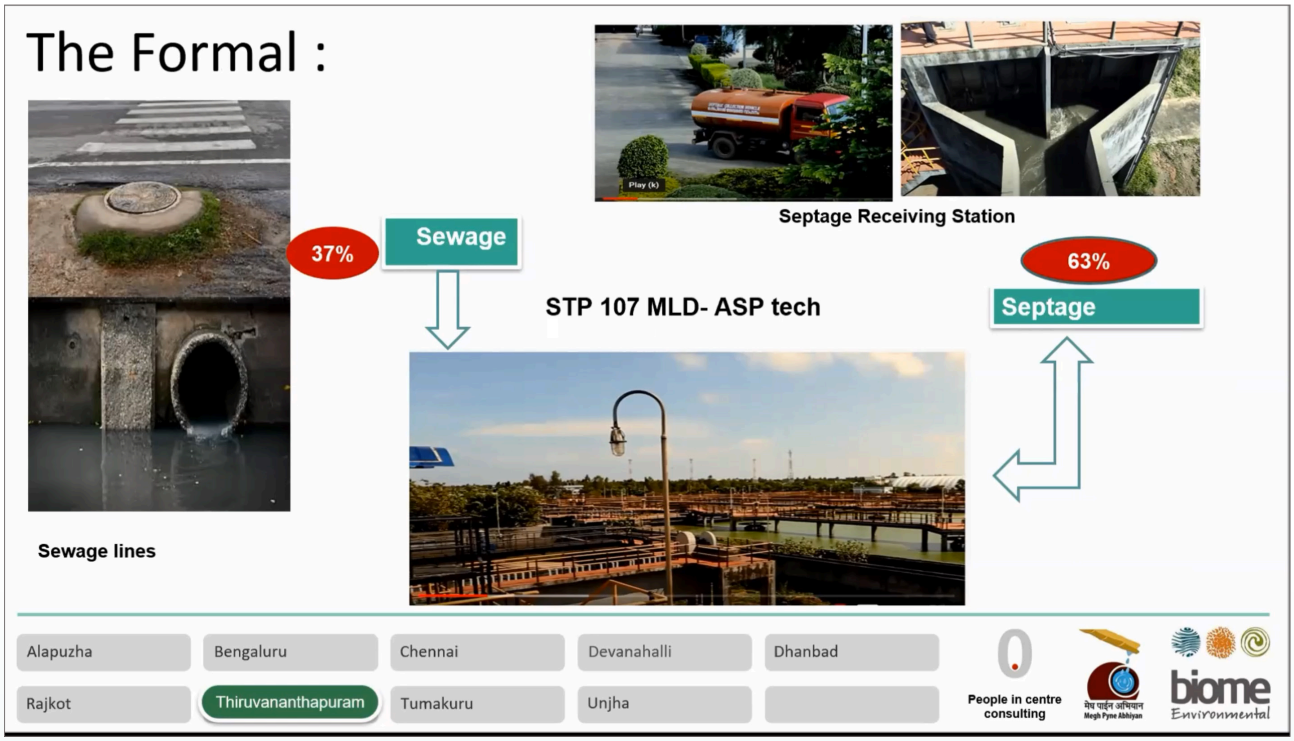


4. Thiruvananthapuram Municipal Corporation (Kerala) – Ms. Vijaya V

The capital city of Kerala, Thiruvananthapuram (area: 214 sq km and population of 955,494) is bounded by the Arabian Sea on the west, and has an undulating terrain comprising hilly, midland and coastal areas. It has abundant water resources and is the only city in Kerala with full-fledged sewerage system (service levels for water supply and sewage network are 83% and 37% respectively).

In 2013, an STP was commissioned (capacity 107 MLD), which in 2019, started treating septage as well. The municipal corporation also maintains a dashboard for septage collection management for an Uber model of septage collection. The rates are fixed according to the amount to septage collected (Rs. 3,570 for 5,000 litres, Rs. 7,140 for 8,000 litres etc. excluding GST). Commercial establishments like hotels and resorts are charged Rs. 3000 per trip. There are about 30 trucks operating conducting about 50-60 trips per day. The corporation also gets a revenue from these services and charges Rs. 750 per trip. The desludging operators have further formed a collective –All Kerala Septic Tank Cleaners, Owners and Workers Association. Following an NGT order in 2013, a survey was conducted to identify polluters who empty wastewater, toilet waste and other municipal waste into rivers that follow through the city – Killiyar and Karamana.

Covid-19 has posed a major setback to the city's effort in sanitation. However, with the youngest mayor and oldest sewerage system, the city is expected to soon see a renewed momentum for safe and sustainable sanitation solution.

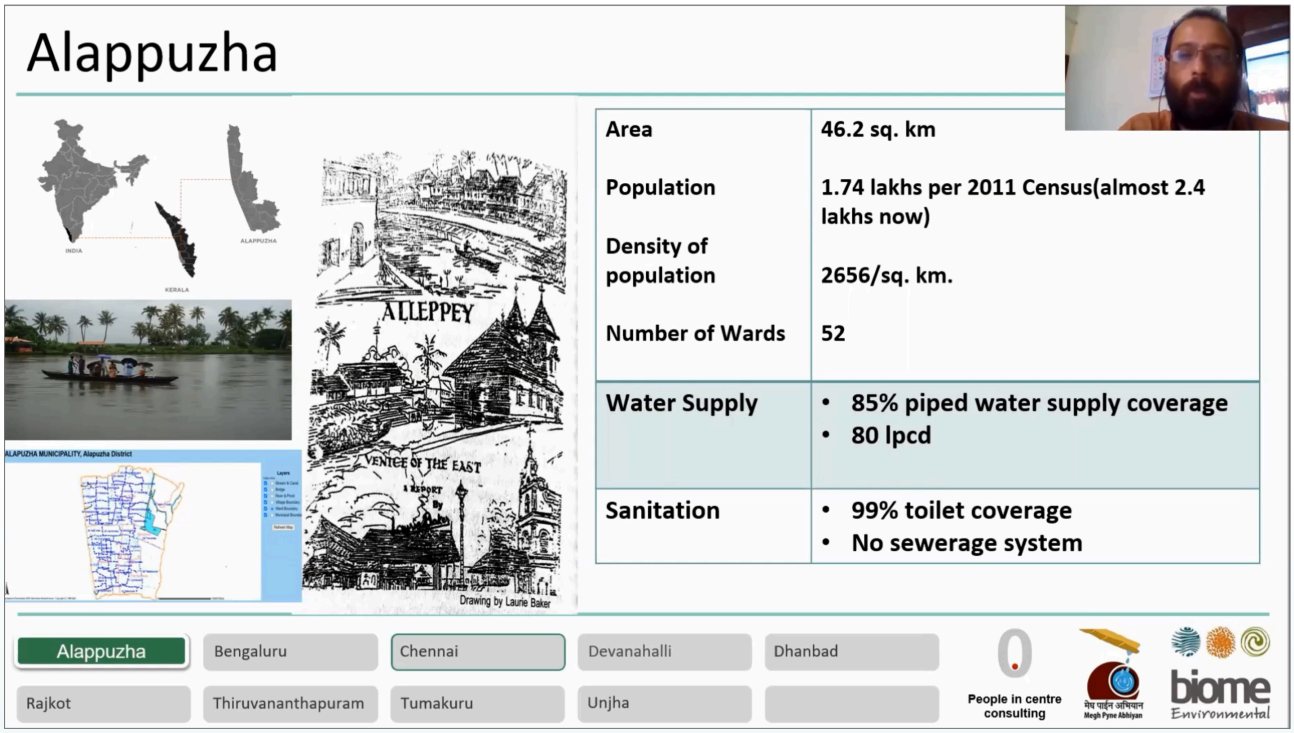


5. Alappuzha Municipal Council (Kerala) – Mr. Saji Sebastian

Alappuzha is situated in southern part of Kerala, known for its backwaters, tourism as well as marine products. Double pit toilets are not suited for this town due to the high water table. Use of unscientifically designed septic tanks is common making them act as leach pits thus polluting the groundwater. Faecal sludge and septage from households, other establishments and house boats find their way into canals and water bodies. Desludging operators operate informally and charge Rs.3,000 to 5,000 per emptying. No designated oxidation pond or sewage farm is available for treating wastewater leading to dumping in canals. Canals, for which Alappuzha is famous, have become drains and waste dumps.

In order to make them navigable and attractive to tourists, a canal rejuvenation project has been launched. Both solid waste and liquid waste management is to be taken care of to ensure the project's success. The Thumboormozhi model of aerobic composting, Clean Home Clean City initiatives are notable initiatives. DEWATS pilot model has been set up to treat wastewater. The Canalpy Project funded by KILA, IIT Mumbai and others has been set up for canal cleaning. Also, 3 STPs and 2 FSTPs are also planned under AMRUT program. With regard to the treatment infrastructure, apart from the 10 KLD mobile septage treatment units, there are three other treatment infrastructure with a combined capacity of 305 KLD. The floods in 2018 were a wakeup call for ensuring safe sanitation practices. Temporary regulation of desludging operators and usage of treatment infrastructure of PSUs and private sector is currently being implemented.

Preliminary recommendations include identifying and adopting an appropriate sanitation technology for flood prone and high water table areas, formalising septic tank cleaning and disposal operations, and providing for adequate treatment facilities.



6. Greater Chennai Municipal Corporation (Tamil Nadu) – Mr. N Meenakshi Sundaram

Chennai is a metropolis with a population of 7.8 million. Surface water, ground water and desalinated water are the primary sources of drinking water. Presently, Chennai Metrowater Supply and Sewerage Board (CMWSSB) supplies 831 MLD of drinking water to the citizens.

The core area of the city is fully sewered. There are 12 STPs generating 530 MLD of treated wastewater, of which 146 MLD is reused, and the remaining released in waterways as per Central Pollution Control Board (CPCB) norms. CMWSSB promotes reuse of treated wastewater from 1993 by selling 36 MLD to the petrochemical industries near the city at the rate of Rs.22/kL, generating revenues of Rs. 13.5 crore annually. Chennai is also the first Indian city to initiate biogas based power generation from wastewater as early as 2005. Till 2018, around 134,534 kWh has been generated and Rs. 61.84 crore are cost savings on energy. Additionally, it is also the first city to achieve 25% wastewater recycle and reuse. CMWSSB has initiated tertiary treatment of wastewater using Reverse Osmosis technology to fetch an added value by selling treated wastewater at a rate of Rs. 80-180/kL. Faecal sludge co-treatment infrastructure is available at 3 STPs which prevents dumping of septage indiscriminately in water sources. CMWSSB has ambitious plans of filling lakes with tertially treated waste water. The aim is to reduce dependence on desalination and groundwater sources in case of monsoon failures.

Honey suckers operating in the city remain largely informal, unregulated with no checks and enforcements of any kind. Major takeaways from the city are that water scarcity acted as a driving force towards integrated urban water management systems being established, co-treatment of FSS at STPs optimises treatment infrastructure and reduces pollution, and that the city is promoting circular economy by energy recovery from wastewater treatment and also recharging lakes with wastewater.

7. Bruhat Bengaluru Mahanagara Palike (Karnataka) – Ms. Nikita Harikishan

The Bengaluru Water Supply and Sewerage Board (BWSSB) is responsible for management of city's water and wastewater. Water supply from Cauvery river is 1,440 MLD. Approximately, another 600 MLD deficit is met by ground water. Currently, total wastewater generated is 1,640 MLD.

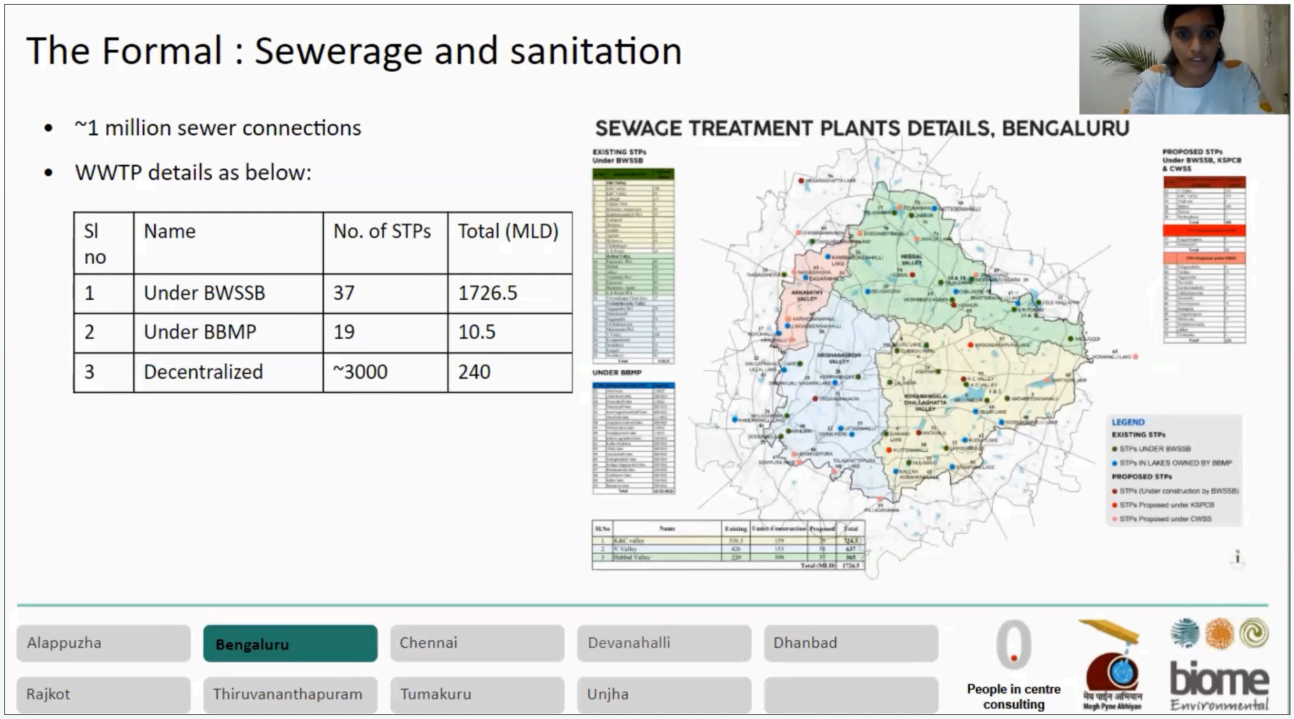
The regional topography of the city is in such a manner that the uncaptured wastewater flows out of the city through Vishwabharti valley and Dakshin Pinakhini stream. This has been informally picked up by farmers to irrigate more than 190 sq. km of land for more than 4-5 decades. This wastewater is used to grow all kind of crops such as vegetables, ragi, paddy, flowers and mulberry. Farmers have made huge investments to pump the wastewater as far as 15-20 km from the river. A simple pretreatment process such as sedimentation in a shallow pond or an open well is followed before using this it through drip irrigation. No significant health hazards are reported so far.

On the formal side, the city has approximately sewer connections. Formally, the city has achieved decentralized wastewater treatment system by establishing 37 STPs with a total capacity of 1,726.5 MLD under BWSSB, 19 STPs with a total capacity of 10.5 MLD under BBMP and additionally approximately 3,000 smaller wastewater treatment facilities across the city with a combined capacity of 240 MLD.

Government has launched first of its kind irrigation project to transfer 810 MLD secondary treated and chlorinated waste water for ground water recharge of drought affected districts. The KC Valley project uses 440 MLD of TWW from Kolar is used to fill 134 lakes, 210 MLD from HN Valley is used to fill 65 lakes, 120 MLD treated wastewater from Anekal is used to fill 69 lakes and 40 MLD of TWW from Hoskote is used to fill 30 lakes. In total, 810 MLD of treated wastewater is used for filling of 298 lakes.

Provision of treated wastewater saves livelihoods of the drought affected districts and ensures food security for the city. Bengaluru has been managing treated wastewater by using it for agricultural, ecological and industrial use. Jakkur lake is one of the examples of ecological reuse. There is a 15 MLD wastewater treatment plant in this lake funded by KPCL. There are also artificial wetlands integration mechanisms. The treated wastewater is facing conflict of interest with industrial use as it is to be given to a power plant which will deprive its ecological use of lake recharge. As another example, BEL has rejuvenated Doddabommasandra lake as part of their CSR initiative and has set up a wastewater treatment plant with SBR technology of 10 MLD capacity. The lake receives 8MLD of water and 2 MLD is used for horticulture. BEL is also engaged in O&M activities.

Preliminary recommendations include appropriate and proportionate distribution of treated wastewater for agriculture, ecological and industrial/urban use through a formal policy framework.



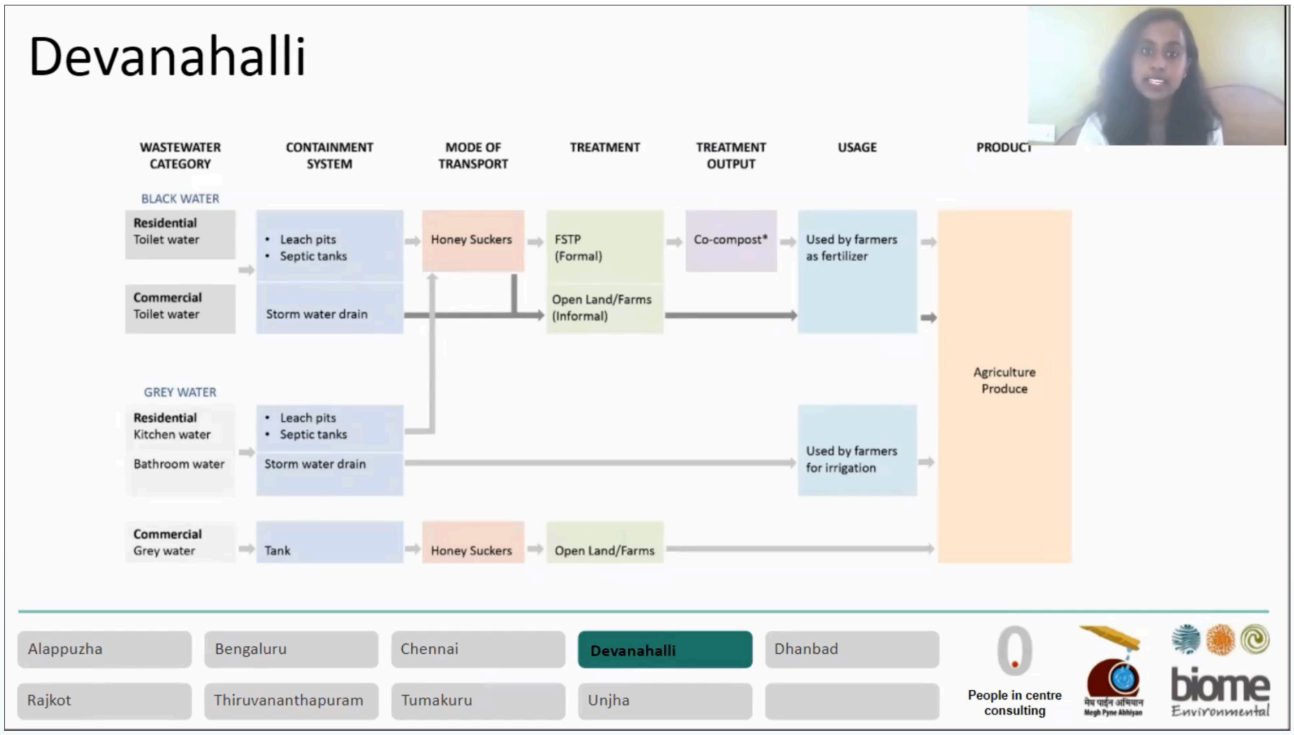
8. Devanahalli Municipal Council (Karnataka) – Ms. Rakshita ML

The city of Devanahalli is located in Bengaluru Rural district with a population of 28,051 (2011). It is a drought prone area and the city is dependent only on groundwater.

Blackwater, i.e., faecal sludge from the households is treated in the formally set up FSTP, while gray water from the households is led into the storm water drains. Untreated mostly graywater from the storm water drains is being used by the farmers to grow fodder maize, spinach, flowers and vegetables. Farmers follow furrow irrigation which ensures less human contact because of which the farmers report very few health hazards. Before the FSTP was set up, all the faecal sludge generated in the town was used by the farmers as manure. Method of use for agriculture were direct application, composting and mixing with other farm manures. Currently there are 5 private honeysucker operators in the city.

Devanahalli FSTP was set up in 2015 and is designed to treat 6000 liters/day, however, the current utilization is just 50%. Municipal wet waste is added at 1:2 ratio. The co-compost generated is sold to the farmers at Rs. 7/kg. There are multiple challenges faced by the current system, including the high cost of compost as reported by farmers with inadequate results, and lack of financial sustainability of the FSTP. The treated wastewater from the HN Valley of Bengaluru is being directed to Sihineer Kere Lake, which is the only sweet water source in Devanahalli.

Preliminary recommendations include monitoring of Sihineer Kere Lake for water quality through wells, borewells, planning for financial sustainability of the FSTP, and formalising the honeysucker-farmer relationship using Sanitation Safety Plan (SSP) should be done.



9. Tumukuru Municipal Corporation (Karnataka) – Ms. Rakshita ML

Tumakuru is a city located 70 km from Bengaluru. It has a population of 3,20,000 (2011). The city has no perennial source of water and is dependent majorly on Hemavathi reservoir for water which is around 170kms away from the city.

Tumakuru city has 17% household with sewerage coverage and rest 83% of the households are dependent on onsite sanitation systems. There are about 20 private honeysuckers in the city. There is a business opportunity as at present Rs.10 lakh profits are made annually. Farmers use the faecal sludge to grow areca nuts and coconuts. The demand of faecal sludge in the city is more than its supply, and farmers report no health and environmental hazards.

One government owned honeysucker is operating formally which empties the faecal sludge in the manhole and primary treatment plant. There is one STP operating in the city since 2004. The STP is designed to treat 24.75 MLD of wastewater, although the utilized capacity is just 10 MLD currently. Aerated Oxidation Pond is the technology adopted in this STP. Post-treatment the treated wastewater is lead into Bheemasandra lake. Farmers utilize this water to grow a medicinal crop 'Baje', which is a labor-intensive crop and provides livelihood to 3,000-5,000 workers during the harvesting period. The crop has led to doubling of income for the farmers. Additionally, farmers have not reported health hazards.

The city is currently moving towards 24/7 water supply, and is planning to expand its sewerage network to 100% of households under the Smart City Mission. The city is also considering selling wastewater to industries and implementing Sequential batch reactor with additional capacity of 25 MLD.

Preliminary recommendations include developing a mechanism to distribute treated wastewater proportionately between industries and farmers, and to consider using treated wastewater to fill more lakes in the city. Further, farmers and honeysuckers should be formally integrated as solution providers.

Broad Observations and Findings

Apart from the presentations made by individual speakers, the following points were separately brought to the notice of listeners as interesting stand-out observations during the course of the study:

- Ms. Alka Palrecha observed that there exists market- and cooperative-based institutions in the wastewater ecosystem and these have been operational for decades. However, due to their informal nature, they lack mention in relevant government policies. In many cases, they are working in tandem with the municipality, so there are formal mechanisms which have evolved over time. There is a need for cognizance of these institutions which are working, thriving and functional for so many years.
- Mr. Eklavya Prasad emphasized the point that there is an immense paucity of data and information in water and sanitation across India, which has resulted in uninformed government policy finding acceptance within the larger public.
- Ms. Vijaya V. said that Kerala has witnessed the formation of a union of septic tank truck owners and operators which is a positive move towards formalizing their work and working with the government in tandem.
- Mr. S. Vishwanath stated that currently, to inform sanitation technology and approach, the typologies are being differentiated largely on the basis of rainfall and hydrogeological setting. However, there are other factors such as socio-economic, which would further define them. So, identifying these typologies is also something that needs to be worked on going forward.

5. Closing Remarks and Next Steps

The summarising remarks were made by Mr. S. Vishwanath where he laid out the following learnings from across cities:

- There exists an informal system of wastewater use amongst farmers outside of our cities, and therefore, a conversation around whether a city can end this informal system for its gains needs to be initiated.
- Each city has a supplemental driver, driving decision-making at the city-level. For example, Alappuzha needs to rejuvenate its canal to drive tourism. Similar observations are true for Bengaluru, Chennai and Thiruvananthapuram as well.
- Cities can learn from each other's practices since the practices followed vary widely.
- Cities moving towards sewerage systems need to adopt an in-between FS system in the interim.
- Availability of data and information remains a challenge across cities, and even in metro cities, disaggregated data needs to be made available to inform government policy.

The next step is to bring together the findings of the study and frame broad recommendations. These will be formed in a way so as to inform government policy in water and sanitation.

Annexure 1: Agenda of the Webinar

Time	Session	Speaker
Inaugural session		
5mins	Context Setting	SCBP, NIUA
10mins	Keynote Speaker	Hitesh Vaidya, Director, NIUA
Presentations		
5mins	Need and aim of the research study	S Vishwanath, Biome Environmental Trust
30mins	Wastewater and septage management: Current scenario and learnings from cities	• Eklavya Prasad, Megh Pyne Abhiyan • Alka Palrecha, People in Centre • Saji Sebastian, Socio Economic Unit Foundation • N Meenakshi Sundaram and Vijaya V, Independent Consultants • Rakshitha M L and Nikita Harikishan, Biome Environmental Trust
5mins	Conclusion of the finding	S Vishwanath, Biome Environmental Trust
10mins	Q&A and Vote of Thanks	Moderated by SCBP, NIUA

Annexure 2: Profile of Speakers

Mr. S. Vishwanath, Biome Environmental Trust

S. Vishwanath is a civil engineer and an urban planner. He has 34 years of experience in the water, wastewater and sanitation sector helping design rainwater harvesting, aquifer recharge, wastewater recycling and ecosan systems. He is an Adjunct Professor at Azim Premji University, Bengaluru, and a Trustee with Biome Environmental Trust. He is a member of the Sustainable Sanitation Alliance and International Water Association. He has been a member of various expert committee which helped formulate the RWH policy for Bengaluru, and wastewater policy and the water policy for Karnataka, drafted by the Karnataka Knowledge Commission.

Ms. Vijaya V., Independent Researcher

Vijaya V. is an independent development consultant with over 20 years' experience. Her areas of specialisation include urban development, governance, decentralisation and WASH. She has a postgraduate degree in Urban and Rural Community Development from the Tata Institute of Social Sciences, Mumbai. She provides advisory and consulting services, research and capacity support to government/non-government organisations and development agencies.

Mr. Eklavya Prasad, Megh Pyne Abhiyan

Eklavya Prasad is leading Megh Pyne Abhiyan (literally meaning Cloud Water Campaign), a public charitable trust, for past 15 years. MPA has been conceptualised and sketched by him in partnership with local NGOs, and supported by village volunteers, resource institutions and professionals in parts of Bihar, Jharkhand and West Bengal. Prasad has been guided by the experiences accumulated while working on water concerns for past 25 years. He is working on issues concerning resilience and adaptability amidst extreme weather conditions, participatory groundwater management, safe and secure drinking water processes and technologies, and disaster resilient and ecosan system, through collective accountability and action.

Ms. Alka Palrecha, People in Centre

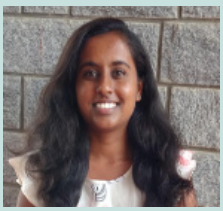
Alka Palrecha has founded People in Centre at Ahmedabad, India, and engaged in developmental work in partnerships with non-profits and governments. She works with urban and rural communities for water resources and services. She holds a master's degree in Landscape Architecture from the School of Planning and Architecture, New Delhi, and was a Humphrey Fulbright Fellow at Massachusetts Institute of Technology. Palrecha is currently interested in policies and institutional processes for the safe reuse of urban wastewater for agriculture in peri-urban India. She has carried out studies in five states in India and made a film Wastewater Bazaar.

Mr. N. Meenakshi Sundaram, Independent Researcher

N. Meenakshi Sundaram is an engineer with over 40 years' experience in water, wastewater and sewerage infrastructure (both onsite and offsite sanitation) and civil engineering practice, supervising construction of underground/overhead reservoirs, water distribution stations, water head works, water treatment plants, water networks, sewage treatment plant, sewage pumping stations, sewer/storm water networks, allied O&M and commissioning works during his tenure with the Chennai Metropolitan Water Supply & Sewerage Board. He also has been a third-party reviewer for infrastructure works. He has recently worked on an ADB initiative on smart water management and urban climate change resilience.

Mr. Saji Sebastian, Socio-economic Unit Foundation

Saji Sebastian is the Executive Director of the Socio-Economic Unit Foundation (SEUF), an NGO based in Kerala. Socio-Economic Unit Foundation is the pioneer organisation in integrated water and sanitation programme in Kerala and works to empower communities and institutions with special focus on sustainable provision of water and environmental sanitation through capacity building, participatory training, action research, studies, development of guidelines and demonstration projects. SEUF is an accredited agency in the state and a Key Resource Centre nationally.



Ms. Rakshitha M. L., Biome Environmental Trust

Rakshitha M. L. holds a master's degree in Economics from Mount Carmel College, Bengaluru. Rakshitha's interest lies in action research and public policy. She is based out of Tumkur and started her research journey by studying water and sanitation of Tumkur city. Rakshitha is currently working on the Million Wells for Bengaluru campaign.

Ms. Nikita Harikishan, Biome Environmental Trust

Nikita Harikishan is practicing as a bio-architect, combining natural building, permaculture, whole-systems and participatory design. Strongly rooted in circular design systems, her current research work involves understanding the reuse of wastewater of Bengaluru.

Annexure 3: Glimpses from the Webinar

Notes:

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