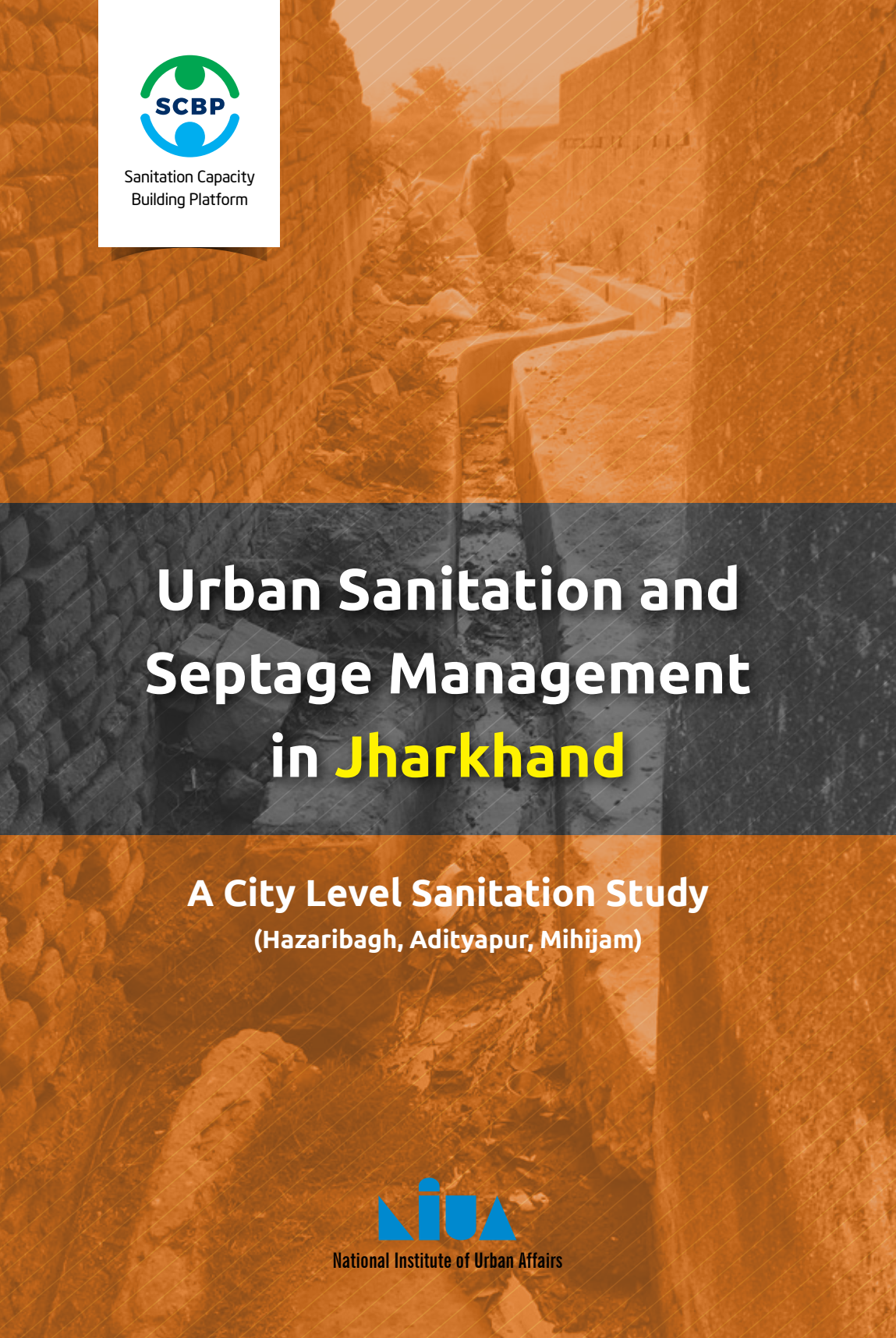
SCBP
Sanitation Capacity
Building Platform
Urban Sanitation and
Septage Management
in Jharkhand
A City Level Sanitation Study
(Hazaribagh, Adityapur, Mihijam)
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Foreword

Sanitation Capacity Building Platform (SCBP) established in 2016 is anchored by NIUA. It works as a collaborative initiative of experts and organisations committed to the goal of sanitation to support and build the capacity of towns/cities to plan and implement decentralized sanitation. The platform lends support on urban sanitation to Ministry of Housing and Urban Affairs (MoHUA), Government of India and supports states and cities to move beyond Open Defecation Free (ODF) status by addressing safe disposal and treatment of human faeces. It is a resource centre for Learning and Advocacy Material, important Government Orders and Reports, Training Modules, Workshop Reports and other publications produced under SCBP and its partner organisations.

The Platform partners include Center for Water and Sanitation (C-WAS) at CEPT University, CDD Society and BORDA, ECOSAN Services Foundation (ESF), Administrative Staff College of India (ASCI), UMC, Centre for Policy Research (CPR), iDeck and WASHi. The Platform also engages and supports Nodal AMRUT accredited training institutions, universities, research organisations and NGOs. SCBPs work on Faecal Sludge and Septage Mangement (FSSM) is a Bill and Melinda Gates Foundation (BMGF) supported urban sanitation programme initiative. It is a knowledge platform on decentralised urban sanitation. It is a resource centre for Learning and Advocacy Material, important Government Orders and Reports, Training Modules, Workshop Reports and other publications produced under SCBP and partner organisations.

ABOUT NIUA

National Institute of Urban Affairs (NIUA) is premier institute for research, capacity building and dissemination of knowledge for the urban sector in India. It is registered as an autonomous body under the Ministry of Housing and Urban Affairs, Government of India. NIUA conducts research in emerging themes such as urbanization, urban policy and planning, municipal finance and governance, land economics, transit oriented development, urban livelihoods, environment and climate change and smart cities. NIUA supports innovations in the urban sector through informed dialogues, knowledge exchanges, training and capacity building. In its mission to promote evidence-based policy-making and urban scholarship, NIUA is currently engaged in inter-disciplinary research and proactive engagements with change agents, which involve projects that create & maintain digital interface solutions.

ABOUT THE STUDY

In order to understand the urban sanitation challenges in the Indian states, a field based research on septage and wastewater management was commissioned by NIUA. The states of Rajasthan and Jharkhand were selected for the study. Under this project 3 towns were also selected per state by the researchers for qualitative and quantitative assessment of current sanitation, septage and wastewater management. The ULB's institutional landscape and the major challenges in these towns were analysed. Using the town wise findings, a state level perspective and understanding of urban sanitation management was obtained. The deliverable of the research will be used as inputs into the training material for the Sanitation Capacity Building Platform (SCBP).

The key research areas for the study were –

1. Status of septage containment, conveyance, disposal and treatment systems in each town.
2. Analysis of the sustainability and equitability of the existing and proposed sanitation services in the context of municipal finances and institutional structure of the ULBs.
3. The business and operational model for private sector operators with a special focus on profitability and their relationship with ULB.
4. Impact of unsafe disposal and lack of treatment of wastewater and faecal sludge on ground water and surface water bodies.
5. Possible improvements that can be brought about in septage and wastewater disposal in terms of provisioning and governance in urban areas of the state and towns.

The research focused on primary data collection in the 3 towns and its contextualization and assessment at the state level. Municipal and ULB norms, actual operations of ULBs and government departments were studied along with an analysis of the budgets and expenditures of ULBs related to sewerage management. The study also focused on the affordability, equity and technology comparison between septage and sewerage management. Slum sanitation and wastewater challenges in the 3 towns also provided some perspective on equity issues. Review of other secondary data such as DPRs, performance reports, annual budget documents etc. were used in the study. Laboratory tests of water samples from surface water, groundwater and potable water were also conducted to provide the evidence for contamination and environmental damage.

Introduction to Research

Given these host of recent initiatives on urban sanitation, questions need to be asked about how these are being implemented on the ground and with what impacts. In order to address these questions, a study was carried out to understand urban sanitation, waste water and septage management in selective towns of Jharkhand. In doing so, the objective was to provide recommendations for improvement of urban sanitation in the State, focusing particularly on the challenges pertaining to institutional arrangements, financing and investments, public-private partnership and community participation. To carry out the study, three towns were selected as cases, namely **Hazaribagh, Adityapur and Mihijam**. While Hazaribagh and Adityapur are Municipal Corporations and are also AMRUT towns, Mihijam is a Nagar Parishad.

The report is structured into six sections. Following introduction, the section two presents the overall picture of urbanisation in Jharkhand. Section three gives a glimpse of urban sanitation and septage management scenario of the State followed by section four, which deals with the current planning and initiatives for the same. In section five, a summary of the three case study towns of Jharkhand including Adityapur, Hazaribagh and Mihijam, is given. The final section gives the main conclusions and recommendations of the study. Following were the research questions and methodology.

Research Questions

1. What is the current status of sanitation, septage and wastewater management in Jharkhand? What is the ongoing plan for improving the same and what are the challenges in implementing that plan?
2. What is the current status of sanitation, septage and wastewater management in Hazaribagh, Adityapur and Mihijam? What are the technologies/systems in use and the current FSS management practices?
3. How sustainable and equitable are the existing and proposed sanitation, septage and wastewater disposal services in the three towns? This is understood in context of Municipal Finances and Institutional structure of the Urban Local Bodies and the economic situation of the population in general and the poor in particular.
4. What are the septage containment, conveyance, disposal and treatment systems in the three towns? What is the formal and informal model of urban sanitation management? What is the role of ULBs, private sector and civil society in that model?
5. What is the impact of any unsafe disposal and treatment of waste water on

the ground and surface water?

6. What are the possible improvements that can be brought about in septage and wastewater disposal in terms of provisioning and governance in the three towns?

Methodology

The study was based on both quantitative and qualitative research methods. It included review of secondary literature and primary data collection from key stakeholders related to sanitation, wastewater and septage management both at the level of state and case study towns.

Review of Secondary Literature

This included:

1. Review of published articles, reports, census data and other relevant documents on urban sanitation in Jharkhand and on the case study towns.
2. Study of economic survey of Jharkhand, annual plans, city sanitation plan, detailed project reports or related documents, and performance reports of various projects proposed or undertaken with funding from the state government or national investment programmes such as JNNURM, SBM, AMRUT etc.
3. Analysis of the annual budget documents and audited reports of the ULBs of the case study towns.

Primary data collection

This included:

1. In-depth interviews with key officials of the State Urban Development Department and other relevant agencies at state level.
2. In-depth interviews of ULB officials, sanitary workers, manual scavengers, private sludge operators, project contractors, journalists, elected representatives of ULBs and civil society groups.
3. Group discussions with beneficiaries, residential committees and members of the community.

Laboratory testing of water quality

In order to understand the health and environmental impact of waste water, surface water and ground water samples from different sites were collected for testing (on both microbiological and chemical parameters). Testing was done in a laboratory with NABL accreditation in Ranchi.

Introduction

Access to adequate sanitation is a basic human right, as an essential condition for public health. Most of the world's governments and international agencies have committed themselves to improving sanitation through the Millennium Development Goals, which arose from the United Nations Millennium Declaration adopted in September 2000. The Millennium Development Goal 7 states: Target 10 is to halve, by 2015, the proportion of people without sustainable access to improved sanitation (NIUA, 2015).

The sanitation situation in urban India is rather dismal. Almost 60 million people in urban areas do not have access to proper sanitation and more than two-thirds of waste water is let out untreated, polluting land and water bodies. According to the Census of India 2011, 72.6 per cent households in urban areas have availability of latrines with septic tanks, 7.1 per cent households have pit latrine, 1.7 per cent households have service latrine, and 18.6 per cent do not have latrine facility. Whereas 49.8 per cent households in India defecate in the open, this figure is lower in the urban areas, at 12.6 per cent. At the same time, 44.5 per cent households in urban India have connection to closed drainage facility, 37.3 per cent to open drainage facility and 18.2 per cent have no drainage facility. A large proportion of households, which are unconnected to the waste management system, discharge their waste in the storm water drains.

As the figures show, prevalence of open defecation and the collection, treatment and disposal of faecal sludge is one of the most important challenges in India. It has been studied that inadequate and inappropriate sanitation has serious environmental health implications by way of pollution of water bodies caused by organic matter and bacterial pollution of faecal origin (CPCB 2009). According to study done by UNESCO/WHO, around 88 % of diarrhoeal deaths of children can be attributed to inadequate sanitation hygiene and water (UNICEF/ WHO, 2009). Increasingly, it is been recognised that sanitation is a cause of malnourishment, leading to stunting and long-term cognitive diseases. About one in every 10 deaths in India is from causes related to inadequate sanitation and hygiene (WSP, 2010).

Sanitation in India is a State subject. State-level steering committees and urban development departments play the role of guidance and support to Urban Local Bodies (ULBs), which are mandated to undertake planning, design, implementation, operation and maintenance of sanitation services in cities and towns. Over the past one and a half decade, the Government of India has been

active on the goal of improving the sanitation scenario of urban India. During this period, one can see several policy interventions and investments programmes on urban sanitation in India. The most important of these initiatives include Jawaharlal Nehru National Urban Renewal Mission (JNNURM) 2005, National Urban Sanitation Policy 2`008, Swachh Bharat Mission (SBM) 2014, Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2015 and more recently the National Faecal Sludge and Septage Management (FSSM) Policy 2017.

Jawaharlal Nehru National Urban Renewal Mission (JNNURM)

The GOI launched JNNURM in late 2005. The programme was aimed at undertaking urban reforms across 65 selected cities (mostly million-plus). It included two sub-missions: Urban Infrastructure and Governance (UIG), which focused on infrastructure; and Basic Services for the Urban Poor (BSUP), with a focus on shelter for the urban poor. For all other medium and small towns in the country, the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) and the Integrated Housing and Slum Development Programme (IHSDP) were launched with focus areas mirroring those of UIG and BSUP respectively. The GOI planned to invest 120,536 crores under the programme during the seven-year period from 2005 to 2012. Significant amount of funds was allocated for sanitation projects under UIG and UIDSSMT (GOI 2005).

National Urban Sanitation Policy (NUSP)

The NUSP was declared in 2008. It is quite comprehensive and detailed. It lays out a vision for urban sanitation in India. It instructs states to come up with their own detailed state-level urban sanitation strategies and City Sanitation Plans. It moots the idea of totally sanitised and open-defecation cities as a target and the setting up of a multi-stakeholder City Sanitation Task Force to achieve this. Environmental considerations, public health implications and reaching the urban poor are given significant emphasis in the policy. Funding options are laid out including direct central and state support including through existing schemes, public-private partnerships, and external funding agencies. It directs that at least 20% of the funds should be earmarked towards servicing the urban poor (GOI 2008).

Swachh Bharat Mission (SBM)

In October 2014, the SBM was launched for all 4,041 statutory towns as per Census 2011. It seeks to address specific issues namely open defecation, manual scavenging, solid waste management and general awareness and behaviour

towards healthy sanitation practices and their linkages to public health. Thus, the mission components include provision of household, community and public toilets; effective SWM techniques; public awareness campaigns; and capacity building of implementing bodies (GOI 2014).

Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

On 25th June 2015, AMRUT was launched for cities with a population of more than 1 Lakh. Itis focused on urban infrastructure development that seeks to encourage capacity building and reform implementation. Its main objective is to ensure universal access to water supply and sewerage. The mission also includes other components, such as improving storm water drains to reduce flooding; pedestrian, non- motorised and public transport facilities; parking spaces; and green spaces, parks and recreation centres, especially for children. The component related to sanitation in AMRUT includes the following (GOI 2015).

A. Sewerage

Decentralised, networked underground sewerage systems, including augmentation of existing sewerage systems and sewage treatment plants.
Rehabilitation of old sewerage system and treatment plants.
Recycling of water for beneficial purposes and reuse of wastewater.

B. Septage

Faecal Sludge Management- cleaning, transportation and treatment in a cost-effective manner.
Mechanical and biological cleaning of sewers and septic tanks and recovery of operational cost in full.

C. Storm Water Drainage

Construction and improvement of drains and storm water drains in order to reduce and eliminate flooding

National Policy on Faecal Sludge and Septage Management (FSSM) 2017

The Ministry of Urban Development issued the National Policy on Faecal Sludge and Septage Management in February 2017. Overall vision of the policy is that all Indian cities and towns become totally sanitized, healthy and livable and ensures sustenance of good sanitation practices with improved Onsite Sanitation Services together with faecal sludge and septage management to achieve optimum public health status and maintain clean environment with special focus on the poor (GOI2017). Following are the objectives of the policy:

- The key objective of the urban FSSM Policy is to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city.

- Ensure that all benefits of wide access to safe sanitation accrue to all citizens across the sanitation value chain with containment, extraction, transportation, treatment, and disposal / re-use of all faecal sludge, septage and other liquid waste and their by-products and end-products.

- Suggest and identify ways and means, including the methods and resources, towards creation of an enabling environment for realising safe and sustainable FSSM in India.

- Define the roles and responsibilities of various government entities and agencies, and of other key stakeholders such as the private sector, civil society organisations and citizens for effective implementation of FSSM services throughout the country.

- Enable and support synergies among relevant Central Government programs such as SBM, AMRUT and the Smart Cities Mission to realise safe and sustainable sanitation for all at the earliest, possibly by the year 2019.

- Mitigate gender-based sanitation insecurity directly related to FSSM, reducing the experience of health burdens, structural violence, and promote involvement of both genders in the planning for and design of sanitation infrastructure.

Urbanisation in Jharkhand

Jharkhand is one of the newly formed States in India. Essentially a tribal region, the State is now gradually getting urbanised. The 2011 Census recorded Jharkhand's urban population as 24.05 per cent, which is lower than the national average of 31.14 per cent. Even then, this represented a significant growth in the number of its towns between 2001 and 2011. Jharkhand had 152 towns in 2001, which went up to 228 towns in 2011(Census 2011).

Figure 1:District Map of Jharkhand

Most of the urban residents live in big cities and more than half (54.6 per cent) of them reside in the ten-major Class I cities having a population of 100,000 and above (Government of Jharkhand 2017a). The share of urban population in these cities has increased by 32.6 percent during 2001-2011 Census. Dhanbad

and Ranchi also emerged as the two Million Plus cities in 2011. In contrast, the share of urban population in Tier-II towns, with a population of 50,000 to 99,999, has declined considerably (-51.7%). According to 2011 Census, only 11.1 percent of Jharkhand's urban population resides in these towns, which has also decreased in numbers (18 in 2001 to 12 in 2011 Census). The proportion of urban population has also declined in the Medium towns i.e. Class-III and Class-IV towns (Government of Jharkhand 2018). This clearly indicates that either there is intra migration within the state (people are moving from small towns to the big cities) or there is inter migration from Jharkhand to other states.

Further, there is a high disparity in district-wise concentration of urban population, ranging from 58 percent in Dhanbad to 5 per cent in Godda. The districts with the highest urban population primarily fall under the mining-industrial area of the state.

Figure 2 Map of District Wise Level of Urbanisation in Jharkhand

Districts of Jharkhand with Highest Urban Population

Dhanbad	1,560,394 (58.13%)
PurbiSinghbhum	1,274,591 (55.56%)
Bokaro	983,644 (47.70%)
Ramgarh	418,955 (44.13%)
Ranchi	1,257,335 (43.14%)

Districts of Jharkhand with Lowest Urban Population

Simdega	42,944 (7.16%)
Khunt	44,982 (8.46%)
Latehar	51,858 (7.13%)
Chatra	62,954 (6.04%)
Godda	64,419 (4.90%)

Unplanned urbanisation is often accompanied by growth of slums. The total urban population of Jharkhand residing in urban slums was 372,999 and total slum households were 72,554 as per the Census 2011. About 72.38 percent of the total slum population of Jharkhand resides in the Class-I cities alone, with Ranchi having the highest share (19.92 per cent) followed by followed by Jamshedpur (11.27 per cent).

Urban Local Bodies in Jharkhand

There are 45 ULBs in Jharkhand including Municipal Corporations, Nagar Parishads, Nagar Panchayats and Notified Area Committees/Municipalities.

Table 1: Categories of Urban Local Bodies in Jharkhand

Municipal Corporation (9)	Nagar Parishad (20)	Nagar Panchayat (15)	Notified Area Committee (1)
Adityapur Chas Dhanbad Deoghar Giridih Hazaribagh Mango Medininagar Ranchi	Bishrampur Chatra Chakradharpur Chaibasa Chirkunda Dumka Gumla Garhwa Godda Jhumritilaiya Jugsalai Kapali Lohardaga Mihijam Madhupur Ramgarh Pakur Phusro Simdega Sahibganj	Basukinath Bundu Chakulia Chhatarpur Domchanch Hussainabad Jamtara Khunti Koderma Latehar Manjhiaon Nagar Uttari Rajmahal Saraikela Barharwa	Jamshedpur (NAC)

The table above shows that there are nine municipal corporations, 20 Nagar Parishads, 15 Nagar Panchayats and one Notified Area Committee in Jharkhand.

With rapidly growing urban population, Jharkhand faces the prospective situation of numerous urban challenges, of which urban sanitation would be one of the most important.

Executive Summary

Jharkhand's urban population is lower than the national average of 31.14 per cent., but there is a significant growth in its towns between 2001 and 2011. The State had 152 towns in 2001, which went up to 228 towns in 2011. There are 45 ULBs in Jharkhand including Municipal Corporations (9), Nagar Parishads (20), Nagar Panchayats (15) and Notified Area Committee (1). With a rapidly growing urban population, Jharkhand faces the prospective situation of numerous urban challenges, of which urban sanitation is one of the most important.

The study reviews the sanitation, septage and wastewater management situation in Jharkhand through the case studies of three Urban Local Bodies (ULBs) including Adityapur Municipal Corporation, Hazaribagh Municipal Corporation and Mihijam Nagar Parishad. The research shows that the overall sanitation scenario in urban Jharkhand is dismal. Only 67 per cent of urban households have toilets within the household premises which are lower than the national average of 81.39 per cent. Almost 31 per cent are dependent on open defecation, and two per cent are using public toilets. Nearly 73 per cent of private toilets are connected to septic tank systems, which can be related to the lack of proper sewerage system in the State. As a result, most of the wastewater from the households, including septic tanks overflow into the drains.

Given the prevalence of septic tank-based toilets in the State, desludging is an essential mechanism of cleaning the toilets. The study shows that out of the three-case study ULBs, only Hazaribagh Municipal Corporation and Mihijam Nagar Parishad have suction machines for sludge collection and disposal. But these are also not always functional. All three towns, however, have private operators who provide these services. A critical issue is the continuing practice of Manual Scavenging in Mihijam, which violates the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013. Most of those who work as manual scavengers are employed with the Nagar Parishad as sanitation workers but do this work on the side for extra income. They belong to a poor Dalit community, which has been carrying out manual scavenging for generations.

There are several studies which reveal that the quality of drinking water sources is rapidly deteriorating across Jharkhand. The water quality tests in the three study towns suggest that many of the chemical and biological parameters of samples of surface and groundwater are not within the permissible limits. Inappropriate management of domestic wastewater and sludge are having a significant impact on water bodies in the State, including ponds, lakes, dams and rivers.

An analysis of the sanitation staff of the three case study towns shows that all three ULBs were understaffed. Most of the sanitation staff are on short-term contracts. Contractualisation is not only a pattern for those on the lower rung of the work chain but also for the City Managers, who are the senior most after the Executive Officer. While they have better pay, but they work on short-term contracts, moving from one city to another after an average period of 2-3 years. This potentially impacts the continuity in the planning and supervision of small and big projects on sanitation. Also, except for Mihijam, the other two ULBs do not have a Health Inspector, even as it is an important position in the chain.

Jharkhand is one of the few states which has drafted its Faecal Sludge and Septage Management (FSSM) Policy in 2017. Many towns of the State are now covered under the new urban initiatives for improvement of urban sanitation, including sewerage and septage projects. Of the 45 ULBs, sewerage work is to happen in eight towns. This includes sewerage network and Sewerage Treatment Plants (STPs). The remaining 37 ULBs will have FSSM projects.

Seven Class-I cities including Dhanbad, Ranchi, Deoghar, Hazaribagh, Adityapur, Chas and Giridih have been identified for development under AMRUT. The initial SAAP (2015-16) proposed Rs 3918.58 crores for fund allocation for all five components of the mission, but the State got approval for only Rs 1245.24 crores for various projects in the mission period. Out of this approved budget, the sewerage and septage projects have been allocated Rs. 444.1 crores. The cost of any project under AMRUT has to be shared by Centre, State and ULB. The Centre's share is 50 per cent of the total cost and shares of State and ULB are 30 per cent and 20 per cent respectively.

A sewerage project has already been initiated in Adityapur under the AMRUT scheme. The total cost of the project is Rs. 240 crores including the capital expenditure CAPEX of Rs. 199.96 Crores and operation and maintenance expenditure of Rs. 40.86 Crores. While the CAPEX would be covered under AMRUT funds and State funds, the OPEX would be covered by ULBs through user fees and other resources. As part of the AMRUT scheme, a 64 KLD Fecal Sludge Treatment Plant (FSTP) is also being built in Hazaribagh. The total cost of the project is Rs 32.6 crores. The CAPEX of the project is Rs. 8.05 crores and the annual OPEX for the project is Rs. 24.51 crores. The Operation and Maintenance Cost (OPEX) would be through public outreach activities and collection of user charges from consumers.

The study highlights a significant potential challenge in operation and maintenance of such sanitation projects through the case of Adityapur and Hazaribagh. A review of Municipal finances of both the ULBs shows that they are in deficit. Moreover, the operation and maintenance (O&M) expenditure of these projects is much higher than the total revenue generated by the Corporations. This requires that individual households in these cities pay the additional money to match the need. It does raise the question of whether a consumer in a small town will be willing or able to pay this cost.

Section I

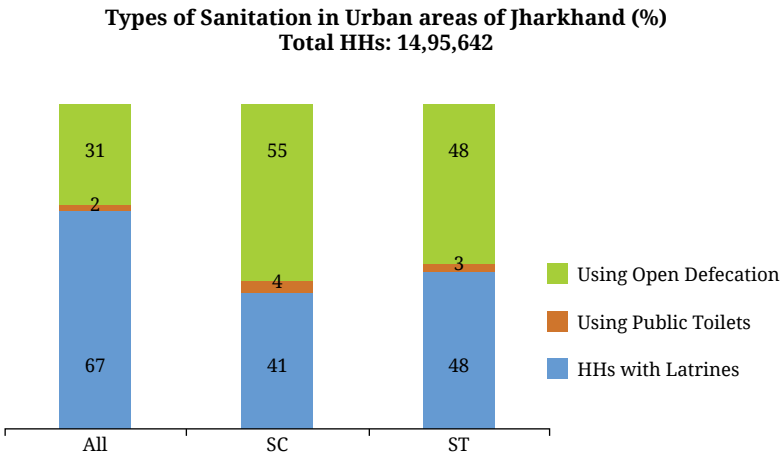
Urban Sanitation and Septage Management in Jharkhand

Urban Sanitation and Septage Management in Jharkhand

Like many other states, the scenario of urban sanitation in Jharkhand is poor and if we look at the data, there is no significant improvement on the same between 2001 and 2011.

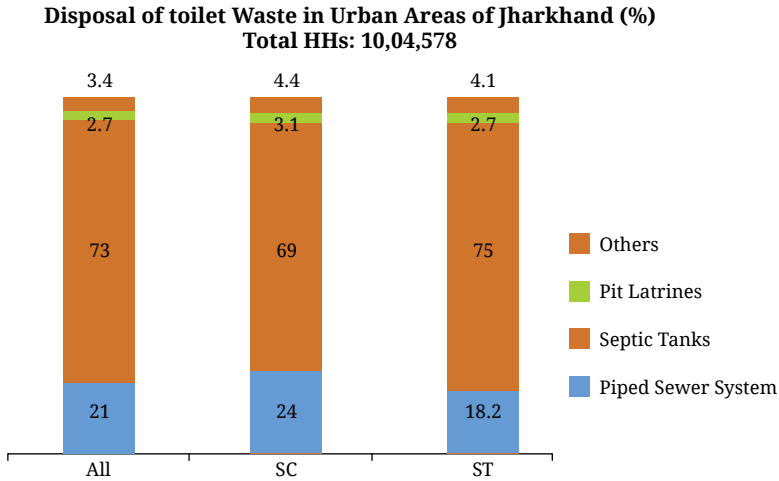
Status of Toilets

Figure 3: Type of Sanitation Facilities



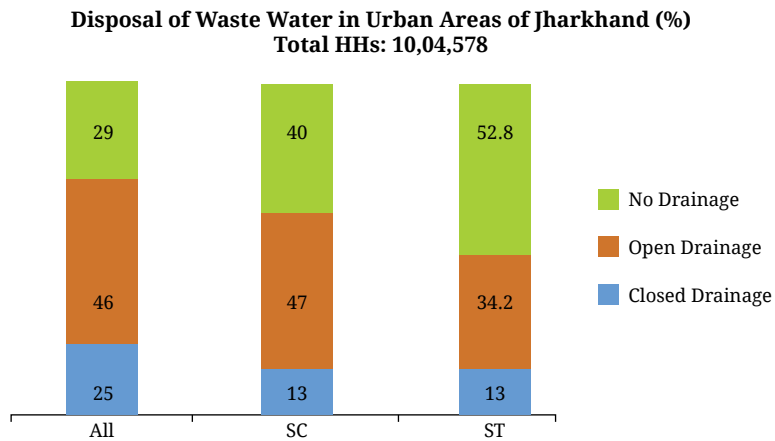
As can be seen from the above graph based on the 2011 Census, only 67 per cent of urban households in Jharkhand have latrines within the premises. This is lower than the national average of 81.39 per cent. 31 per cent are dependent on open defecation and two per cent are using public toilets. The number of households dependent on open defecation among the Scheduled Castes is much higher (55 per cent) and almost 50 per cent among the Scheduled Tribes.

Figure 4 Disposal of Toilet Waste



As the graph shows, 73 per cent of private latrines have septic tanks, 2.7 per cent are pit latrines 3.4 per cent others. Only 21 per cent are connected to a piped sewer system. There is not much difference in the figures of the SC and the ST households with the latter having a greater proportion of toilets with septic tanks, at 75 per cent.

Figure 5 : Disposal of Grey Water



The lack of sewerage system means most of the waste water from the households, including septic tanks overflows into the drains. As such, 29 per cent of the urban areas do not have access to proper drains (see above graph). In terms of urban households with no access to waste water-outlet connection,

Jharkhand's average is much higher than the national average of 12.86 per cent. Of the existing drains, 46 per cent are open and 25 per cent are closed drains, even as the latter are regarded as a safer and cleaner drainage system for waste water and grey water as it remains covered and therefore decreases the chances of water-borne and vector borne diseases. The State average of Jharkhand is much lower than the national average of 56.17 per cent of urban households in the country with access to closed waste water-outlet connection.

As per the State Economic Survey 2016-17, most of the Class-I cities of Jharkhand have a combination of both open and closed drainage system. The condition of Class-II towns is not very good as more than half of them have open drainage networks. The drainage and sanitation facility in the slums of the State is no better. Dhanbad, Chas, and Hazaribagh are the Class-I cities where only open drainage system is available in their slum areas (Government of Jharkhand 2017).

Swachh Bharat Mission in Urban Jharkhand

As part of the Swachh Bharat Mission, the State's ULBs have together constructed over 2 lakh (212471) individual household toilets across major cities, along with constructing 1661 public toilet seats and 3852 community toilet seats (data accessed on August 14, 2018 from SBM website). In April 2018, Jharkhand was declared as became the 10th state to be certified open defecation free (ODF) in urban areas by the Ministry of Housing and Urban Affairs (MOHUA). Also, Jharkhand was declared as best performing state in this year's Swachh Survekshan, followed by Maharashtra. Contrary to such declarations, our field survey reveals that open defecation is continuing in the State. This may be attributed to the fact that many toilets targeted under SBM are still under construction and many of the newly constructed public and community toilets are currently not functioning.

Sewerage and Septage Management Planning

Many towns of Jharkhand have now been covered under the new urban initiatives for the improvement of urban sanitation. Ranchi, the capital of Jharkhand, has been selected under the Smart Cities Mission. Seven Class-I cities including Dhanbad, Ranchi, Deoghar, Hazaribagh, Adityapur, Chas and Giridih have been identified for development under AMRUT. The selection has been done based on data from Census 2011.The state has also requested the addition of Jamshedpur, Mango, Ramgarh and Sahibganj on the basis of the selection criteria of the guidelines. Swachh Bharat Mission is also being implemented across the state both in rural and urban areas. More importantly, Jharkhand is one of the few states, which has drafted its own Faecal Sludge and

Septage Management (FSSM) Policy in 2017 and now in the process of planning and implementing sewerage and septage projects across towns by keeping in synergies with other central government initiatives.

The key objective of "the FSSM Policy is to set the context, priorities, and direction for, and to facilitate, state-wide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city" (Government of Jharkhand 2017b). More specifically, the Policy will:

1. Mainstream FSSM by the year 2019, and ensure that all benefits of wide access to safe sanitation accrue to all citizens across the sanitation value chain from containment, extraction, transportation, treatment, and disposal / re-use of all Faecal sludge, septage and other liquid waste and their by-products and end-products.
2. Suggest and identify ways and means, including the methods and resources, towards creation of an enabling environment for realising safe and sustainable FSSM in Jharkhand.
3. Define the roles and responsibilities of various government entities and agencies, and of other key stakeholders such as the private sector, civil society organisations and citizens for effective implementation of FSSM services.
4. Enable and support synergies among relevant Central and State Government programs such as SBM, AMRUT, Smart Cities Mission, to realise safe and sustainable sanitation for all at the earliest, possibly by the year 2019.
5. Adopt an appropriate, affordable and incremental approach towards achieving laid out environmental standards for FSSM.

According to the Policy, responsibility for establishing basic regulatory requirements for FSSM rests with ULBs. State Urban Development Agency will maintain an oversight role and will integrate and interpret the requirements of the several applicable Federal laws and issue regulations and guidance to ensure that they are applied consistently toward municipal sludge management. Responsibility to operate and maintain appropriate sludge management systems rests with each ULB.

For treatment of faecal sludge, the policy suggests different kinds of mechanisms including physical, biological and chemical.

A three-phase approach will be designed to implement the policy.

1. In the financial year 2017-18 it will be implemented in all the notified Nagar Nigam.

2. In the financial year 2018-19 it will be implemented in all the notified Nagar Parishad.
3. In the financial year 2019-20 it will be implemented in in all the notified Nagar Panchayat.

According to the policy, the ULB may have a mix of the sewerage and the septage plan or only septage plan depending upon the population, terrain and available fund and technological options. In the bigger ULBs a mix of sewerage and septage may be applied depending upon the ground situation and the fund availability while in the smaller towns the septage may be given preference over the sewer lines.

Policy recommends that financing for FSSM Plans may be available under AMRUT; 14thFinance Commission funds, or under any other scheme. ULBs are encouraged to levy sanitation tax/ user charges to meet the O&M cost for effective FSSM operation. A separate head of the tax called 'Septage Tax' will be created which may be levied in the property tax for the operation and maintenance of the sepatge.

The FSSM policy of Jharkand is now being translated into various sewerage and FSSM projects. Of the 45 ULBs, sewerage work is to happen in eight towns. This includes sewerage network and Sewerage Treatment Plants (STPs). The rest of the 37 towns will have Faecal FSSM projects. According to the State Urban Development Agency (SUDA) Director, the plan is that by the mid 2019 all the towns will have some sort of sewerage or septage management facility. Following table shows the status of projects that have been initiated. For the other towns, the projects are still in planning stage.

Table 1: Status of sewerage and septage Projects

S No.	ULB	Project	Status
1	Ranchi	Sewerage	Ongoing
2	Adityapur	Sewerage	Ongoing
3	Shahibganj	Sewerage	Ongoing
4	Rajmahal	Sewerage	Ongoing
5	Dhanbad	Sewerage	To start
6	Jamshedpur	Sewerage	To start
7	Jugsalai	Sewerage	To start
8	Mango	Sewerage	To start
9	Hazaribagh	FSTP	Project Finalised
10	Chas	FSTP	Project Finalised

S No.	ULB	Project	Status
11	Giridih	FSTP	Project Finalised
12	Deogarh	FSTP	Tender online
13	Chirgunda	FSTP	DPR finalised
14	Phusro	FSSM	DPR being done
15	Ramgarh	FSSM	DPR being done
16	Chaibasa	FSSM	DPR being done
17	Palamu	FSSM	DPR being done
18	Dumka	FSSM	DPR being done

Source: JUIDCO Website and information provided by the Director, SUDA

Planned investment as per AMRUT

The Jharkhand Urban Infrastructure Development Company (JUIDCO) has been selected as the Project Development and Management Consultant for AMRUT in Jharkhand. As per the AMRUT guidelines, a plan for the period (2015-20) was envisaged under which the detailed GAP analysis was done and the fund requirement for the 7 AMRUT cities was calculated. The state had prepared a 5-year perspective plan (for fund allocation for all five components of the mission) for the total project size of Rs. 3918.58 crores as mentioned in the State Annual Action Plan (SAAP) of Jharkhand 2016-17.However, it seems that there has been a significant change in the perspective plan and allocation of funds after it got approval from the Ministry of Urban Development (MoUD). Table 3 below gives the latest picture of the projects and funds sanctioned for the entire mission period of AMRUT.

Table 2: City & component wise project funds required for entire mission period of AMRUT (FY 2015-16 to FY 2019-20)

Name of ULB	Project	Project Cost (As per DPR)	Amount Sanctioned by MoUD			Balance project cost for remaining mission period
			FY 2015-16	FY 2016-17	Total	
Ranchi	Water Supply	188.14	70.00	54.00	124.00	64.14
	Septage/Sewerage	40.36	40.36	0.00	40.36	0.00
	Park and Development	5.00	1.00	2.00	3.00	2.00
Dhanbad	Water Supply	101.16	0.00	77.00	77.00	24.16
	Septage/Sewerage	0.00	0.00	0.00	0.00	0.00
	Park and Development	5.00	1.00	2.00	3.00	2.00

Name of ULB	Project	Project Cost (As per DPR)	Amount Sanctioned by MoUD			Balance project cost for remaining mission period
			FY 2015-16	FY 2016-17	Total	
Deoghar	Water Supply	0.00	0.00	0.00	0.00	0.00
	Septage/Sewerage	23.50	16.00	7.50	23.50	0.00
	Park and Development	4.00	1.00	1.00	2.00	2.00
Chas	Water Supply Phase 1	72.41	40.00	30.00	70.00	2.41
	Water Supply Phase 2	71.16	50.00	21.16	71.16	0.00
	Septage/Sewerage	9.54	9.54	0.00	9.54	0.00
	Park and Development	4.00	1.00	1.50	2.50	1.50
Adityapur	Water Supply	0.00	0.00	0.00	0.00	0.00
	Integrated Sewerage (Phase – 1)	235.94	15.00	24.00	39.00	196.94
	Integrated Sewerage (Phase – 2)	115.54	16.24	99.30	115.54	0.00
	Park and Development	4.00	1.00	1.00	2.00	2.00
Hazaribagh	Water Supply Phase 1	285.43	30.00	0.00	30.00	255.43
	Water Supply Phase 2	25.00	0.00	25.00	25.00	0.00
	Septage/Sewerage	11.86	11.86	0.00	11.86	0.00
	Park and Development	4.00	1.00	1.00	2.00	2.00
Giridih	Water Supply	28.84	0.00	28.84	28.84	0.00
	Septage/Sewerage	7.36	7.36	0.00	7.36	0.00
	Park and Development	3.00	1.00	1.00	2.00	1.00
	Grand Total	1245.24	313.36	376.30	689.66	555.58

Source: State Annual Action Plan (SAAP) of Jharkhand 2017-18

According to the SAAP FY 2017-18, the total cost of the projects proposed under AMRUT is Rs 1245.24 crores for the entire mission period. Out of this, Rs 689/66 crores have been approved by Apex Committee of MoUD as proposed in the SAAPs of FY 2015-16 and FY 2016-17. The balance amount of Rs 555.59 crores is required for the period, of which ACA is 262.41 crores, State share is 175.90 crores and ULB share is 117.27 crores. The total cost of sewerage and septage projects is Rs. 444.1 crore under AMRUT. Table 3 suggests that all the ULBs have received their funds for sewerage and septage projects except for Adityapur, which has already received funds for Phase 2 of the project but have only got part of the total project cost for Phase 1.

Other funding sources

Apart from AMRUT towns, funds are available from JNNURM for Ranchi, and from the Namami Gange - National Mission for Clean Ganga for other towns. For sewerage projects in Dhanbad and Jamshedpur, the Government is considering EAP (externally aided projects). Funds are also being sought from World Bank and ADB as loans. Namami Gange projects are World Bank funded, so these are technology neutral. Sewerage projects are also technology neutral. For FSSM projects, different technologies are being used. In the DPR prepared by CDD, Devanahalli (name of the town) model is being promoted. Most of the FSTPs will have Devanahalli model because it is cheaper. In places where other agencies have made DPR, a different technology will be used. There is also a proposal of having pyrolosis technology in Ramgarh, as an experiment.

Section II

Analysis of Case Study Towns

Analysis of Case Study Towns

Three towns were chosen for a detailed case study of the current scenario and upcoming projects on sanitation, namely **Adityapur, Hazaribagh and Mihijam**. The selection criteria of the three towns are described below.

Location Map of Study Towns

Hazaribagh is a Class I town in the Hazaribagh district and the divisional headquarters of the North Chotanagpur division. It is one of the oldest Municipalities in the State and has recently been notified as a Municipal Corporation. Alongside other six other ULBs, Hazaribagh would be benefited by AMRUT and the state FSSM related initiatives in Phase I during the financial year 2017-18. At present, there is a plan to build a Faecal and Sludge Treatment Plant (FSSTP) in the town, which would be the first in the State. As such, Hazaribagh has been in news with regard to contamination of its famous lake due to inappropriate sanitation provisions. The town has been chosen to get a picture of an old Municipal and mining towns of Jharkhand.

Adityapur is an industrial town and a satellite town of Jamshedpur. It has also been recently notified as a Municipal Corporation. The town is surrounded

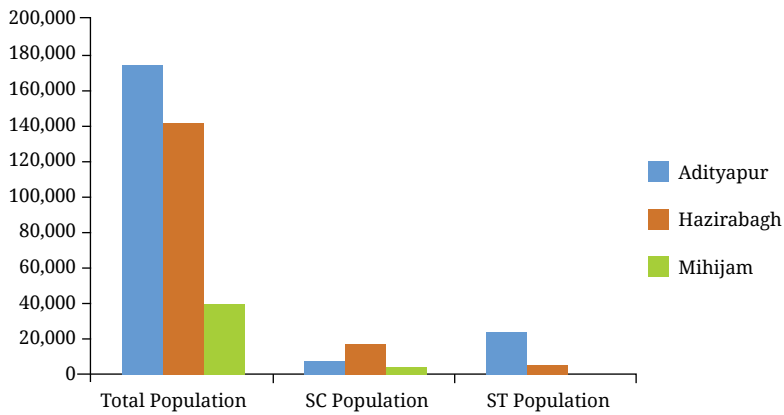
on three sides by the Kharkai River. Inadequate sanitation is one of the major causes of the pollution of this river, as suggested by recent studies. Adityapur is covered by most of the Central government schemes on sanitation, including AMRUT and it would also benefit from the state FSSM strategy of Phase I during the financial year 2017-18. The case of Adityapur gives a picture of sanitation challenges faced by small-scale industrial towns in Jharkhand.

Mihijam is one of the important urban centers in the Jamtara district. It is a class III town as well as a Nagar Parishad. It adjoins the town of Chittaranjan (West Bengal) where the railway locomotives industries is based. Absence of a sewerage network has meant the waste water from households, including from overflowing septic tanks finds its way to the nearby drains and then to nearby ponds and other water bodies. There has been some sanitation related initiatives in Mihijam under SBM and recently a draft City Sanitation Plan of the town has also been developed. The case of Mihijam represents the sanitation scenario of majority of Nagar Parishads and Nagar Panchayats towns of Jharkhand.

Here is a comparative profile of the three study towns.

Demography

Figure 6: Demography of Study towns



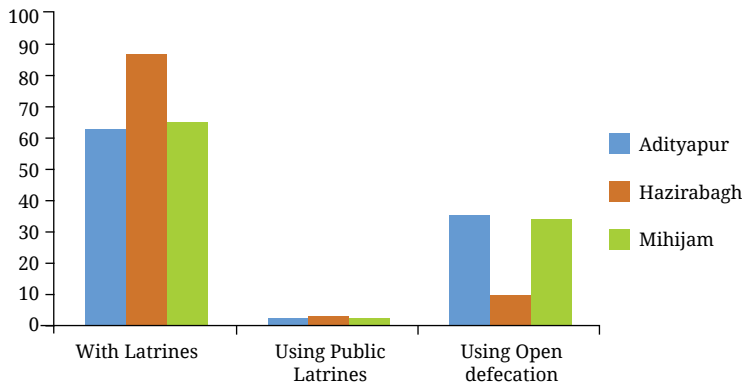
SC: Scheduled Caste, ST: Scheduled Tribe

According to the 2011 Census, the population of Adityapur is 174355, which is higher than Hazaribagh and Mihijam, with a population of 142,489 and 40463 respectively. Adityapur also has the highest decadal growth rate of population from 2001 to 2011, which is 46.2 per cent, followed by Mihijam (21.74 per cent) and Hazaribagh (11.9 per cent). However, Adityapur has the lowest density of population, which is 3358, compared to 3699 in Mihijam and 5403

of Hazaribagh. Compared to the overall population of the town, the Scheduled Caste population is highest in Mihijam (14.3 per cent) followed by Hazaribagh (10.83 per cent) and lowest in Adityapur (5 per cent). However, the Scheduled Tribe population is highest in Adityapur (13.82 per cent), followed by Mihijam (5.04 per cent) and Hazaribagh (4 per cent).

Status of Toilets

Figure 7: Type of Sanitation in Study towns



As seen in the graph above, among the three cities, Hazaribagh has the highest proportion of private latrines (88 per cent), followed by Adityapur (63.3 per cent) and Mihijam (65.3 per cent). In all three cities, the number of households using public/community toilets is quite low with only a marginal difference. Again, it is highest in Hazaribagh (2.5 per cent) followed by Adityapur (1.5 per cent) and Mihijam (1.4 per cent). So the number of households dependent on open defecation is therefore the lowest in Hazaribagh (10 per cent), followed by Adityapur and Mihijam, with similar figures of 35.3 per cent and 33.4 per cent respectively.

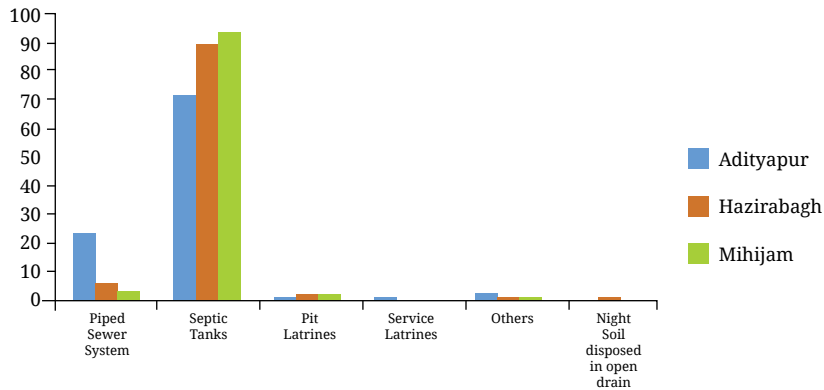
The figure on open defecation might have gone down now with the construction of new individual and public toilets. Following is the data taken from the Swachh Bharat Mission website (July 15, 2018). However, as our field survey reveals, many of the newly constructed public and community toilets are currently not functioning.

Table 3: Toilets built under SBM since Oct 2, 2014

Type of Toilets	Adityapur	Hazaribagh	Mihijam
Individual Toilets	6728	2696	1733
Public Toilets	6 (50 seats)	5 (62 seats)	1 (14 seats)
Community Toilets	22 (194 seats)	15 (153 seats)	2 (30 seats)

In the Swachh Survekshan 2018, Adityapur was ranked as 8 and Hazaribagh as 9, out of 9 select cities in the state. Further, Adityapur was ranked 64 and Hazaribagh 96 out of 471 cities/towns nationally with a population of more than one lakh. Mihijam was ranked 129 out of 468 towns in the East Zone and 30 out of 32 towns in the state ranking with a population of less than one lakh.

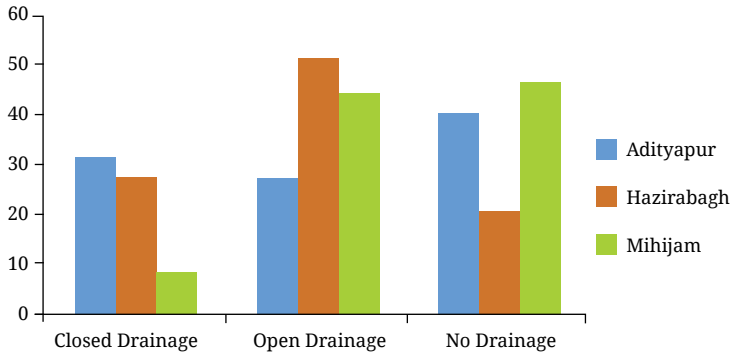
Figure 8: Types of Toilets in Study Towns



If we consider the type of toilets, as given in graph above, we can see that in all the three cities, the toilets are predominantly based on the septic tank system - 71.4 per cent in Adityapur, 89.5 per cent in Hazaribagh and the highest 94 per cent in Mihijam. The reliance on septic tanks for disposal of toilet waste can be understood with the fact of the absence of a sewerage network in all three cities.

In Hazaribagh and Mihijam, 6.2 per cent and 3.3 per cent households are connected to the piped sewer system respectively. Adityapur has a higher proportion of 23.5 per cent households connected to the piped sewer system. This is because Adityapur was initially built as a planned city with a proper sewerage network. Today, however the old sewer lines have collapsed and flow like open drains. In the other two cities also, septic tanks often overflow into local storm water drains, which meet the bigger drains.

Figure 9: Disposal of Grey Water in Study Towns



As such, all three cities do not have a proper drainage network either. As the graph above shows, in Adityapur, 40 per cent of the city does not have drains. And of the existing, only 32 per cent are closed drains. The remaining 28 per cent drains are open. Hazaribagh has a better scenario with almost 80 per cent of the city covered with drains. Of these, 52 per cent are open drains and 28 per cent closed. In Mihijam, 47 per cent of the town has no drainage system. Of the existing, only 8.5 per cent is closed and remaining 44.5 per cent is open.

Desludging

Table 4: Desludging Operations in Study Towns

Particulars	Adityapur	Hazaribagh	Mihijam
Septage Produced	Data not available	57 KLD	29 KLD (Calculated on the basis of annual projected figure for 2018 provided inthe City Sanitation Plan of Mihijam)
Average Size of Septic tank	Length 10 feet, Breadth 8 feet, Depth 10 feet	Length 8 feet, Breadth 4 feet, Depth 10 feet	Length 10 feet, Breadth 4 feet, Depth 7 feet
Connected to Soak Pits	1 percent	2.1% of households with latrines	2% of the Households with latrine
Average desludging period	15 years	15-20 years	

Particulars	Adityapur	Hazaribagh	Mihijam
Desludging service provider (Machine based)	ULB has no machines; 6 private operators	ULB has 2 machines; 1 operational; 5 private operators	ULB has 1 machine, which is non operational; 1 private operator
Average demand in a month	7-8 HHs	5-6 for ULB, 7-8 for private operators	5-6 for ULB and private operators
Desludging cost	Rs 2500-3000	ULB – Rs 1000; Private – Rs 1200 for first trip, Rs 1000 for second trip	ULB – Rs 2500; Private – Rs 2500-3000
Service Lag	1 day	2-3 days for ULB, 1 day for private operators	3-4 days for ULB, 1 day for private operators
Disposal of Septage	Outskirts in Sapra, Yespur and farm lands	On outskirts near Kheergaon	On outskirts near Rajbadi
Treatment	Some farmers using sludge as compost after drying	No treatment facility	No treatment facility
Relationship with ULB	Private operators have registered with ULB	Out of 5 operators, 4 are registered with ULB; Fine of Rs 5000 for not registering; ULB takes 10 % of their monthly income	Private operator not registered with ULB
Manual Scavenging	None according to AMC	None according to HMC	Ongoing; Dalit Community at Haadi Pada involved in this work

Given the predominance of septic tank-based toilets in all three cities, desludging is an important responsibility of the Municipality. As can be seen in the table above, out of the three ULBs, Adityapur Municipal Corporation has no suction machines for sludge collection and disposal, whereas Hazaribagh has two, and Mihijam has one machine respectively (which is not always functional). People can put in an application at the Municipality office to avail this service. All three cities however have private operators, who own suction machines. Most of them belong to the Dalit community, and started this work within the last five years.

The private operators charge somewhat higher than the Municipality for per tank clean up, but are more responsive to the calls. Averagely, in all three towns, households clean their tanks once in 15-20 years. According to the operators in Adityapur, the vehicle is occupied for at least 3-4 days a week but in Hazaribagh, it is 1-2 days per week. Almost all the workers employed in the work are from the Dalit community.

A major issue is of disposal of sludge. In all three towns, the Municipality has not allotted a site/facility for sanitary disposal of sludge. This is despite the fact that the operators have registered with the Municipality in both Adityapur and Hazaribagh. As a result, both the official and private tractor operators dispose the sludge on the outskirts, which raises serious concerns for environmental health. In Adityapur, the operators also deposit the sludge on some private farm lands, where it is processed and used as compost.

Another critical issue is the prevailing practice of manual scavenging in Mihjam. This work is done by men of Haadi Pada basti. It is a poor Dalit community, which has been carrying out manual scavenging for generations. No other community in the town is involved in this work. Presently, about 30-40 male members do this work. Most of them are also casual labour (sanitary workers) for the Municipality but they do this on the side to earn extra money. Typically, they get one call in a month or two. About 5-6 workers together go and clean the tanks at an average charge Rs 12,000, which means that each worker gets about Rs 2000. Given that this work is outlawed under The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013, this issue must be addressed at the earliest by the authorities.

Water Quality Testing

Does the present scenario of sanitation have an impact on the water bodies/ sources of the three cities? In order to investigate this relationship, water testing was done on various sources of surface water (both drinking water and waste water) and ground water.

Various chemical parameters that were tested include:

TDS – Total Dissolved Solids, DO – Dissolved Oxygen, BOD – Biochemical Oxygen Demand, AN – Ammonical Nitrogen, TN – Total Nitrogen

Various biological parameters that were tested include:

TC – Total Coliform, FC – Faecal Coliform, FS – Faecal Streptococci

The parameters and standards taken for the water quality tests have been drawn upon similar studies commissioned by NIUA in the recent past. Even though the Bureau of Indian Standards has withdrawn IS:2296, but this is the standard that is being adopted here to assess water quality, as it is more stringent than the later standards prescribed by the MoEFCC. This is especially in light of the serious impact that diluted standards may have on environmental and human health. Class A water is that which can be used for drinking without conventional treatment but with disinfection and Class C water is that which can be used for drinking with conventional treatment and disinfection.

The following are the test results:

Table 5: Comparative Results of Water Quality Test in Study Towns

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
ADIYAPUR								
Kharkai River Near NIT	164	1.6	16	0.05	0.65	540	ND	ND
Kharkai River at Domuhani	422	2	16	0.2	2.14	920	350	ND
Sitarampur Dam	304	6.8	4.8	0.07	1.67	49	2	ND
AIADA Tap water supply	432	6.4	1.6	0.02	7.8	ND	ND	ND
Kalpanapuri Nala	768	0	80	0.76	7.9	>1600	920	>1600
Kalpanapuri Borewell	716	6.4	1.6	0	97.9	350	49	ND
HAZARIBAGH								
Charwa Dam	76	7.6	3.6	0.015	0.57	350	ND	ND
Matwari Tap Water	84	6.8	2	0.01	2.52	>1600	920	ND
Hazaribagh Lake 1	494	6.8	8	0.22	2.48	>1600	540	>1600
Hazaribagh Lake 2	246	8	3.6	0.5	22.15	>1600	350	ND
Chistia Mohalla Nala	1038	0	32	0.92	10.87	>1600	540	>1600
Chistia Mohalla Borewell	968	4	1.2	0	23.53	540	ND	ND
Okni Pond	668	4.4	24	0.15	4.91	920	ND	ND
Okni Borewell	608	7.2	1.2	0	15.08	ND	ND	ND
MIHIJAM								
Ajay River Pump House	166	8	1.6	0.02	1.53	>1600	7.8	ND

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Tap near gate no.2	148	8	2.8	0.02	0.52	>1600	540	ND
Pokhartala Pond	478	9.2	3.2	0.02	1.74	920	170	ND
Pokhartala Handpump	1392	6	0.8	0.07	268.6	>1600	>1600	1600
Kishori Pond	1174	6	5.6	0.04	4.1	>1600	920	240
Well Near Kishori Pond	838	4	3.6	0	27.4	>1600	540	ND
Well Near Gate no.2	428	5.6	4.8	0.02	260.8	>1600	70	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000		

ND – Not Detectable
DL – Detectable Limit

The water quality tests in the three study towns show that the quality of drinking water is deteriorating due to poor sanitation. Many of the chemical and biological parameters of samples are not within the permissible limits as seen in the table above.

In all three cities, local drains carrying domestic waste water and untreated sewage discharge into and contaminate existing water bodies like ponds, lakes and rivers. For instance, the test of River Kharkai shows that as the river journeys down Adityapur, its water quality greatly worsens due to the fact that domestic and industrial waste water of the city enters it at 22 source points. Similar is the story of the ponds of Hazaribagh and Mihijam. The water quality of these ponds is poor due to the inflow of local drains. As the tests show, this has an impact on the wells and borewells in the vicinity. The water from these sources is therefore not fit for drinking purposes. Even the official sources of water supply such as from Sitarampur Dam in Adityapur and Charwa Dam in Hazaribagh are not totally safe. The poor quality of treated piped water supply in Matwari colony in Hazaribagh is also a matter of concern. It suggests that there is a high possibility that waste water is mixing through the pipelines. Overall, the tests show that the inadequate sanitation provisions and septage management facilities in the three towns has a serious bearing on the quality of drinking water sources, both surface and ground water.

Section III

Sanitation Staffing

Sanitation Staffing

Figure 10: Organigram of ULB's

All the three ULBs have a similar structure of the sanitation staff, as represented by the ornogram above. The executive power of the ULB is exercised by a Board. The ULBs are headed by a Chairman, who is elected by the public, and presides over the meetings of this Board. To assist the Board, various committees and ward committees are constituted. The State government appoints an Executive Officer who administers according to the provisions of the Act and any Rules and Bye-Laws made under the Municipal Board. S/he also carries into effect every resolutions of the Board passed in conformity with the provision of law.

The City Manager/s, who are recruited on a contract are responsible for the overall management of the Municipal affairs and report to the Executive Officer. The Sanitary Inspector reports to the City Manager/s and supervises permanent and temporary sanitary workers - the latter through private contractors. These workers are responsible for solid waste management, cleaning streets and drains.

Table 6: Sanitation Staff in Study Towns

Post	Adityapur	Hazaribagh	Mihijam
Executive Officer	1	1	1
City Manager	3	4	1
Sanitary Inspector	1	1	0
Health Officer	0	0	1
Private Contractors	6	0	1
Sanitary Workers (Permanent)	0	90	4
Sanitary Workers (Contractual)	200	286	50

Source: Adityapur Municipal Corporation, Hazaribagh Municipal Corporation and Mihijam Nagar Parishad

The table above gives the number of staff in all three ULBs. In Adityapur, at present, there are six contractors who each oversee 5-6 wards, and about 200 sanitary workers in all. Even though Adityapur has a bigger population, but the number of workers is much less than that of Hazaribagh (376). Mihijam

Nagar Parishad has 50 sanitary workers. In all three ULBs, most of these workers are temporary; Adityapur, has no permanent sanitary worker. This is because the sanctioned positions in all these towns have never been filled. This is a major issue that needs attention as inadequate wages and lack of social security hugely impact not only the quality of workers' life but also the quality of work. In all ULBs, this concern was expressed by the workers. For instance, in Hazaribagh, workers residing in Ambedkar Basti noted that earlier a board used to regularize 10-12 workers every year but no longer. According to them, there are 299 sanctioned posts but no appointments have been made since 2000 after the formation of Jharkhand government.

Contractualisation is not only a pattern for those on the lower rung of the work chain but also the City Managers, who are the senior most after the Executive Officer. Although they have a better pay, but work on short term contracts, moving from one city to another after an average period of 2-3 years. This potentially impacts the continuity in planning and supervision of small and big projects on sanitation. Also, except for Mihijam, the other two ULBs do not have a Health Inspector, although it is an important position in the chain. This gap should be plugged.

Upcoming Sewerage and Septage Projects

As part of the ongoing initiatives on sanitation, two of the case study towns including Adityapur and Hazaribagh now have an AMRUT project on sewerage and FSSM respectively. No such project has been planned for Mihijam. The details of the project are given below.

Table 7: Comparative Sewerage and Septage Projects in Case Study Towns

Towns	Type of Project	Project Details	Budget & Timeline
Adityapur	Sewerage & Drainage Project	135 km sewerage pipeline; five intermediate sewerage pumping stations; four STPs (Sequential Batch Reactor Technology)	CAPEX = Rs.199.69 Cr OPEX = Rs.40.86 Cr Total = 240.55 Cr Within 30 months (project inagurated in Feb 2018)
Hazaribagh	Feacal Sludge Treatment Plant (FSTP)	Collection of septage from IHHL, Transportation, Treatment through Moving Bed Bio Film Reactor (MBBR) Technology, Disposal	CAPEX = Rs.8.05 Cr OPEX = Rs.24.51 Cr Total = 32.56 Cr Completion date by the end of 2018
Mihijam	Currently there is no sewerage or septate project. Only city sanitation plan available with recommendation of short term, mid-term and long term solutions.		

Source: Adityapur Municipal Corporation and Hazaribagh Municipal Corporation

Project in Adityapur

A sewerage project has already been initiated in Adityapur under AMRUT scheme. As part of this project, 135 km long sewerage pipeline would be laid out (Old sewerage pipes would be replaced with new ones) in all localities and roads. The sewerage line would itself be connected to five Intermediate Sewerage Pumping Stations (ISPS) and four Sewerage Treatment Plant (STPs), where the water would be treated using the technology of Sequential Batch Reactor (SBR). The treated water would be used for gardening, vehicle wash, construction etc. The solid remains would be used as compost in farming activities. The project has a 30-month deadline from the date of inauguration of the project, which happened in February 2018. The contract for construction, as well as operational and maintenance for five years was given to Shapoorji and Pallonji Group. According to the AMC, the four sites where the STPs would be built are Shapra Village, ShaldinBasti, KulupTangi and SetuVihar. However, there have been some problems in land acquisition for three of these sites.

The total cost of the project is Rs. 240 crores including the capital expenditure CAPEX of Rs. 199.96 Crores and operation and maintenance expenditure of Rs. 40.86 Crores. While the CAPEX would be covered under AMRUT funds and State funds, the OPEX would be covered by ULBs through user fees and other resources.

Projects in Hazaribagh

As part of the AMRUT scheme, a 64 KLD Fecal Sludge Treatment Plant (FSTP) is now being built in Hazaribagh. It will be the first town of the state that will get such a plant and will thus be a model plant for other towns. Following a DPR and tender, the contract for the plant has been given to a contractor named Bijay Sarawgi, who is based in Ranchi. He also has the contract for building a septage plant in the city of Chas. The project components include collection of septage from IHHL, transportation to FSTP, treatment of septage through Moving Bed Bio Film Reactor (MBBFR) technology and disposal of treated wastewater and compost.

The total cost of the project is Rs 32.6 crores. The CAPEX of the project is Rs. 8.05 crores and the annual OPEX for the project is Rs.24.51 crores. The Operation and Maintenance Cost (OPEX) would be through public outreach activities and collection of user charges from consumers.

Project is Mihijam

Currently there is no sewerage or septate project in Mihijam. However, the town has a City Sanitation Plan (CSP) available with recommendation of short term, mid-term and long-term solutions. As a short term measures between 2017 and 2020, the CSP proposes development of site for spetage management.

Discussion with the officials of the Nagar Parishad and the field survey suggest that there is not much happening with regard to the short-term measures suggested in the CSP.

Review of Municipal Finances

In reports on the three study towns, an analysis of Municipal Finance was carried out based on three years from 2015-16 to 2017-18 in order to assess the financial status of the ULB as well as financial implications and viability of new sanitation projects. Here the analysis has been presented for the last one year, 2017-18.

Table 8: Comparative Sewerage and Septage Projects in Case Study Towns

Item	Adityapur		Hazaribagh		Mihijam	
	2017-18 (In Lakhs)	2017-18 Per Capita (Rs.) *	2017-18 (In Lakhs)	2017-18 Per Capita (Rs.)*	2017-18 (In Lakhs)	2017-18 Per Capita (Rs.)*
Revenue Receipts	752	335	1230	706	338	729
Revenue Expenditure	889	396	3932	2258	259	745
Receipt - Expenditure	-137		-2702		79	
Capital Receipts	4467	1989	5432	3119	1398	3016
Cap Expenditure	1563	696	2050	1177	1483	3199
Receipt - Expenditure	2905		3382		-85	

*Population was extrapolated using the growth rate between 2001 and 2011

The above table illustrates that the revenue expenditure of both AMC and HMC is more than the revenue receipts during the year 2017-18. In the case of MNP, revenue income has been higher than expenditure for the given period. In contrast, the capital expenditure for both AMC and HMC has remained lower than receipts in 2017-18. In the case of AMC and HMC there is revenue deficit and capital surplus, but for MNP there is revenue surplus and capital deficit. In per capita terms for AMC, both revenue expenditure as well as receipts is much lower than capital receipts and expenditure. In HMC, per capita revenue expenditure is quite high than revenue receipt, while per capita expenditure is less than half of the capital receipt. In MNP per capita capital expenditure is significantly higher than per capita revenue expenditure.

Both for AMC and MNP, apart from own source, a significant part of overall revenue depends on grants and contributions, which is about 40 per cent and 66 per cent respectively in 2017-18. Even though the figures of grants and contribution of AMC has been declining over the years but still it shows that both the ULBs have high dependency on external revenue. Major chunk of revenue expenditure is on establishment (mainly on salaries) followed by operation and maintenance.

Capital receipts of the all the three ULBs including AMC, HMC and MNP mostly include grants and contribution for specific purposes with its share for about 70 percent, 90 percent and 85 percent in 2017-18 respectively. In both AMC and HMC, alongside roads and bridges, there has been significant amount of capital expenditure on the construction of sewerage and drainage, which has been gradually increasing over the years. In MNP Capital expenditure mainly results in the acquisition or increased value of a capital asset (e.g. land, land improvements, infrastructure and equipment).

As discussed in the earlier section, there is a plan of sewerage project (with the budget of Rs. 240 crores) in Adityapur and FSTP project (with a budget of Rs. 32.6 Crore) in Hazaribagh. While the sewerage project has a five-year operation O&M cost of Rs 4086 lakhs, the annual O&M cost of the project comes to around Rs. 2451.43 lakhs. According to the State Action Plan (SAAP) of Jharkhand on AMRUT projects, the O&M cost has to be borne by the respective ULBs through user charges and its own resources. Given the precarious nature of Municipal finance of both the ULBs, the resource mobilisation especially for the same will be a challenge. In Adityapur, the annual O&M expenditure of the project will come around Rs. 817 lakhs and in Hazaribagh the annual O&M cost would be Rs. 2451.43, which is much higher than the total revenue generated by both the ULBs respectively.

Section IV

Conclusions and Recommendations

Conclusions and Recommendations

Is Jharkhand Open Defecation Free?

The study shows that the overall sanitation scenario in urban Jharkhand is dismal. Only 67 per cent of urban households have toilets within the premises. This is lower than the national average of 81.39 per cent. Almost 31 per cent are dependent on open defecation and two per cent are using public toilets. Within private toilets, 73 per cent are based on septic tank systems. This can be related to the lack of proper sewerage system and results in most of the waste water from the households, including septic tanks overflowing into drains. In April 2018, Jharkhand was declared as became the 10th state to be certified open defecation free (ODF) in urban areas by the Ministry of Housing and Urban Affairs (MOHUA). Also, Jharkhand was declared as best performing state in this year's Swachh Survekshan, followed by Maharashtra. Contrary to such declarations, our field survey shows that open defecation is continuing in the State. This may be attributed to the fact that many toilets targeted under SBM are still under construction and many of the newly constructed public and community toilets are currently not functioning.

Septage Disposal: Is it a Private Responsibility?

Given the predominance of septic tank based toilets in all three cities, desludging is an important responsibility of the Municipality. However, out of the three ULBs, only Hazaribagh Municipal Corporation and Mihijam Nagar Parishad have suction machines for sludge collection and disposal. But these are also not always functional. All three cities however have private operators, with these machines. Most of them belong to the Dalit community, and started this work within the last five years. A critical issue is the continuing practice of Manual Scavenging in Mihijam. Most of those who work as manual scavengers are employed with the Nagar Parishad as sanitation workers but do this work on the side for extra income. They belong to a poor Dalit community that has been carrying out manual scavenging for generations. Given that this work is outlawed under The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013, this issue must be also addressed at the earliest by the authorities and the workers should get adequate relief under the provisions of this Act. A major issue is also the disposal of sludge. In all three towns, the Municipality has not allotted a site/facility for sanitary disposal

of sludge. This is despite the fact that the operators have recently registered with the Municipality in both Adityapur and Hazaribagh. As a result, both the official and private tractor operators dispose the sludge openly on the outskirts, which is in clear violation of SWM Rules (2016). It also raises serious concerns for environmental and public health, and thus must be addressed on an urgent basis.

Deteriorating Water Quality: A Public Health Crisis

Inappropriate management of domestic waste water and sludge are having a major impact on water bodies of Jharkhand, including ponds, lakes and rivers. There are several studies which reveal that the water quality of the drinking water sources is rapidly deteriorating across Jharkhand. Our water quality tests in the three study towns substantiates this, as many of the chemical and biological parameters of samples of surface and ground water are not within the permissible limits. All this suggests that there is an urgent need for action at different levels. In addition to planning treatment and proper disposal of waste water and septage, there should also be strict monitoring of water quality by the ULBs under the Environmental Protection Act and related norms, and also a public campaign to raise awareness among the citizens.

Is Present Sanitation Planning Sustainable?

Many towns of Jharkhand have now been covered under the new urban initiatives for improvement of urban sanitation in the State. Seven Class-I cities including Dhanbad, Ranchi, Deoghar, Hazaribagh, Adityapur, Chas and Giridih have been identified for development under AMRUT. All these towns will have either sewerage or septage projects. The initial SAAP (2015-16) proposed Rs 3918.58 crores for fund allocation for all five components of the mission but the State got approval of only Rs 1245.24 crores for various projects in the mission period. Out of this approved budget, the sewerage and septage projects have been allocated Rs. 444.1 crores. The cost of any project under AMRUT has to be shared by Centre, State and ULB. The share of Centre is 50 per cent of the total cost and shares of State and ULB are 30 percent and 20 percent respectively.

The study highlights a major potential challenge in the operation and maintenance of big sanitation projects, such as those on sewerage and septage in Adityapur and Hazaribagh respectively. The review of Municipal finances shows that the Municipal Corporations are in deficit. And the O&M expenditure of these projects is much higher than the total revenue generated by the Corporations. This requires that individual households in these cities pay the additional money to match the need. It raises the question whether a consumer

in a small town will actually be willing or able to pay this cost. So, this brings to the fore concerns of financial viability of the project, as well as equity.

Long Term Planning and Short Term Contracts

A related issue is contractual nature of staff in all ULBs. The city managers, who are on the senior end of the work chain (after Executive Offer) and are responsible to look after the day to day functioning of these new projects, are on short term contracts of average 2-3 years. By the time s/he familiarizes oneself with the local issues and functioning (such as through capacity building trainings), it is time to move to another city. This surely has a potential impact on the effectiveness of planning and implementation of a project, and thus its sustainability. It is recommended that there should be some permanent positions at this level to allow a consistent channel of monitoring and accountability of new sanitation projects. The issue of contractualisation however runs right up to the State level. There is only one permanent town planner, based in Ranchi. Town planners in ULBs are all on short contracts, and therefore are unable to bring in the planning perspective derived from a long term relationship with a city. The State government must rethink this ad-hoc nature of employment in the urban sector, given that a host of new initiatives are on the agenda. Additionally, most of the sanitary workers are also temporary with low salaries and no social security, which does affect their motivation and work efficiency. It is also recommended therefore that the sanctioned positions for sanitary workers be filled up at the earliest.

Wither Democratic Decentralisation

Overall, the study points to a weakening of the process of decentralized democratic governance as envisioned in the 74th Amendment, under which the ULBs were to undertake more localized planning according to local needs and become more self reliant along the way. Even as decentralized technological solutions are being promoted for sanitation, the planning for the projects is completely centralized. This needs to be addressed. As elected representative body of urban citizens, the ULB should be empowered to evaluate and design suitable projects for their areas instead of being required to act as a mere implementing and monitoring agency for the projects imposed from above. In this process, necessary financial, technical and other support should of course be provided from the State and Centre.

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Annexures

Annexure 1
Adityapur

I. INTRODUCTION

Geography

Adityapur is a city and a Municipal Corporation under the Greater Jamshedpur Metropolitan Region of the State of Jharkhand and falls under the Saraikela-Kharswana district. It is named after Raja Aditya Pratap Singh Deo, the last ruler of Saraikela. It is about five kms from Gamharia, the sub district headquarters, 20 kms from district headquarters Saraikela Kharswana and 145 kms from Ranchi. The river Kharkai flows around Adityapur on three sides - North, South and West. It also connects the city to Jamshedpur via a toll bridge through Kadma and the Kharkai Bridge through Bistupur. The yearly average rainfall of the city is 1132.9 mm. The maximum temperature goes upto 45 degree Celsius and minimum to 7 degree Celsius.

Map of Adityapur City

Economy

Adityapur is primarily an industrial township whichwas set up in 1960s, with much of the development concentrated along the Tata-Kandra Road. It has incorporated about 83 villages of the area. As one of the largest industrial belts in India, Adityapur largely serves as a satellite town of Jamshedpur (Tata

Industries). Therefore, the industries here are mainly small and medium scaleancillary industries for Tata. For instance, many parts of Tata Trucks are made here and then sent for assembly in Jamshedpur. Additionally, Adityapur has about 20 large scale industries such as TGS, Usha Martin, Omni Auto L.M.T and RSB. Altogether the city has1200 industries, out of which 900 are running and 300 are sick units.

Demography

The following is a brief demographic profile of the city, based on the 2011 Census.

Table 1: Total Population

No. of Households	Total Population	Total no.of Males	Total no. of Females	Population Density
36,224	174,355	91,664 (54 %)	82,691 (46 %)	3558 per sq km

In 2011, the population of the city was 174355. The total area of the city was 49 sq km and a density of 3358 persons per sq km. In 2001, the population was 119,233, which signifies a decadal growth rate of 46.2 per cent.

Table 2: SC and ST Population

Total SC population	SC Males	SC Females	Total ST population	ST Males	ST Females
8843 (5%)	4505	4338	24,104 (13.82 %)	12,078	12026

As given in the table above, the SC and ST population of the city is 5 per cent and 13.82 per cent respectively.

Sex Ratio

The sex ratio in the city is 902, which is less than the state figure of 948, but has improved from 2001, when it was 868.

Literacy Rate

The literacy rate is 81.93 per cent, which is higher than the state average of 66.41 per cent. The Male literacy is around 88.0 per cent, while female literacy rate is 75.18 per cent. Urban Population

The share of Adityapur in the total urban population of the state is 2.2 per cent. This grew from 1.99 per cent in 2001.

Slum Population

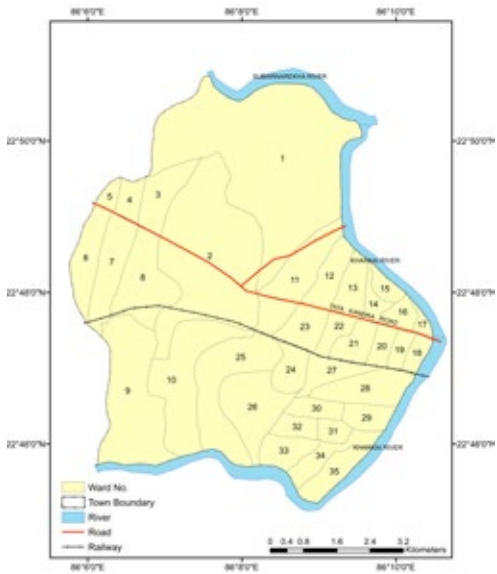
As per the Economic Survey of Jharkhand FY 2016-17, the total slum households in Adityapur are 6457 and the total slum population is 29574 (Government of Jharkhand 2017). The slum population is 7.93 per cent of the total population of the city.

Administration

The Notified Area of Adityapur was established in the year 1963. Following a notification in 2013 and the Municipal elections held in April 2018, it has been upgraded to the status of a Nagar Nigam (Municipal Corporation). Adityapur Municipal Corporation (AMC) is responsible for provision of basic amenities like water and sanitation to the citizens. It is also authorized to build roads within the Municipal limits and impose taxes on properties coming under its jurisdiction.

AMC however has no role in providing facilities to the industries. The management of the industrial area is undertaken by the Adityapur Industrial Area Development Authority (AIADA), which was established in 1972 by the Government of Jharkhand. It is responsible for provision of landand other amenities to the industries. Over the last decades, the industrial area has expanded a lot and now extends to areas such as Ghatshila, Rahargora and Chaibasa.

Ward Map of Adityapur Municipal Corporation



The city is divided in two parts, Adityapur 1 and Adityapur 2. These are located respectively on two sides of the railway line, which intersects the city in the middle. For administrative purposes, the city is divided into wards. Earlier there were 32 wards, which have expanded to 35 after the Municipal Elections.

Adityapur was built as a planned city. However at the time, its population was about 10,000, which has now grown to about 3 lakhs. So all the earlier planning has collapsed and provision of urban services has not caught up. The city has expanded in a haphazard manner, and therefore has poor housing, and attendant problems of congestion, water shortage and lack of public sanitation. In the initial years, a government housing colony was made under the Bihar Housing Board, as per the Housing Board Master Plan prepared in 1960. The ward wise distribution of housing is as follows:

Wards	**Type of Housing**
13-21, 24-30	Housing Board
1--12, 32	Private Housing
Remaining	Both Housing Board and Private Housing

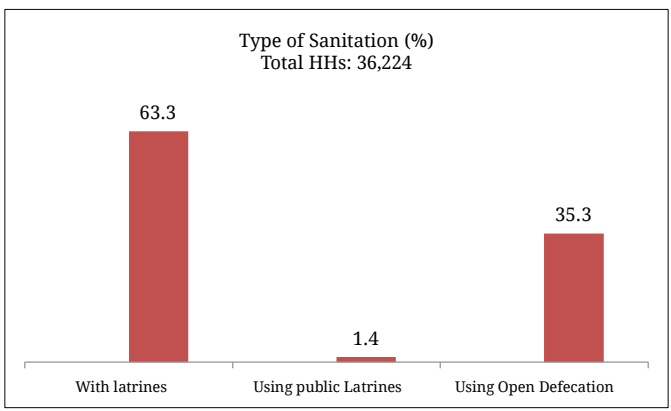
Despite being an industrial area, the city has no industrial housing. Exceptions are a few big industries like Usha Martin which provide some housing units to its workers. Majority of the workers therefore live in private housing.

II. SANITATION AND SEPTAGE MANAGEMENT

Status of Toilets

Among the Class-I cities, Adityapur falls below the State's average availability of improved sanitation in the form of flush toilets. This is alongside two other cities – Dhanbad and Bokaro Steel City (Government of Jharkhand 2017).

Figure 1: Type of Sanitation in Adityapur



As the graph above shows, almost two-thirds of the city's households have private latrines and the remaining largely dependent on open defecation. Less than two per cent are using public latrines. This can be explained by the low number of community/public toilets as given in the following data in Economic Survey FY 2016-17 (Government of Jharkhand 2017).

Table 3: Existing Community Toilet/Public Toilet Status

Total Number	Total Seats	Functional	Non Functional
7	36	5	2

As such, Adityapur is one of the two Class-I cities where least number of community toilets are provided (see Table 3), leaving most of the slum households dependent on open defecation (ibid.) Of the slum households having toilets, almost 98 per cent have flush/pour flush latrines. Following is the data provided by the 2011 Census Report.

Table 4: Type of Private Latrines in Slum Households

Pit	41
Flush/Pour Flush	2721
Service	1
Others	24
Community	3

With the Swachh Bharat Mission (SBM) in place, a number of new individual and public toilets have been built. Following is the data (Table 5) from the Swachh Bharat Mission website (accessed on July 15, 2018). This might be an important step in reducing open defecation. However, our field survey reveals that many of the new community and public toilets are currently not functioning.

In the Swachh Survekshan 2018, Adityapur was ranked 8 out of 9 select cities/towns of the State and 64 among 471 cities/towns/UTs nationally with a population of more than one lakh. In 2017, it was ranked 144 in national ranking.

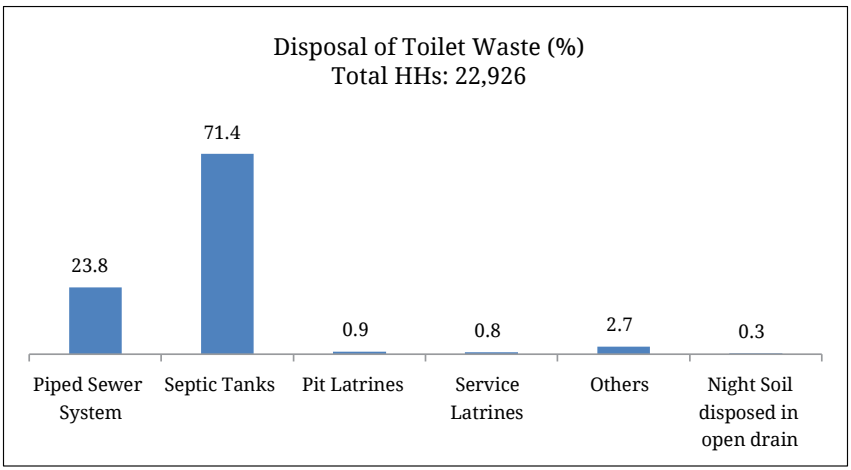
Table 5: Toilets Constructed under SBM

Individual Toilets	6728
Public Toilets	6 (50 seats)
Community Toilets	22 (194 seats)

Sewerage and Drainage

If we look at the type of toilets in the city, as given in graph below based on the 2011 Census, almost 70 per cent of the households have septic tank systems. Only about a quarter are connected to a piped sewer system.

Figure 2: Disposal of Toilet Waste in Adityapur

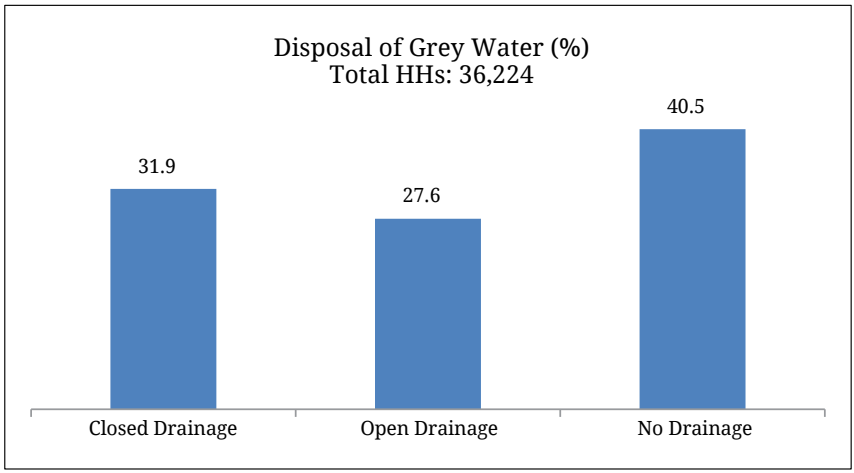


When the Housing Board Colony was built up in the 1960s, it had a proper sewerage system. But now most of that has collapsed, as repairing and rebuilding has almost never been done. The rest of the city never got this system. The old sewer lines flow like open drains and are connected to the big drains. The water from septic tanks also overflows into the drains.

Open and Closed Drains in Adityapur

As such, most of the city does not have a proper drainage system. As the graph below shows, 40 per cent of the city does not have drains. And of the 60 per cent drains,only 32 per cent are closed drains. The remaining 27.6 per cent drains are open.

Figure 3: Disposal of Grey Water in Adityapur



These drains carry both domestic and industrial wastewater, and meet the big drains (nalas) in the city. These big drains flow into the Kharkai River.The drains coming from Jamshedpur also fall into the river (See section below on Water Quality). Some drains also flow into the low-lying areas on Kandra road.

According to AMC officials, the city has about 1800 running metres of pakka drains, which the Municipality is maintaining. Then there are kutcha and brick work drains (data not available with AMC). These drains are constructed on the request of ward members through maintenance funds. Since the funds are limited, decisions about which areas should be given priority for drains are taken in the board meeting.

In our observation, the drains have only been partially constructed in parts of the city. Some residents, such as those in Manjhi Tola, Tripurari Colony have all collectively built a drain in their streets with no support from Municipality. There has been some civil society concern and action on the issue of sanitation. For instance, in 2015, residents of Adityapur submitted a demand to the AMC to fix the five decade old sewer system in the city. It was led by the voluntary organisation Jan Kalyan Morcha (Jenamani 2015). A meeting with Om Prakash, head of the Morcha revealed that this organisation has been doing advocacy efforts for improvement in water and sanitation active for the last 10-15 years

and in this regard given letters to Commissioner, Members of Parliament, Chairman, District Commissioner and SDO.

Desludging

Given that 71 per cent of the households with latrines have septic tanks, septage management is an important responsibility for the Municipality. The following table gives in brief the present scenario of this work.

Table 6: Desludging Operations in Adityapur

Particulars	Details
Septage Produced	Data not available
Average Size of Septic tank	Length 10 feet, Breadth 8 feet, Depth 10 feet
Connected to Soak Pits	1 per cent
Average desludging period	15 years
Desludging service provider (Machine based)	ULB has no machines; 6 private operators have 7 machines in all
Average demand in a month	7-8 HHs
Desludging cost	Rs 2500-3000
Service Lag	1 day
Disposal of Septage	Outskirts in Sapra, Yespur and other farm lands
Treatment	Some farmers using sludge as compost after drying
Relationship with ULB	Private operators have registered with ULB
Manual Scavenging	None

System of providing Desludging Services

There is no data on how much of septage is produced in Adityapur. The average size of the septic tank is 10 feet in length, 8 feet in breadth and 10 feet in depth. The AMC has no arrangement or plan for sludge collection and disposal. The city therefore solely relies on septage management by private operators, who have suction machines and tractors.

A man called Pahad Singh in 2013 brought the suction technology in Adityapur. He saw this technology being used in Delhi at a hotel he was staying in. Right away, he bought a second hand machine and transported it to Adityapur. Initially he was the only operator in the area. But soon the demand grew. As Pahad Singh was in full time employment, he wasn't able to cater to all the calls, so he encouraged his other close associates to start this business. At present, there are six more people with one machine each (the other five are

Lal Singh, Jaswal, Guptaji, Vinay and Randhir). Pahad Singh has two machines, so in all seven machines operate in the area. Most of them belong to the Dalit community. As shown in the pictures below, they have done massive publicity of the service all over the town, through paint notices on public wall and poles.

Pahad Singh with his Suction machine and Tractor

Licensing and Monitoring

Recently, all the private operators have registered with AMC and Jugsalai Notified Area. The registration is like an official permission for them to operate in the area, though the permission does not extend for disposal of sludge in any designated site/s. The AMC does not regulate their work. As such, the operators do not have much demand from the ULBs, except the removal of entry barriers for their six wheel vehicles in different areas.

Advertisements for Private Desludging Operators

Some time back the operators had made a group called 'Green India, Clean India' and wanted to register it as a company. Their aim was to ask the state government for a loan on setting up septage treatment plant. But as consensus did not emerge on the issue among all operators, the plan was shelved.

Demand and Payment of Service

Apart from Adityapur, these operators work in all neighbouring areas including Sonari, Jugsalai, Mango and Jamshedpur. They charge Rs 2500-3000 per tank clean up. If it is a big tank and requires two rounds, then the charges are Rs 5000. The tractor capacity is 5000 litres. Averagely,a 4-5 memberfamily gets its tank cleaned once in 15 years.

According to the operators, the vehicle is occupied for at least 3-4 days a week. As such, unless there are two clients in a day, he doesn't send the vehicle, because the payment received from one house is just about enough to cover the labour wages. With two clients, he can save some money. Altogether, theyhave work for about 20 days in month. Sunday is off for labour and festive days like Navratras and Ramzan are also low on demand.

Sludge Disposal

There is no one fixed site for disposal of sludge. It is mostly disposed near the forestland in Sapra and other barren areas, which is in clear violation of the Solid Waste Management (SWM) Rules 2016. The operators have also taken some farm lands on outskirts on lease or for free for this disposal. For instance, one bigha land has been taken near the village Yespur on an annual lease for Rs 15,000. Another farm site is near Mango. Initially they contacted and paid the farm owners to allow disposal of sludge on vacant farm land. After the farmers understood the value of this sludge as compost and started using it, they stopped taking money for this disposal.

When the farm is empty the sludge is put right onto it. When it is not empty then sludge is deposited in six feet deep pits. Human sludge cannot be used as compost right away. First the water in it has to evaporate. And when it is dry, it has to be mixed with gobar (cow dung) and soil. This dried mixture is then ready as compost. Most farmers are open to using it because they use tractors to spread it. This is unlike the tribals, who work with hand and therefore don't like to work with human sludge.

The operators anticipate that in near future sludge disposal would be a challenge, as most of the farm land is now being taken over by builders for apartments. The residents would not want sludge near their houses.

Solid Waste Management

As can be seen below in the pictures, the solid waste management of the city is dismal. While solid waste is collected, but there is no provision for either its treatment or scientific disposal. At present, the waste collectors dump the waste in open, low lying areas, such as near the Radha Swami land on the banks of river Kharkai. There is no officially designated dump site. According to the AIADA officials, the hazardous industrial waste is also disposed openly in a barren land near Dugni village in Saraikela.

There is now a plan to build an integrated solid waste management plant. About 30 acres of land has been identified in the area of Chota Govindpur. The tender is in progress. All the solid waste of Jamshedpur, Adityapur, Jugsalai and Mango would be sent there. Waste would also be segregated and wet waste would be made into compost. Additionally, a hazardous waste management facility is being built outside AMC industrial area at Dugni by the company, Ramky Enviro Engineers Limited. Funding for this projectis coming from the government under Industrial Infrastructure Upgradation Scheme (IIUS).

III. WATER QUALITY

Does the present scenario of sanitation have an impact on the water bodies/ sources of Adityapur? In order to investigate this relationship, water testing was done on various sources of surface water (both drinking water and waste water) and ground water.

Various chemical parameters that were tested include:
TDS – Total Dissolved Solids, DO – Dissolved Oxygen, BOD – Biochemical Oxygen Demand, AN – Ammonical Nitrogen, TN – Total Nitrogen

Various biological parameters that were tested include:
TC – Total Coliform, FC – Faecal Coliform, FS – Faecal Streptococci

The parameters and standards taken for the water quality tests have been

drawn upon similar studies commissioned by NIUA in the recent past. Even though the Bureau of Indian Standards has withdrawn IS:2296, but this is the standard that is being adopted here to assess water quality, as it is more stringent than the later standards prescribed by the MoEFCC. This is especially in light of the serious impact that diluted standards may have on environmental and human health. Class A water is that which can be used for drinking without conventional treatment but with disinfection and Class C water is that which can be used for drinking with conventional treatment and disinfection.

Water Supply

There are two chief sources of water in the residential areas of Adityapur – piped water supply and ground water. Piped water is supplied by the Public Health Engineering Department (PHED) through the treatment plant at Sitarampur Dam. Legal water connections are available to 7500 homes, largely in the Housing Board area. The rest of the city's residents in private colonies rely on private borewells (HYDT borewell).

Similar is the case with industries. According to Secretary, AIADA, only a few industries get piped water supply and the rest have borewells. Boring is not legally allowed to the industries as AIADA doesn't give permission for the same. However, as industries need water, so AIADA does not really penalize them for borewells. Few industries take water from the Subarnarekha River, such as Usha Martin, which pumps its water directly from the river.

Now, the Jharkhand Urban Infrastructure Development Company (JUIDCO) is making a Detailed Project Report (DPR) for a new water treatment plant which will cater to both industrial and residential areas. This would include a new dam/barrage at Gajya on Kharkai River. It would supply about one crore gallon of water every day.

River Pollution

Three kinds ofwastewater typically destroy water bodies - industrial, agricultural and domestic. In Adityapur, both domestic and industrial waste water is a major cause of pollution of both the river Subarnarekha (which comes from Ranchi) but more importantly Kharkai River (which comes from Orissa and flows on three sides of the city). This has been a matter of concern for the residents.

In recent years, the impact of industrial pollution on water bodies in the area has been documented by researchers. In 1994, a report by World Bank said that in Adityapur, the industrial waste is discharged into open drains and into the Kharkai River and so "installation of combined effluent treatment plants is advisable" (Bhatia et al 1994). In 2012, a report 'Pollution Glorified' published

in the magazine 'Down to Earth' reported about a medium-scale iron and steel mill belonging to conglomerate Usha Martin, that is polluting Sitarampur dam, a major water source. The report noted:

> Spread over 120 hectares, the mill became operational in Adityapur, a suburb of Jamshedpur, in 1974. It includes two mini blast furnaces, three coal-based sponge iron kilns of capacity 350-tonne-per-day and a steel-making unit with three electric arc furnaces…The Sitarampur dam, a major water source, has been contaminated as the mill discharges untreated wastewater into the dam (Down to Earth 2012).

It was in 2012 that a Common Effluent Treatment Plant (CETP) was approved for Adityapur industrial area. It was claimed that once the CETP is operational, the Kharkhai River will be saved from being exposed to the 5 million litres (5MLD) of liquid waste daily generated by the industries (Sridhar 2012). In the last few years, the CETP for hazardous industrial waste, of a capacity of 10.000 MLD has been constructed by the company Ramky Enviro Engineers Limited. It is located next to Gamharia *thana.* According to AIADA officials, all industries mostly generate liquid waste, whichis now transported to CETP in containers. Now a pipeline is being made to carry this waste, in which the liquid waste would be pumped. The treated water would be used by the industry.

Pollution of Kharkai River

The pollution in the Kharkai River was also documented in two recent studies are quoted below:

> This water pollution of Kharkai River through discharging of different types of wastes such as industrial wastes, household and growth centre related wastes, chemical fertilizers, and landfill leakages has affected all fishes and most of the aquatic plants and animals to death, disruption of food chains, and critical diseases to human beings, destruction of ecosystems and environment, and socio-cultural habits of the people in

the area. Lack of proper management of industrial wastages release and lack of proper implementation of the policies are the main reasons of it (Gupta and Verma 2017).

Domestic wastes and industrial wastes are manmade pollutants of water. The state of surface and ground water pollution in Jamshedpur is alarming. Especially the Kharkai is largely polluted by the people of Adityapur and Jamshedpur city.... Excess of pollution in the Kharkai River water leads to algal blooms. The worst part is, this bad impact transports to others through food chain. Therefore, we must be aware of the adverse influence polluted water may have on us (Verma and Sinha 2016).

TEST RESULTS

Kharkai River near NIT and Kharkai River at Domuhani

The pollution of the Kharkai River can be attributed not only to the drains coming from Adityapur, but also from Jamshedpur. The river is fairly clean till the first drain meets near the National Institute of Technology (NIT) in Adityapur. As the river flows downstream, multiple drains carrying domestic waste enter it. The first major industrial drain comes in from Jamshedpur. It is called the *Lal Nala,* as it carries iron pigments from Tata industries. The second major drain carrying industrial waste from Jamshedpur meets at the bridge connecting Jamshedpur and Adityapur. This is opposite the Parvati Ghat, near the Radha Swami land. Between these two drains is the Jamshedpur power plant. Altogether, from the point that Kharkai enters in Adityapur until it leaves the city at Domuhani (near Mango Bridge) there are 22 source points for waste water entering the river. And almost 65 per cent of them are big drains.

To understand how these drains impact the quality of river water, it was tested at two points – near NIT (before the first drain enters) and at Domuhani when it meets the river Subarnarekha. The following are the results:

Kharkai River at NIT

Kharkai and Subarnarekha Rivers meet at Domuhani

Table 7: Water Testing Results in Adityapur (1)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Kharkai River near NIT	164	1.6	16	0.05	0.65	540	ND	ND
Kharkai River at Domuhani	422	2	16	0.2	2.14	920	350	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000		

ND – Not Detectable
DL – Detectable Limit

The test results show that as the river journeys down Adityapur, its water quality hugely deteriorates due to discharge of wastewater. At NIT, the water quality is much better. Even though some chemical parameters are not within limit, but they are not alarming. The biological parameters except TC are normal. When the river reaches Domuhani, all the chemical parametersare out of permissible range except TDS and DO. Two biological parameters, TC and FC, are also unusually high. It is clear that both domestic and industrial waste water is contributing to excessive river pollution.

Sitarampur Dam and AIADA Tap Water Supply

Since Adityapur was established, both the population and water requirement of the city has increased to almost 30 times. But there remains only one source of piped water supply. This is from the Sitarampur dam, which is located on the outskirts of the city and is charged through a stream of Kharkai river. A water treatment plant is in operation here since the 1970s.The technology used in this treatment plant is very old. Essentially it has not been upgraded after it was built. Originally it had a capacity of 50 lakh gallons of water, which might have reduced over the years. According to the residents, the quality of treated water from the dam is very poor. This is attributed to old pipes, which have never been replaced. Therefore most people use RO technology with this water in their homes.

A test was done to see if there is any contamination of this water in the course of its supply to the residents. Two samples were therefore taken – one of the untreated water at the dam and two of the treated water, from a tap at AIADA office. The following are the results:

Table 8: Water Testing Results in Adityapur (2)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Sitarampur Dam	304	6.8	4.8	0.07	1.67	49	2	ND
AIADA Tap water supply	432	6.4	1.6	0.02	7.8	ND	ND	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000		

ND – Not detectable
DL – detectable limit

The test results show that from its source (dam) to the end (tap), chemical parameters including TDS and TN increase significantly beyond permissible range, but two other biological parameters including TC and FC, which were not within the permissible limit,improve. The results show that the quality of the dam water is not as bad despite the fact some industrial and domestic waste water enters it from one side. However if sanitation systems are not in place then due to over population and ongoing expansion of the industrial area, the dam water could get much more contaminated than what it is today.

Sitarampur Dam

Kalpanapuri Nala and Kalpanapuri Borwell

Kalpanapuri is a residential colony in Ward No. 23 and comprises both Housing Board and private housing. The office of the AMCis also located in Kalpanapuri. A big drain flows right in front of this office. Many small drains carrying domestic waste waterfrom residential area meet this drain. Almost all of the residents in private housing are dependent on ground water through borewells nearby. A water quality test was therefore done of two samples - drain water (Kalpanapuri Nala) and of a borewell near it (Kalpanapuri Borwell) – to know if there is any issue of contamination.

KalyanpuriNala outside AMC Office

The result shows that all the chemical parameters except DOand all the biological parametersfor the drain water are out of permissible limit. This was expected. But what is alarming is that for the water drawn from the borewell near to the drain, all other chemical and biological parameters, except for BOD, AN and FS, are out of permissible range. This shows that there is some contamination of the ground water due to the drain, and therefore this water is not suitable for drinking and cooking purposes. However, given that treated piped water supply is not available for this locality, people have no choice but to depend on it.

The water quality results from all the sites of Adityapur clearly indicate the

deteriorating quality of both surface and ground water in the city due to improper sanitation. Besides proper disposal of industrial waste water, urgent measures are required for treatment of domestic waste water to prevent the Kharkai River from becoming a big drain.

Table 9: Water Testing Results in Adityapur (3)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Kalpanapuri Nala	768	0	80	0.76	7.9	>1600	920	>1600
Kalpanapuri Borewell	716	6.4	1.6	0	97.9	350	49	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000		

ND – Not Detectable
DL – Detectable Limit

IV. SANITATION STAFF

This section lays out the work chain responsible for sanitation in the city. The AMC is headed by a Chairman, who is elected by the public, and presides over the meetings of the Board, which exercises the executive power of the Corporation. To assist the Board, various committees and ward committees are constituted. The State government appoints an Executive Officer who administers according to the provisions of the Act and any Rules and Bye-Laws made thereof under the Municipal Board. S/he also carries into effect every resolutions of the Board passed in conformity with the provision of law.

Figure 4: Ornogram of AMC

As seen in the ornogram above, the top government official in the chain is the Executive Officer (EO). The city manager/s report to the EO. They are recruited on a contract and undertake regular trainings in Ranchi. The city manager supervises the Sanitary Inspector, who is the only permanent staff in this chain. The Sanitary Inspector is in-charge of private contractors who employ

temporary sanitary workers. As given in the table below, there are currently six contractors in Adityapur, who oversee 5-6 wards each. Each contractor has about 30 workers (six for each ward). Overall, about 200 sanitary workers are employed with AMC. Out of these six workers per ward, two are for door-to-door collection of waste and four for waste disposal and cleaning of drains. The AMC pays the contractors through the Swachh Bharat Mission.

Table 10: Sanitation Staff in AMC

Post	Staff
Executive Officer	1
City Manager	3
Sanitary Inspector	1
Health Inspector	0
Private Contractors	6
Sanitary Workers (Permanent)	0
Sanitary Workers (Contractual)	200

Source: Adityapur Municipal Corporation

According to a City Manager, while the workers are assigned per ward, but sanitation work in the city is also driven by demand from the public. If they have any complaints about sanitation in the area, they register it online or manually at a counter within the AMC office. The Sanitary Inspector informs the respective contractors to address the issue.

As seen, all the sanitary workers are temporary, reporting to private contractors. Inadequate wages and lack of social security are huge concerns for the workers and necessarily has an impact on the quality of work. It is important that the staff is regularized and given proper remuneration. Also, at present, there is no Health Inspector in the ULB, which a gap that needs to be plugged.

V. UPCOMING SEWERAGE PROJECT

Like in most Urban Local Bodies (ULBs), thereis a standard process of finalising sanitation projects in Adityapur. AMC sends its demand for projects to the State government, which decides on the grant. If it is a smaller project of Rs. 50 lakh to 1 crore, then the tender is put out by the AMC itself on its website, such asfor small constructions related to drainage. However, planning for bigger projects such as sewerage and septage, is the domain of the State government. If the State government decides on a project, then Jharkhand Urban Infrastructure Development Company (JUIDCO) makes the Detailed Project Report (DPR) and puts out the tender online. After the contract for a project is finalized, the Municipality gives the land for the same. The projects are usually for five

years and the AMC has to monitor the project and support JUIDCO in overall supervision of these projects.

Recently, as part of the AMRUT scheme, a sewerage project has been initiated in Adityapur. At present, 27 MLD of sewerage is generated in the city. By 2047, the population of the city is expected to grow to 4,52,402 and the sewerage is expected to grow to 50 MLD.

On February 11, 2018, the Chief Minister, Raghubar Das inaugurated the Sewerage project at the Jay Prakash Udyan. As part of this project, 135 km long sewerage pipeline would be laid out (Old sewerage pipes would be replaced with new ones) in all localities and roads. The residents would have to connect their toilets with a pipe to the main line. In case the colony is far from the main line, the Municipality would make arrangements for this connection. The sewerage line would itself be connected to five Intermediate Sewerage Pumping Stations (ISPS) and four Sewerage Treatment Plant (STPs), where the water would be treated using the technology of Sequential Batch Reactor (SBR). The treated water would be used for gardening, vehicle wash, construction etc. The solid remains would be used as compost in farming activities. The project has a 30-month deadline.

The DPR gives the following details:

1. Sewer and Appurtenance Works including pipe supports for Drain Crossing, Trenchless Excavation.
2. Civil, Electrical and Mechanical works for 5 Intermediate Sewerage Pumping Stations (3.11 MLD, 5.14 MLD, 5.14 MLD, 5.18 MLD and 1.15 MLD)
3. Civil, Electrical and Mechanical works for 4 STPs (6 MLD, 28 MLD, 13 MLD and 3 MLD)
4. Construction, providing services and development of Administrative lick (including office, staff quarter, laboratory etc)

The DPR was prepared by M/S TCE, a consultancy firmand submitted it to the State government. A tender was then floated online. The contract for construction, as well as operational and maintenance for five years was given to Shapoorji and Pallonji Group.

The following is the cost of the project:

Table 11: AMRUT Funds for Sewerage Project (In Crores)

Capital Expenditure (CAPEX)	199.69
O& M Expenditure for five years (OPEX)	40.86
Total	240.55

According to the guidelines of the AMRUT scheme as well as the State Annual Action Plan given by the Ministry of Urban Development, the CAPEX would be covered under AMRUT funds and OPEX would be raised by AMC by charging user fees from consumer and through other internal sources with support from the state.

In addition, AMC has the responsibility of providing the land for the project and also has to support JUIDCO for information, correspondence and monitoring. Both AMC and JUIDCO are therefore the supervising agencies. The funds are to come directly from the State to AMC, which is responsible to pay Shapoorji and Pallonji. According to the AMC, the four sites where the STPs would be built are Shapra Village, Shaldin Basti, Kulup Tangi and Setu Vihar. However, as given in the table below (Table 12), based on the information given by AMC, there have been some problems in land acquisition for three of these sites.

Table 12: Land Encroachments on Proposed Sites for STPs

STP	Khata No.	Khatian No.	Ward	Location	Area Required as Per DPR	Area available as per R.E.V.M.E.P	Type of Land	Status	Remarks
STP1	416	1741	02	Shapra Village	2.6 Acre	1.74 Acre	Purani Patri	Encroachments removed on 01-02-2018	Site clearance awaited from JUIDCO
STP2	261	28	05	Shaldih Basti	7.3 Acre	4.00 Acre	Purani Patri	Almost 50% land is encroached	Site clearance awaited from JUIDO; Encroachment removal is pending
STP3	285	1808	17	Kulup Tangi	4.5 Acre	4.00 Acre	Purani Patri	The total area is encroached by Brick Field. Balance part of the land is situated on low lying area on river bank.	This area will affect the scheme design as well as the length of Network Pipeline due to its location in the low lying area. Instead we are proposing any of the land in khata no. 17, khata no. 1197, 1198, 1199 & 1223 as a replacement to fit the design.
STP4	1182	3271/72	---	Setu Vihar	2.10 Acre	(0.93+0.47) = 1.40 Hct= 3.50 Acre	PuraniPatri + Goda land	The land is partially encroached in plot no. 3271; Totally encroached in plot no. 3272.	Site clearance awaited from JUIDO; Encroachment removal is pending

VI. REVIEW OF MUNICIPAL FINANCE OF ADITYAPUR MUNICIPAL CORPORATION

This section makes an analysis of the financial status of Adityapur Municipal Corporation (AMC) by reviewing its three year budget documents and audited financial reports from 2015-16 to 2017-18, and in that light makes an assessment of the financial implications and viability of the new sewerage project in the city.

As seen in the table below, the revenue receipt for AMC show a decline over the period from 2015-16 to 2017-18 but in case of revenue expenditure there has been a significant increase from Rs 377 lakhs in 2015-16 to Rs 889 in 2017-18. In 2017-18 expenditure exceeds receipt by Rs137 lakhs. On the other hand, capital expenditure has remained lower than receipts in all the three years. In per capita terms both revenue expenditure as well as receipts are much lower than capital receipts and expenditure.

Table 13: Overall Finances of AMC from 2015-16 to 2017-18

	2015-16 Actuals (In Lakhs)	2016-17 Actuals (In Lakhs)	2017-18 Actual (In Lakhs)	2017-18 Per Capita (in Lakhs)
Revenue Receipts	915	1249	752	335
Revenue Expenditure	375	577	889	396
Receipt - Expenditure	540	671	-137	
Cap Receipts	3505	3921	4467	1989
Cap Expenditure	877	2502	1563	696
Receipt - Expenditure	2628	1419	2905	

Source: Annual audited Financial Account and Budget for Various years
*Population was extrapolated using the growth rate between 2001 and 2011.

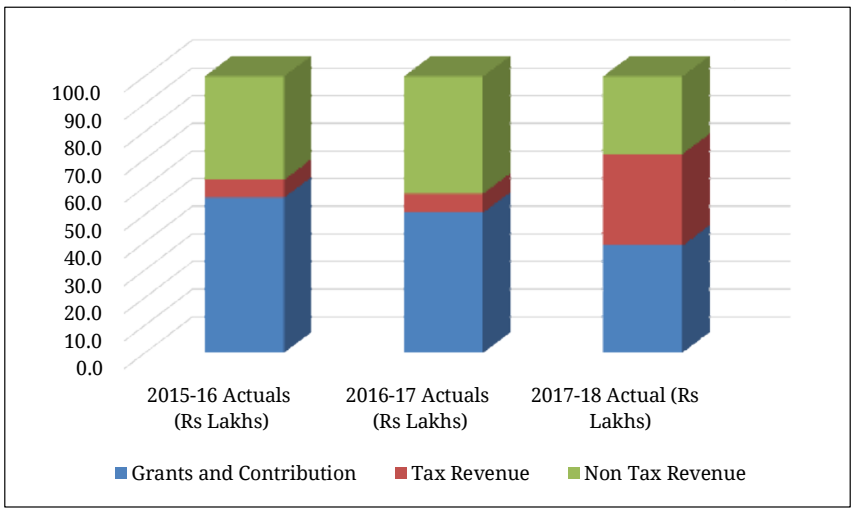
Tax revenue, fees and user charges are important component of own source revenue for the AMC. Apart from that, a significant part of overall revenue depends on grants and contributions. As can be seen in the table below, share of grants and contribution have been more than 50 percent in 2015-16 and 2016-17 but it slips downward to 39 percent in the year 2017-18. Share of taxes in overall revenue has increased to a considerable extent from six percent to 33 percent between 2015-16 and 2017-18. The year 2016-17 shows very high non tax revenue with its share crossing 40 percent. This increase is mostly attributed to excess provisions written back to the Corporation.

Table 14: Revenue Receipts of AMC from 2015-16 to 2017-18

	2015-16 Actuals (In Lakhs)	2016-17 Actuals (In Lakhs)	2017-18 Actual (In Lakhs)
Own Source			
Tax Revenue	59	86	249
Rental income - Municipal Properties	5	11	2
Fees and User Charges	310	290	182
Sale and Hire Charges	3	6	0
Others	23	221	27
External Source			
Revenue Grants, Contribution and Subsidies	514	634	292
Total	915	1249	752

Source: Annual audited Financial Account and Budget for various years

Figure 4: Share of Grants and Contribution, Tax Revenue and Non-tax Revenue in OverallRevenue of AMC (In %)



Source: Annual audited Financial Account and Budget for various years

Establishment expenses, expenditure on operation and maintenance and expenditure out of revenue grants and contribution are the three most important components of revenue expenditure for the AMC. Together they comprise more than 90 percent of the total expenditure for the first two years. In 2017-18, a large chunk of expenses comes under miscellaneous expenses as Rs.312 lakhs are spent under this category.

Table 15: Revenue Expenditure of AMC from 2015-16 to 2017-18

	2015-16 Actuals (In Lakhs)	2016-17 Actuals (In Lakhs)	2017-18 Actual (In Lakhs)
Establishment Expenses	70	82	61
Administrative Expenses	15	49	49
Operation and Maintenance	125	237	175
Interest and Finance Charges	0	0	0
Program Expenses	0	1	1
Revenue Grants, Contribution and Subsidies	164	208	292
Others	0	0	312
Total	375	577	889

Source: Annual audited Financial Account and Budget for various years

Capital receipts of the Corporation mostly include grants and contribution for specific purposes with its share more than 70 percent in all the three years. Within grants and contribution share of State government is higher than that of Central government for all the three years. In 2017-18 State government gave Rs 2302 lakhs as grant and Central government transferred around Rs1171 lakhs in 2017-18.

Table 16: Capital Receipts of AMC 2015-16 to 2017-18

	2015-16 Actuals (In Lakhs)	2016-17 Actuals (In Lakhs)	2017-18 Actual (In Lakhs)
Grants, Contribution for Specific purposes			
Central	54	649	1171
State	2507	2278	2302
Total Grants and Contribution	2560	2927	3472
Deposits Received	150	212	281
Other Liabilities	795	782	714
Total	3505	3921	4467

Source: Annual audited Financial Account and Budget for various years

Two most important component of capital expenditure for the AMC includes repayment of loans and advances and expenditure on fixed assets. Within the fixed assets, construction of roads and bridges are a top priority of the Corporation followed by sewerage and drainage and public lighting. On an

average for three years Rs309 lakhs was spent on roads and bridges and Rs164 lakhs for sewerage and drainage projects.

Table 17: Capital Expenditure of AMC from 2015-16 to 2017-18

Item	2015-16 Actuals (In Lakhs)	2016-17 Actuals (In Lakhs)	2017-18 Actuals (%)	Average of three years
Investments- Municipal Fund	0.0	0.0	236.5	78.8
Loans, Advances and Deposites	3.3	678.2	1.3	227.6
1. Fixed Assets				
Buildings	12.1	39.4	193.8	81.7
2. Infrastructure Assets				
Park & Playgrounds	0.0	28.0	0.0	9.3
Roads and Bridges	499.1	365.0	64.1	309.4
Sewarage& Drainage	184.9	299.5	7.5	164.0
Water Ways	21.6	148.5	60.2	76.8
Public Lighting	61.4	275.6	0.0	112.3
3. Others Assets				
Plant & Machinery	0.0	4.2	0.0	1.4
Vehicles	19.0	71.2	64.0	51.4
Office & other equipment	3.3	0.2	0.9	1.4
Furniture, fixtures, fittings and electrical appliances	3.4	0.0	10.8	4.7
4. Others fixed Assets	69.4	7.8	0.0	25.7
Total Capital Expenditure on Assets	874.1	1239.8	401.2	838.4
Capital Works in Progress	0.0	584.1	923.6	502.6
Total Capital Expenditure	877.4	2502.1	1562.6	1647.4

Financial Implications of Sewerage Project

The AMC is one of the seven ULBs that have been chosen for AMRUT scheme in Jharkhand. AMRUT scheme is implemented with funding from three sources namely Central government, State government and ULB. In Adityapur, the share of ULB is 20 percent of the total cost and share of Centre and State are 50 percent and 30 percent respectively. The present project on sewerage plant has capital expenditure of Rs 19969 lakhs with five-year operation and maintenance cost of Rs 4086 lakhs.

Table 18: Revenue Generation and O&M Requirement for New Project

Particulars	In lakhs	Per Capita Rs.
Operation and Maintenance for a year in AMRUT Project	817.2	364
Total Revenue generated in 2017-18	752.3	335
Tax revenue and user charges in 2017-8	430.9	192
Operation and Maintenance Expenditure in 2017-18	175	78

Given the precarious nature of Municipal finance in Adityapur, the resource mobilization, especially for operation and maintenance will be a challenge. If we break the operation and maintenance expenditure annually, the expenses come around Rs 817 lakhs, which is much higher than the total revenue generated by the Corporation. The tax revenue along with user fees for the corporation is Rs 192 in per capita terms, which is almost half of what is required. Given this shortage, the operation and maintenance of this project will require raising additional resources. This means that individual households in Adityapur will have to pay to the additional money to match the need.

VII. CONCLUSIONS AND RECOMMENDATIONS

1. As a satellite town of Jamshedpur, Adityapur was set up in 1960s as a planned township with a proper sewerage system. More than 50 years later, the city population has grown almost 30 times, but the provision of basic amenities has not caught up. Most of the population lives in private, unauthorized colonies, with no planned facilities of piped water supply or sanitation. The sewerage network has collapsed as the pipes were never repaired or replaced. The old sewer lines now also flow like open drains, and meet the bigger drains of the city which fall into the Kharkai River that surrounds the city on three sides.
2. According to the 2011 census, about 65 per cent of the population has private toilets. The remaining population is dependent largely on open defecation, which may now have reduced, given that a number of private and community toilets have been built under the Swachh Bharat Mission.
3. As per the 2011 Census, private latrines are largely based on septic tank systems, and whose water mostly goes into the open drains. Currently AMC has no role in desludging operations. That is being done by six private operators, who have seven suction machines. They dispose the sludge on the outskirts, which poses a huge environmental health hazard and is also in violation of Solid Waste Management (SWM) Rules 2016. While AMC has registered these operators but has not given them any allocated site/facility for sanitary disposal of sludge. It also has no plan for septage management in near future. This is a matter of concern that needs to be addressed at the urgent.

4. The water quality results from all the sites of Adityapur clearly indicate the deteriorating quality of both surface and ground water in the city due to improper sanitation and septage management. Proper disposal and treatment of both domestic and industrial waste water should be a priority in the interest of public and environmental health. This is especially required to prevent the Kharkai River from becoming a big drain.
5. Now, as part of the AMRUT scheme, a sewerage network is to be built in the city by 2019, which would comprise a 135 kms long sewerage pipeline, four STPs and five pumping stations. The project would ensure that wastewater is treated before being discharged into the water bodies. While the project has been inaugurated in February 2018, but issues of land acquisition for STPs remain.
6. While the sewerage network would be a big step in provision of sanitation, but a major challenge remains the operation and maintenance and thus the financial viability of the project. Our review of Municipal finances shows that the Corporation is in deficit. Given the precarious nature of Municipal finance in AMC, the resource mobilization, especially for this project would be a challenge because annually the O&M expenditure of the project will come around Rs 817 lakhs which is much higher than the total revenue generated by the Corporation. This requires that individual households in Adityapur will have to pay the additional money to match the need. This raises the question whether a consumer in a small town will actually be willing or able to pay this cost. So, along with sustainability, this brings to the fore concerns of equity in relation to big projects such as these.

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Annexure 2
Hazaribagh

I. INTRODUCTION

Geography

Hazaribagh is a Municipal Corporation and the only Class-I city in the Hazaribagh district of Jharkhand. It is the headquarters of the district, as well of the North Chotanagpur division, Sadar sub-division and Sadar block. Surrounded by forests on all its sides, Hazaribagh falls within the Chotanagpur plateau region and is at an altitude of 604 metres above sea level. The city is situated at the junction of NH-100 and NH-33, and is at a distance of about 93 kms from Ranchi, 120 kms from Bodh Gaya, 231 kms from Jamshedpur, 240 kms from Patna and 389 kms from Kolkata. Its neighbouring towns include Saunda, Patratu and Ramgarh. The nearest airport is Ranchi.

Map of Hazaribagh City

Economy

Hazaribagh is a small regional hub of trade and commerce, particularly agricultural marketing. There are also a number of weekly markets located within the city. Agriculture is the mainstay of the economy of the district, even

though it is mainly at subsistence level due to lack of irrigation and other facilities. There are a few small scale and medium scale industries in the district registered under the District Industrial Centers (DIC).

Demography

The following is a brief demographic profile of the city, based on the 2011 Census.

Table1: Population

No. of Households	Total Population	Total no. of Males	Total no. of Females	Population Density
25,714	142,489	74,132	68,357	5403

In 2011, the city had a population of 142,489. The total area of the city was 26.35 sq km and the population density was 5403. In 2001, the population of the city was 127,269, which signifies a decadal growth rate of 11.9 per cent.

Today the population is estimated to be 1.5-2 lakhs. As per the draft Hazaribagh Master Plan, 2016 (Government of Jharkhand 2016a), by 2040, the population of Hazaribagh town is expected to grow to more than 2.5 lakhs and the population of adjacent rural areas to about 2.5 lakhs.

Table 2: SC and ST Population

Total SC Population	SC Males	SC Females	Total ST Population	ST Males	ST Females
15,425 (10.83%)	7987	7438	5697 (4%)	2708	2989

As given in the table above, the total Scheduled Caste (SC) and Scheduled Tribe (ST) population is 10.83 per cent and 4 per cent respectively.

Sex Ratio

The sex ratio of the city is 922 females per 1000 males, which is less than the state figure of 948, but nevertheless an improvement from 2001 when it was 874.

Literacy Rate

The literacy rate is 89.36 per cent, which is higher than the state average of 66.41 per cent. Male literacy is 92.98 per cent while female literacy rate is 85.44per cent.

Urban Population

In 2011, the share of Hazaribagh in the total urban population of the state was 2.12 per cent. This grew from 1.80 per cent in 2001.

Slum Population

As per the 2011 Census, the total slum households in Hazaribagh are 2050 and the total slum population of 11,333, constituting 7.93 per cent of the total population of the city. However, slums have grown in this decade. According to the Municipal Corporation, at present, there are 25 slums with 2832 households and a population of 14,896. They comprise 10.4 per cent of the city's population.

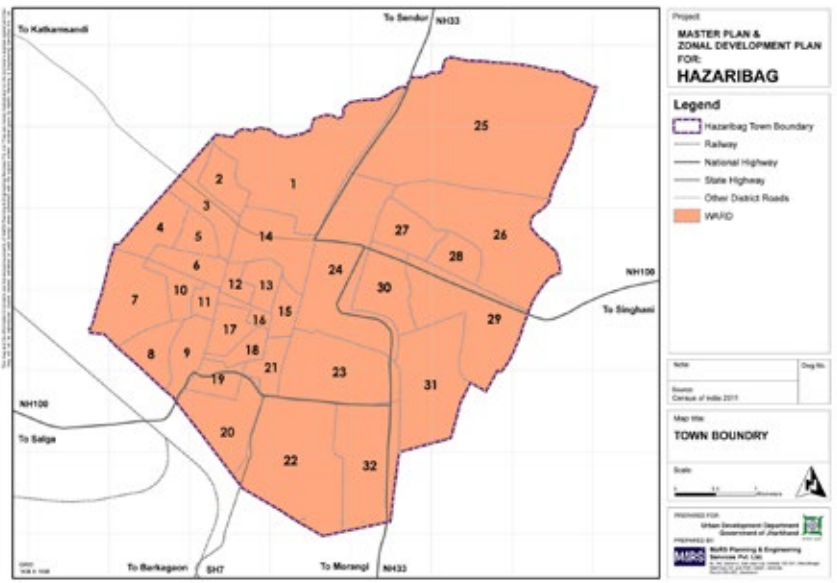
Administration

The Hazaribagh Municipality was established as early as 1865, and is thus one of the oldest local self-government units established in India by the British rulers. In February 2016, the Hazaribagh Municipal Council (HMC) was elevated to the status of Municipal Corporation through a notification of the Government of Jharkhand. The HMC formally came into existence via the Municipal elections held in April 2018. 19 adjacent villages were added in the Municipal area taking the population from 142,489 to 197,466.

Office of the Hazaribagh Municipal Corporation

For administrative purposes, the city is divided into wards. Before the expansion, it was divided into 32 wards. Now the numbers of wards have been increased to 36.Aside from the wards, Hazaribagh also has Tolis or Mohallas, which are small localities named after the dominant (often caste based) professions of the members residing there. A few examples include Butcher Toli, Kumhar Toli, Gawal Toli, Kasai Mohalla, Seth Mohalla, Kazi Mohalla and Dhobi Mohalla, etc. Most of these are in the older part of the city.

Ward Map of Hazaribagh



Source: Hazaribagh Master Plan

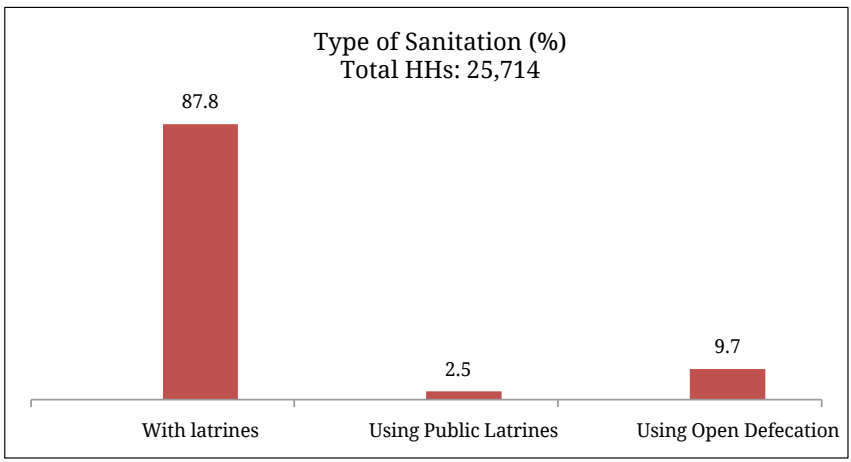
The Hazaribagh Municipal Corporation is responsible for providing basic civic amenities to the city, including water supply, storm water drainage, sewerage and solid waste management, among others.

II. SANITATION AND SEPTAGE MANAGEMENT

Status of Toilets

As seen in the graph below, according to the Census 2011, almost 88 per cent of the households in the city have latrines. About 10 per cent are dependent on open defecation and 2.5 per cent use public latrines.

Figure 1: Type of Sanitation in Hazaribagh



The following is the data on community/public toiletsas given by the Economic Survey FY 2016-17.

Table 3: Status of Existing Community Toilet/Public Toilets

Total Number	Total Seats	Functional	Non Functional
13	123	12	1

In order to discourage open defecation, now a large number of individual and community toilets have been built in the city as part of the Swachh Bharat Mission. According to its website (as accessed on July 15, 2018), the following is the data on toilets built under the scheme. However, as our survey reveals, many of these new community and public toilets are currently not functioning.

Table 4: Toilets Constructed under SBM

Individual Toilets	2696
Public Toilets	5 (62 seats)
Community Toilets	15 (153 seats)

According to the HMC, the figure for constructed toilets is higher, as given below:

- **3578 Individual Toilets**, for which each household was given a support amount of Rs 12,000.
- **10-15 Mobile Modular Urinals**, which have been installed in major locations in the city.
- **20 Community Toilets**, which have been made in slum areas such as Gadikhana, Harinagar and Okni.

Community Toilets built as part of SBM

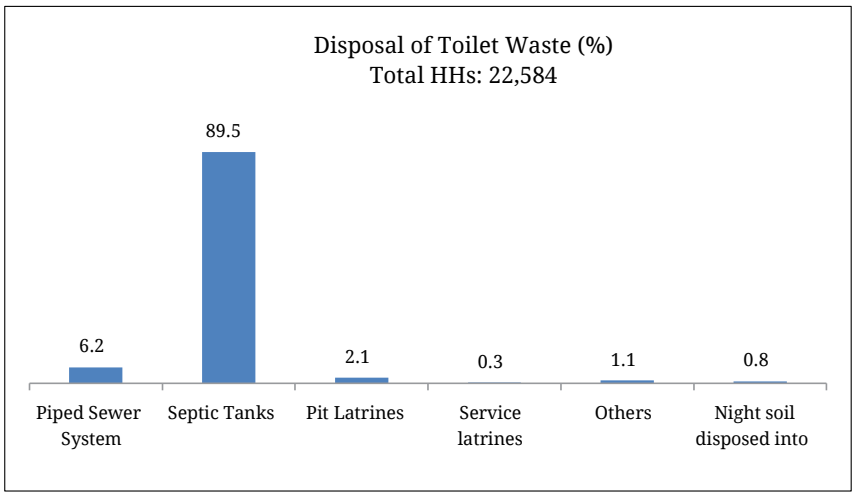
The Municipality has also done awareness campaigns on the perils of open defecation through street theatre.

In the Swachh Survekshan 2018, Hazaribagh was ranked the lowest –nine out of nine select cities/towns in the state, and 96 out of 471Cities/Towns State/UTs nationally, with a population of more than one lakh. Its ranking in 2017 was 91 out of 434 Cities/Towns State/UTs.

Sewerage and Drainage

If we look at the type of private latrines, as given in the Census 2011, then what emerges is that almost 90 per cent of individual toilets are flush/pour flush and based on the septic tank system.

Figure 2: Disposal of Toilet Waste in Hazaribagh



The following is the data on the type of private latrines in slums, as given by the 2011 Census.

Table 5: Type of Private Latrines in Slum Households

Pit	21
Flush/Pour Flush	1879
Service	1
Others	1
Community	0

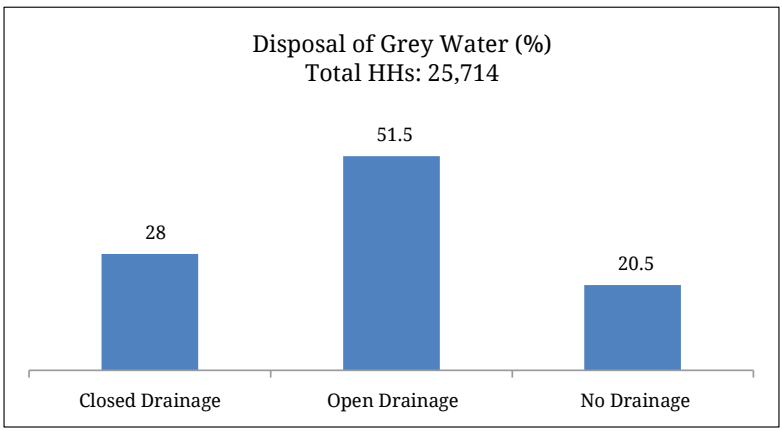
The heavy reliance on septic tanks for disposal of toilet waste can be understood by the fact of near absence of a sewerage network in the city. As the above graph shows, only 6.2 per cent of the households are connected to piped sewer system.

According to the HMC, about 33 kms of the 153 km city length has storm water drains, which is about 35 per cent of the city. The waste water containing domestic sewage normally finds its way to these existing drains and agricultural fields. Overall the incidence of sewerage mixing in the drains is about 40 per

cent. Flooding has been caused in some areas due to overflow of grey water from households into the drains, as well as blockage due to solid waste (Hazaribagh Municipal Corporation 2017).

As such, the city generates wastewater of 19.78 Millions of Litres per day (MLD). However, the drains are not present in the entire city. As the graph below shows, almost 80 per cent of the city is covered with drains, which are both natural and man-made. Of these, 52 per cent are open drains and 28 per cent closed.

Figure 3: Disposal of Waste Water in Hazaribagh



Drains in Hazaribagh

In our observation, the city has partially constructed drains, while construction is on at some places. There is one big drain that carries the bulk of sewage in older part of the city, which goes from Ananda Chowk to Kheergaon. Another goes from Marwari to Sooraj colony. Many small drains fall into the ponds that are spread throughout the city.

According to the former Vice Chairman of the Municipality, the town largely relies on old drainage system, constructed during the British period. Some wards are better and have covered drains such as in Okni, Loshina Road. The new town also has drains but these are not properly planned. Many of these flow out to open spaces. As such, the maintenance and construction of drains is done on the demand of ward members and the decision about it is taken in board meeting. The Nagrik Suvidha maintenance funds from the 14th Finance Commission are used for this purpose.

Drainage in Slums

According to the Census of India (2011), the system of drainage in the slums of Hazaribagh is open. This is also noted by the Economic Survey (2017) which notes that Hazaribagh is one of the three Class-I cities in the state where only open drainage system is available in slum areas.

The story of Bhuiya Mohalla, Matwari, Ward No. 7

Bhuiya Mohalla is an old slum settlement on the west side of Matwari. It has 110 houses. Most of the people work as daily wagers in the city. They have ownership of the land (patta) on which the house have been built. Majority of the houses have own toilets, with pukka or kutcha soak pits. Rest of the people go in the open. Almost everybody in the slum colony has applied for funds under the Pradhan Mantri Awas Yojana, but only 20-30 per cent households have got these funds, using which they have built pukka houses with toilets. None of them have got funds from the Swachh Bharat Scheme to build toilets. There is one community toilet but it is not functional.

The colony has a huge water crisis. There is no tap for supplied water connection. There are four hand pumps, which are also not functional all the time. The drains are also in bad shape. There is one covered drain running in the centre of the colony, and all the households are connected to it. The drain is not cleaned on a regular basis, but only when it is water logged or over flowing, and after repeated complaints.

Desludging

Given that almost 90 per cent of the households with latrines have septic tanks, desludging of septic tanks is an important responsibility for the Municipality. The following table gives in brief the present scenario of this work.

Table 6: Desludging Operations in Hazaribagh

Particulars	Details
Septage Produced	57 KLD
Average Size of Septic tank	Length 8 feet, Breadth 4 feet, Depth 10 feet
Connected to Soak Pits	2.1% of household with latrines
Average desludging period	15-20 years
Desludging service provider (Machine based)	ULB has 2 machines; 1 operational; 5 private operators
Average demand in a month	5-6 for ULB, 7-8 for private operators
Desludging cost	ULB – Rs 1000; Private – Rs 1200 for first trip, Rs 1000 for second trip
Service Lag	2-3 days for ULB, 1 day for private operators
Disposal of Sludge	On outskirts near Kheergaon
Treatment	No treatment facility
Relationship with ULB	Out of 5 operators, 4 are registered with ULB; Fine of Rs 5000 for not registering; ULB takes 10 % of their monthly income
Manual Scavenging	None according to HMC

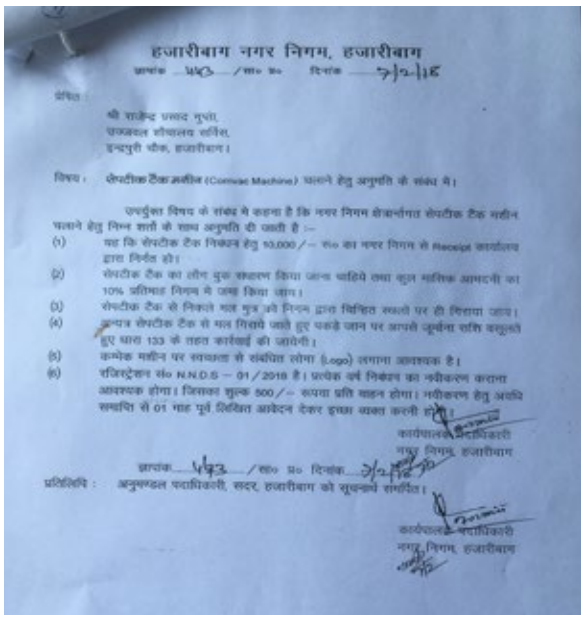
System of providing Desludging Services

According to the information provided by the HMC, about 57 KLD septage is produced in the city from 27167 households.The average size of the septic tank is 8 feet in length, 4 feet in breadth and 10 feet in depth. The wastewater from the septic tank is discharged into the open drains. Septage management is done by HMC and private players. The HMC has two honeycomb suckers for the past 10 years. At present, only one is operational. There are five private operators who own suction machines and tractors. They began operations 1-2 years ago. Most

of them are from the Dalit community. Given the availability of these machines, the HMC maintains there is no longer any manual scavenging in the area.

Licensing and Monitoring

Of these five, four have registered with the Municipality. HMC is now imposing a fine of upto Rs 5000 for those failing to register. The private operators also pay 10 per cent of their income to HMC. The following is the registration document as given by HMC.



हजारीबाग नगर निगम, हजारीबाग

ज्ञापांक ५५७ /सा० प्र० दिनांक ३/२/१८

प्रेषित :

श्री राजेन्द्र प्रसाद गुप्ता,
एक्सक्लूसिव सोल्यूशन्स सर्विस,
इन्दरपुरी चौक, हजारीबाग।

विषय : सेप्टीक टैंक क्लीनर (Contrac Machine) चलाने हेतु अनुमति के संबंध में।

उपर्युक्त विषय के संबंध में कहना है कि नगर निगम क्षेत्रान्तर्गत सेप्टीक टैंक मशीन चलाने हेतु निम्न शर्तों के साथ अनुमति दी जाती है :—

(1) यह कि सेप्टीक टैंक निष्कर्षण हेतु 10,000/— रू० का नगर निगम से Receipt कार्यालय द्वारा निर्गत हो।
(2) सेप्टीक टैंक का लीन बुक संधारण किया जाना चाहिये तथा कुल मासिक आमदनी का 10% प्रतिमाह निगम में जमा किया जाय।
(3) सेप्टीक टैंक से निकले गंद मूत्र को निगम द्वारा चिन्हित स्थलों पर ही गिराया जाय।
(4) कृपया सेप्टीक टैंक से मल गिराते जाते हुए पकड़े जाने पर आपके जुर्माना राशि वसूलते हुए धारा 133 के तहत कार्रवाई की जायेगी।
(5) कम्पेक मशीन पर स्वच्छता से संबंधित लोगो (Logo) लगाना आवश्यक है।
(6) रजिस्ट्रेशन सं० N.N.D.S — 01/2018 है। प्रत्येक वर्ष नवीकरण का नवीकरण कराना आवश्यक होगा। जिसका शुल्क 500/— रूपया प्रति वाहन होगा। नवीकरण हेतु अवधि समाप्ति से 01 माह पूर्व लिखित आवेदन देकर इच्छा व्यक्त करनी होगी।

कार्यपालक पदाधिकारी
नगर निगम, हजारीबाग

ज्ञापांक ५५७ /सा० प्र० दिनांक ३/२/१८

प्रतिलिपि : अनुमण्डल पदाधिकारी, सदर, हजारीबाग को सूचनार्थ संप्रेषित।

कार्यपालक पदाधिकारी
नगर निगम, हजारीबाग

Registration of Private Septic Tank Cleaners

Demand and Payment of Service

Residents can put in an application to the HMC for this service, for which a nominal fee of Rs 1000 is charged and a receipt is provided. The usual response time in the Municipality is 2-3 days. The private operators send their vehicles on receiving calls from individual households. They charge Rs 1200 for one time clean up and Rs 1000 if a second trip is required. Most households require one trip only. Averagely each of them cleans 1-2 household per week, or 7-8 in a month. The staff includes one driver, one operator. They are paid Rs 3000 per month. Ten per cent of the earnings are given to the Municipality. After this an operator saves Rs 10-15,000 per month. The usual response time of the operators is 1-2 days. Most of the residents prefer HMC service as it is cheaper but in case of its unavailability are fine with using the private operators at a little extra cost, mostly because averagely it is a once in a decade expense.

Sludge Disposal

The sludge is disposed in the 'dumping ground' at Kheergaon near the Hazaribagh railway station. This is in clear violation of the Solid Waste Management (SWM) Rules 2016. Also, this site is near some vegetable farms, which supply stock to the city. This raises serious health concerns. According to the Municipal sanitary workers, the area where the sludge is dumped is about 200 sq feet. Recently it has been leveled and 150 saplings have been planted. Earlier some operators were disposing the sludge in the railway line sewers or on the roads, but now they have to pay a fine of Rs 5000 to HMC. As such, HMC has not allocated a sanitary sludge disposal site and therefore the operators resent such fines.

Solid Waste Management

According to HMC (2017), the city generates 71.24 MTPD of solid waste, and has 100 per cent efficiency in solid waste collection. However if we look at the ground situation, at present, the solid waste of the city is largely un-segregated and un-treated and dumped on the outskirts at Kheergaon. The dump often catches fire, causing potential environmental health hazards.

Waste dump being burned at Kheergaon

As part of the Swachh Bharat Mission, efforts are being made to improve solid waste management. The streets and drains in wards are cleaned every day except Sunday. Earlier there was no night sweeping, but now it is being done in commercial areas. The workers click and upload photos of the completed work on the Mission portal. There is also a quick response team, which acts if a complaint is registered in the office with the Executive Officer or on the Swachhta app. The workers have also been given ID cards.

Tipper for Waste Collection

Recently, the HMC has also signed a contract with an NGO, NayiKiran. The organization is involved in door to door collection and segregation of waste in select wards (17, 18). Dry waste is sent to *kabadis* (recyclers) and wet waste is made into compost. They collect a user charge of Rs 40-50 per month from households and Rs 80 in commercial areas. Earlier, another local organisation NavJagriti Kendra was also organising solid waste in a few wards, without support from the Municipality. But it could not continue due to viability issues, as the poorer sections could not give user fees.

In near future, segregation would be a priority for HMC. They want to promote separate dustbins for wet and dry waste (Green and Blue respectively) and also tippers with separate sections.

But according to the Municipality officials, public involvement is a big challenge. For instance the HMC installed 20-27 compost pits in different parts of the city, particularly areas that have bulk generation, such as commercial areas (e.g. Subzi Mandi) but there has not been much success as people put plastic waste in the pit. To build public awareness on waste segregation, the Municipality has now been using street theatre.

Charwa Dam

Now, HMC has also finalized a tender for an integrated Solid Waste Management plant on a site of 20 acres at Mandai, which is about 5 kms outside the town. The plan includes door to door collection and treatment of waste, and construction of a landfill. However, at present local residents in Mandai are objecting to this project, due to potential health risks.

III. WATER QUALITY

Does the present scenario of sanitation have an impact on the water bodies/ sources of Hazaribagh? In order to investigate this relationship, water testing was done on various sources of surface water (both drinking water and waste water) and ground water.

Various chemical parameters that were tested include:
TDS – Total Dissolved Solids, DO – Dissolved Oxygen, BOD – Biochemical Oxygen Demand, AN – Ammonical Nitrogen, TN – Total Nitrogen
Various biological parameters that were tested include:
TC – Total Coliform, FC – Faecal Coliform, FS – Faecal Streptococci

The parameters and standards taken for the water quality tests have been drawn upon similar studies commissioned by NIUA in the recent past. Even though the Bureau of Indian Standards has withdrawn IS:2296, but this is the standard that is being adopted here to assess water quality, as it is more stringent than the later standards prescribed by the MoEFCC. This is especially in light of the serious impact that diluted standards may have on environmental and human health. Class A water is that which can be used for drinking without conventional treatment but with disinfection and Class C water is that which can be used for drinking with conventional treatment and disinfection.

Water Supply

There are two types of water sources in Hazaribagh- surface water and ground water. The main source of supply water is Charwa Dam. A small population of the city also gets treated water of the Hazaribagh Lake. Altogether, piped water supply is available in 30-35 per cent households.

The rest of the households (60-65 per cent) rely on hand pumps, wells and ponds, including the 28 HYDT and 813 Hand Pumps within the Hazaribagh Municipal area with a capacity of 0.42 MLD (ibid). The water level in the city is now going down, due to excessive boring. According to HMC, 70 per cent of the households have 150-300 feet deep boring, indicative of the fact that water table in the city is rather low. Also, the ponds are not much usable now for domestic water consumption as most of them are either private or have been encroached upon by builders, such as in Krishnapuri.

To overcome the water scarcity in the city, a plan has been developed to get piped water from the Konar dam. The detailed project report (DPR) and tender for the same have been done. Also, the HMC has made water harvesting compulsory for new and old buildings, and can therefore take 50 per cent more holding tax from individual households that fail to build harvesting structures.

Test Results

Charwa Dam and Matwari-Tap Water

Spread at an area of 100 acres, Charwa dam is 15 kmsin the northwestern part of Hazaribagh. It was constructed in 1952 by Damodar Valley Corporation (DVC) and given to the Public Works Department in 1954 (Alam et al 2017). The Dam is not connected to any river but it is one of the largest natural sources of

rainwater harvesting. According to an official in the Public Health Engineering Department (PHED), the dam stores 30 lakh gallons of water. As a major source of piped water supply, the dam has two treatment plants of a total capacity of 3 MGD (1.5 old and 1.5 new). The treated water is stored in six water towers - of which three are old, including in Inderpuri, PTC Chowk and Government bus stand and three new, at Bihari Girls school, Kheergaon bus stand and Columbus College. The supply is about 20-22 lakh gallons per day. Out of the 25,714 households in the city, 7239 households have access to this piped water. This is 28.13 per cent of the total population. HMC supplies 77.34 Litres Per Capita per day (LPCD). So the household coverage is deficit by 71.87 per centin reference to the benchmark given by the Ministry of Urban Development (Hazaribagh Municipal Corporation 2017).

Charwa Dam

Contamination has often been reported in localities such as in Gwala Pati, near Sardar Chowk and Matwari, where this water is supplied. According to PHED officials, the quality of treated water is not good mainly because of old water pipes. The average shelf life of Galvanized Iron (GI) water pipes is 10-15 years but these are almost never replaced in the city. The objective of the following test was to know the difference in the quality of water before treatment and afterit is received in the households. Two samples were taken – one, from the dam and another from a tap in Matwari. There have been concerns in the town about the quality of this treated piped water.

Sample Tap Water at Matwari

Table 7: Water Testing Results in Hazaribagh (1)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Charwa Dam	76	7.6	3.6	0.015	0.57	350	ND	ND
MatwariTap Water	84	6.8	2	0.01	2.52	>1600	920	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000		

ND – Not Detectable
DL – Detectable Limit

The test results show that the chemical parameters including DO, BOD, AN and TN are not within range for the dam water, and the biological parameters

including TC are also significantly high. The quality of treated water supplied to Matwari colony is also poor, as high level of DO, AN, TN, TC and FC was found in the sample collected form a tap. It has to be noted that FC was not detected in the dam water but it was detected in the treated tap water, which means either there is some issue at the treatment plant or in the pipeline through which water is supplied. Given that this water is used for drinking purposes, there are serious health concerns for those consuming it.

Hazaribagh Lake 1 and Lake 2

Hazaribagh Lake

Hazaribagh Lake is one of the major water bodies and recreation points in the city. Increasingly, there are concerns about pollution in the lake due to inflow of waste water. As of now, waste water from the neighbouring areas is discharged in a small portion of the lake (Lake 1) which is not connected to the main lake (Lake 2). As of now, water from Lake 2 is being treated and supplied to some nearby houses, such as that of bureaucrats, and the Hazaribagh jail. It is used for both drinking and other purposes. The treatment is being done via a pressure filter with a capacity of 0.35 MGD. There is one storage tower, which stores three lakh gallons water.

A test was done to assess the quality of water in both parts of the lake and to see

if there is any contamination due to the inflow of waste water. The following are the results.

Table 8: Water Testing Results in Hazaribagh (2)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Lake 1	494	6.8	8	0.22	2.48	>1600	540	>1600
Lake 2	246	8	3.6	0.5	22.15	>1600	350	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2			50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3	DL 0.001		5000		

ND – Not Detectable
DL – Detectable limit

The result shows that there is a major impact of wastewater not only on Lake 1 but also on Lake 2. All the chemical parameters except TDS are out of range in both parts of the Lake. Also, all the biological parameters except FSare not within the permissible limit for Lake 2. It is likely that there is an overflow of waste water from Lake 1 to Lake 2. This is a matter of concern because as mentioned, the water of Lake 2 is supplied for drinking purposes in the neighbouring areas. This has also been expressed in a study carried out by the students of Vinoba Bhave University using various physiochemical parameters. The study revealed that the water of Hazaribagh Lake is not usable for domesticand drinking purposes, “which raises serious health concern microbiologically” (Alam et al 2017).

Chistia Mohalla Nala and Chistia Mohalla Borewell

The Chistia Mohalla Nala (drain) is a tributary of a big drain in the older part of the city, which carries the bulk of its sewage. A test was done to assess if the drain has any impact on the ground water sources nearby. A sample was collected of the drain and of a borewell in the vicinity, which is used for drinking water.

It was expected that all the chemical and biological parameters of the Chistia Mohalla Nala would be out of range because it is a waste water drain. All the chemical parameters except DO were not within the permissible limit in the drain water but it is notable that the borewell that is close to it, also has many critical water quality parameters out of range. While the TDS of the borewell

is quite high, the TN, TC, FC, FS levels are also significantly out of range, which suggests that water is not suitable for drinking and cooking purposes.

Chistia Mohalla Nala

Table 9: Water Testing Results in Hazaribagh (3)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Chistia Mohalla Nala	1038	0	32	0.92	10.87	>1600	540	>1600
Chistia Mohalla Borewell	968	4	1.2	0	23.53	540	ND	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2			50		
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3	DL 0.001		5000	DL 1.8	

ND – Not Detectable
DL – Detectable Limit

Okni Pond and Okni Borewell

There are a number of ponds in different parts of Hazaribagh, which have been major source of water recharging. Today, most of these are in a dismal condition. Either they have been encroached upon or are being used for waste disposal. Okni pond, located in the centre of the city, is one of the largest ponds and is gradually transforming into a waste disposal site (both waste water and solid waste) sites. A test was done to assess the quality of water in the pond as well as to see if there is an impact of this contaminated water on the ground water. A sample was therefore taken of the pond and also of a borewell in vicinity.

Okni Pond

The results show that except for DO, all the chemical parameters of Okni pond are out of range. Also, high level of TC is found in this water. As for the water quality of the borewell near the pond, the other parameters are fine except for high levels of TDS, DO and TN.

On the basis of above analysis, it seems that the water quality of Hazaribagh is rapidly deteriorating. Even the official sources of water supply such as Charwa Dam and Hazaribagh Lake are not safe. The ponds, which are major source of water recharging, are also in a dismal state. Cleary, poor sanitation and septage management has a strong impact on this scenario.

Table 10: Water Testing Results in Hazaribagh (4)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Okni Pond	668	4.4	24	0.15	4.91	920	ND	ND
Okni Borewell	608	7.2	1.2	0	15.08	ND	ND	ND
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8	
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000		

ND – Not Detectable
DL – Detectable Limit

IV. SANITATION STAFF

This section lays out the work chain responsible for sanitation in the city. As seen in the ornogram below, the Municipality is supervised by an elected body, the Council, which comprises ward councilors, who are elected for a term of five years. On the top of the Executive chain is the Executive Officer. S/he supervises the city managers, who look after the overall day to day management of the ULB. Presently there are four city managers in Hazaribagh, of whom three are new. They are on a contract, with an average salary of Rs 50,000 per month. There is one sanitary supervisor and 376 sanitary workers.

Figure 4: Ornogram of HMC

Table 11: Sanitation Staff of HMC

Post	Staff
Executive Officer	1
City Manager	4
Sanitation Inspector	1
Health Inspector	0
Sanitary Workers (Permanent)	90
Sanitary Workers (Contractual)	286

Source: Hazaribagh Municipal Corporation

According to the Sanitary Supervisor, sanitary workers in the city carry out solid waste management, cleaning of streets and drains. Out of 376 workers, 286 are temporary. They are on daily wages and paid directly by the Supervisor. The temporary workers get Rs 281 per day and the permanent workers get a minimum wage of Rs 21,000 per month. All the workers are given safety equipment such as gloves and shoes.

The workers are assigned in different wards according to its population. In commercial areas, there are 10-12 workers per ward, and in less densely populated residential areas, there are 8-10 workers. There is one supervisor per ward.

Their daily routine starts at 5 AM in the morning. They get all their material/ equipment daily from the Municipality office and carry out street cleaning, door to door waste collection and drain cleaning. Around 7-7.30 AM, a truck picks up the collected waste and dumps it at the 'dumping ground'. There are a total of 30-35 trucks which transport this waste. The trucks have a partition for dry and wet waste, although the residents do not give segregated waste. The waste is segregated by the workers at 18 points and wet waste is sent for composting. The sludge of the drains is picked up in 1-2 days. There are eight workers for 15 streets. There are 20 tractors for drain waste dumping. Recently the workers had a meeting on segregation of dry and wet waste with Nayi Kiran, an NGO, which is partnering with HMC on solid waste management.

Many of these workers reside in Ambedkar Basti, which is in the old part of the city with about 100 households. All of them belong to Dalit community. Almost 90 per cent of the male earning members are working with HMC as sanitary workers. Even their forefathers were doing this work as the Municipality was formed in 1865. The Basti is essentially old government housing for these workers, for which rent is deducted from their salary. As it is an old colony, the houses are now dilapidated and need repairing.

Discussions with the workers reveal that the foremost concern they share is the non regularization of jobs. Earlier a board used to regularize 10-12 workers every year but no longer. According to them, there are 299 sanctioned posts but no appointments have been made since 2000 after Jharkhand government was formed.

V. UPCOMING PROJECT ON SEPTAGE MANAGEMENT

To improve the sanitation situation in the city, a Feacal Sludge Treatment Plant (FSTP) is being constructed as part of the AMRUT project, the details of which are given below.

Before this project came up, there was a plan to build sewerage system discussed in the State Annual Action Plan (SAAP) of Jharkhand (FY 2016-17) as part of AMRUT (Government of Jharkhand 2016b). It was proposed that "since there is no on-going scheme/ project of sewerage system, city proposes to adopt design, build, finance, operate and transfer (DBFOT) for setting up the sewerage lines treatment and last mile house connections to meet the objective of universal coverage of sewerage system"(HMC 2017).To this end, a DPR was prepared by the Tata Consultancy Services (TCS) and the project was expected to start in the year 2016-17 and completed by the year 2019-20. As part of it, an investment of Rs. 228 Crores was to be made towards construction/augmentation of the storm water drain network and sewerage network of 153km, construction of pumping stations and sluice gates at regular intervals. There was also a proposal to construct an STP of 25 MLD (ibid).

However, according to the town planner in the city, this plan was cancelled due to 'feasibility issues' related to the terrain.

AMRUT Project: FSTP

It is estimated that by 2032, the households in Hazaribagh would increase from 25,794 to approx 30,998, and it is projected that 64 KLD septage would be then produced. Therefore,as part of the AMRUT scheme, a 64 KLD Fecal Sludge Treatment Plant (FSTP) is now being built in the city. Hazaribagh is the first city in the state that will get such a plant and will thus be a model plant for other towns.

Following a DPR and tender, the contract for the plant has been given to a contractor named Bijay Sarawgi, who is based in Ranchi. He also has the contract for building a septage plant in the city of Chas.

At present, 2.5 acres of land has been identified in Sindur for the construction of FSTP. It is on the outskirts of the city. The total cost of the project is Rs 3256.48 lakh (about Rs 32.6 crore). Funds would be dispensed via HMC.

Table 12: Budget Details of the FSP Project

Si No.	Particulars	Amount (In Lakhs)
1	**Part – A**	
	Septage Clearance and Collection (Including Sewage Vaccum truck and Appurtenance works)	125.82
	Septage Treatment (Including Construction of SeTP)	128.69
	Dismantling and Repair Work (Septic Tanks)	183.58
2	**Part – B**	
	Construction, Providing Services and Development of Administrative Block (Including Office, staff quarter, laboratory etc)	123.58
3	**Part - C**	
	Miscellaneous Works (Including Boundary Wall of premises, Shed for Sludge cake/Chemical Storage/Parking lot/MBBR package plant/centrifuge, Construction of DG and Transformer room, GPS Tracking System Expenses, etc.	52.72
4	**Part D**	
	Electrical Works (Including providing, erection and commissioning of 10 km Electric cable, Transformer room, GPS Tracking System Expenses etc)	79.78
5	**Sub-Total** (1+2+3+4)	694.17
6	**Labour Cess** @1%	6.94
7	**Sub-Total** (5+6)	701.11
8	**Part E**	
	Cost of ESAMP – Environmental and Social Assessment with Management Plan as per World Bank Guidelines	2.70
9	**Information Education Communication Community (IEC)** @ 1.5% on SI. No. 5	10.41
10	**JUIDCO Charges** (Centage)	48.59
11	**Charges for preparation of DPR and PMC**	42.00
12	**Sub Total** – CAPEX (7+8+9+10+11)	804.81
13	**Part F**	
	Annual Operation and Maintenance Cost (10 year) (Including Cost of Fuel, Repair, Renewal and Insurance Cost of Machineries, Maintenance Cost Civil/Electrical/Mechanical Works, Manpower Cost, Safety Tools, Power and Energy Cost, etc.) (OPEX)	2452.53
	Grand Total (In Lakhs) (12+13)	3256.24

Source: Hazaribagh Municipal Corporation

As the above table shows, the following is the CAPEX and OPEX for this project (In Crores).

Capital Expenditure (CAPEX)	8.05
O& M Expenditure for 10 years (OPEX)	24.51
Total	32.56

According to the AMRUT Guidelines, Section 5.1, the following would be the fund distribution for the CAPEX funds.

Table 13: CAPEX funds

Name of project	Approved project cost (CAPEX)	Central share	State share	ULB Share	
				14th F.C.	Others
Hazaribagh Septage Management	804.81	402.41	241.44	128.77	32.19

Of the total approved project cost (CAPEX), 50 per cent is centre funds, 30 per cent state funds and rest of the 20 per cent is ULB funds. As per the Jharkhand State Annual Action Plan (SAAP) approved under AMRUT, 80 per cent of ULB funds would be paid from 14th finance commission and rest 20 per cent would be paid from state AMRUT funds. The Operation and Maintenance Cost (OPEX) of the above system for 10 years would be through public outreach activities and collection of user charges from consumers.

Project Plan

The following are the components of the project plan.

Collection: Vehicle mounted super sucker/vacuum machines would collect septage from Individual Household Latrine (IHHL).

Transportation: The septage would be transported to the FSTP.

Treatment: The septage would be treated in two phases by the technology MBBR (Moving Bed Bio Film Reactor). In the first phase, sludge treatment would be done and then Supernatant would be treated. With this treatment all the harmful contaminants of the septage would be destroyed.

Disposal: The treated waste water would be used for various utilities such as gardening, vehicle wash, construction etc. Following septage treatment, the solid substance would be converted into compost which would be used in farming.

Project Details

Based on our interview with HMC officials and the Contractor Bijay Sarawgi, the following are some more details on the management and status on the project.

As per the contract, the Contractor is responsible for construction of the plant as well as operation and maintenance for 10 years for which the standard bid document made under Girdih Septage management scheme would be used as guidance. He has no financial contribution in the project. He would work under HMC, even though HMC was not involved in signing of the contract. The role of HMC is to provide land, and some assistance in construction and manpower. Largely, the manpower and equipment would be of the contractor.

As of April 2018, the contractor was waiting for the government to sign the map of the site. First a boundary wall would be constructed, followed then by an administrative building, and staff quarters. The plan was to make plinth area before monsoons. The deadline for the project is nine months but the contractor hopes to complete it by seven months.

For septic tank cleaning, households would be charged Rs 1500-1800. They would be able to contact the service via phone or sms. According to the contractor, existing private players involved in septic tank cleaning would not be included in the operations. They can however transfer the sludge they collect by their tractors to the treatment plant.

The process would be thus. First the septic tank would be irrigated to make the sludge semi solid. After that the sludge would be extracted through suction pump, 50 m pipes and tractor mounted tanks. It would be transported to the treatment plant. The plant would use a centrifugal technology and would have a wall thickness of 20 mm by 18 mm so there is no corrosion. The water would be separated and sludge would be made as organic compost cakes (fertilizer), which would be sold to agricultural universities and forest and horticulture departments, and also to farmers in nearby villages. After it is treated, this water would have a PH of 7.5, which is good for irrigation and other utilities. According to Sarawgi, in countries like Singapore, this treated water is also used for drinking water but in India, people have a mental blockade in using it for even utilities.

In the first year, the capacity of the plant would be 19 KLD. The plant would not require electricity for its operation, but in fact could generate energy such as biogas. This is being done in countries like Australia. According to him, septage treatment is the answer for all old and small towns, which do not have wide roads and are not connected to sewerage pipes, and where it is difficult to

lay down new pipes. As such, septage treatment has been going on since long such as in Patna where it was being done by Sulabh Shauchalaya, who were collecting human waste and giving it to sewerage plant. He further says that FSTP would also give jobs, at least to communities who were earlier involved with manual scavenging, as other community members are not keen to go in this work even though it is mechanized. Sarawgi says that he would also take responsibility of repairing household septic tanks free of cost, such as applying cement coating, so the discharge water doesn't go to drain. He would also provide safety equipment to all the workers involved.

On the question of challenges in implementation, Sarawgi talks of a lack of involvement of ULB after the contract is given, as also pressure from Ward Councilors to employ their friends/relatives on the plant. But in our analysis, one of the major requirements for both sustainability and financial viability of the project is that consumers get their tanks cleaned more frequently. How willing would they be for this and to pay the fees is a big question as of now.

VI. REVIEW OF MUNICIPAL FINANCE OF HAZARIBAGH MUNICIPAL CORPORATION

This section makes an analysis of the financial status of Hazaribagh Municipal Corporation (AMC) by reviewing its three year budget documents and audited financial reports from 2015-16 to 2017-18, and in that light makes an assessment of the financial implications and viability of the new septage project in the city.

The budget estimates and actual of the HMC for the years 2016-17 and 2017-18 are given in the table below.

As the figures show, revenue receipt for HMC has increased from Rs 1184 lakhs in 2015-16 to Rs 1230 lakhs in 2017-18. The per capita revenue generated for the Corporation stood at Rs 706in 2017-18. Revenue expenditure of the corporation exceeded the revenue receipt in all the three years leading to a fiscal deficit. Per capita revenue expenditure for the year 2017-18 was Rs 2258. In case of capital expenditure there is no deficit as receipt was much higher that capital expenditure. Per capita capital expenditure for Corporation in 2017-18 was Rs 1177.

The two most important sources of revenue for HMC are own tax revenue generated by the Corporation and Grants and contribution it gets from Central and State government. Overtime, the share of grants and contribution has declined from 56 percent in 2015-16 to 31 percent in 2017-18. At the same time, tax revenue share has increased from 19.4 percent to 48 percent (Figure 5).

Table 14: Finances of HMC from 2015-16 to 2017-18

	2015-16 Actuals (In Lakhs)	2016-17 Actuals (In Lakhs)	2017-18 Estimates (In Lakhs)	2017-18 Per Capita (Rs.)*
Revenue Receipts	1184	1561	1230	706
Revenue Expenditure	1951	2270	3932	2258
Receipt - Expenditure	-767	-709	-2702	
Capital Receipts	6537	9880	5432	3119
Cap Expenditure	772	1490	2050	1177
Receipt - Expenditure	5765	8390	3382	

Source: Annual audited Financial Account and Budget for Various years

*Population was extrapolated using the growth rate between 2001 and 2011.

Table 15: Revenue Receipts of HMC from 2015-16 to 2017-18

	2015-16 Actuals (Rs Lakhs)	2016-17 Actuals (Rs Lakhs)	2017-18 Budget Estimates (Rs Lakhs)
Own Source			
Tax Revenue	229	280	592
Rental income - Municipal Properties	162	269	88
Fees and User Charges	89	70	60
Sale and Hire Charges	8	24	14
Others	33	207	95
External Source			
Revenue Grants, Contribution and Subsidies	663	711	381
Total	1184	1561	1230

Among all the components of municipal revenue expenditure, the expenditures on establishment which includes salaries, wages and other related benefits acquire prime importance. Share of establishment expenditure was around 40 percent in 2016-17. Expenditure under revenue grant and contributions is another important component and it has increased from Rs 597 to Rs 1444. But we have to keep in mind that major chunk of money under this category goes in giving salary and wages, so overall share of salary will be much higher. Operation and maintenance expenses have increased from Rs 519 lakhs to Rs 699 lakhs between 2015-16 and 2017-18. Share of operation and maintenance remains around 20 percent of the total revenue expenditure for the Corporation.

Figure 5: Share of Grants and Contributions, Tax Revenue and Non-tax Revenue in Overall Revenue of HMC (in %)

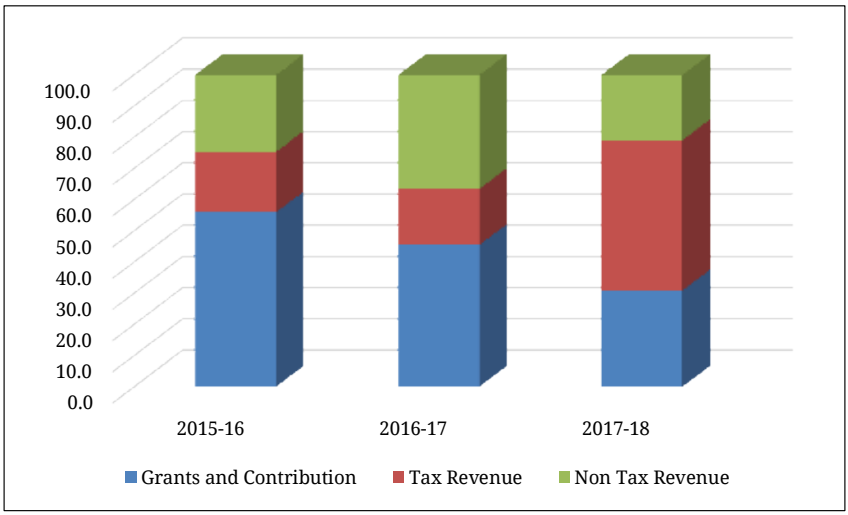


Table 16: Revenue Expenditure of HMC 2015-16 to 2017-18

	2015-16 Actuals (Rs Lakhs)	2016-17 Actuals (Rs Lakhs)	2017-18 Estimates (Rs Lakhs)
Establishment Expenses	362	902	1106
Administrative Expenses	13	39	153
Operation and Maintenance	519	459	699
Interest and Finance Charges	447	447	528
Revenue Grants, Contribution and Subsidies	591	413	1444
Others	20	8	3
Total	1951	2270	3932

Capital receipts mostly include grants for specific schemes run by the Centre and State government and the loans taken by the State government. Share of Central government grant has increased for the Corporation. In 2016-17, theCentral government grant was Rs 3943 out of a total grant of Rs 5531. It should be noted the share of grant in overall capital receipts have also increased overtime (Figure 7). This increase can be mostly attributed to various central government schemes such as AMRUT, Swachh Bharat Abhiyan and NULM. This kind of fund flow also suggests that ULBs are becoming mere implementing agencies of various centralised plans.

Figure 6: Share of Revenue Expenditure for HMC (In %)

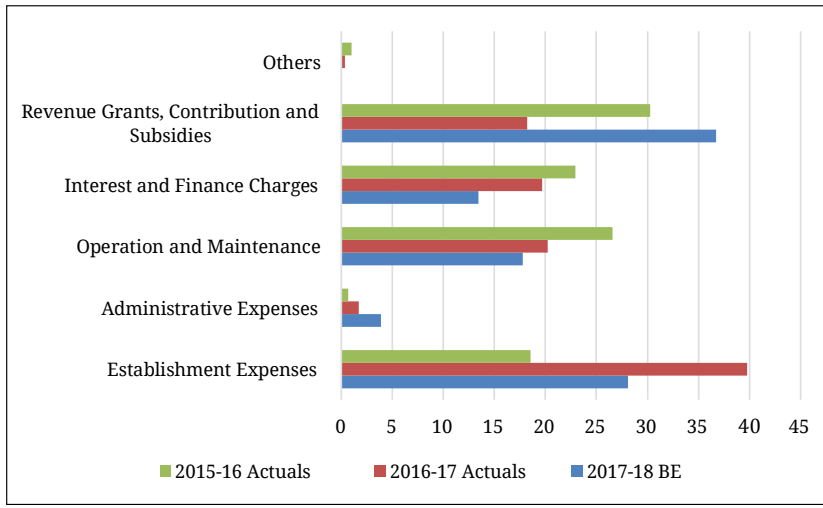


Table 17: Capital Receipts of HMC 2015-16 to 2017-18

	2015-16 Actuals (Rs Lakhs)	2016-17 Actuals (Rs Lakhs)	2017-18 Estimates (Rs Lakhs)
Grants, Contribution for Specific purposes			
Central Govt	1278	3943	3008
State Govt.	1632	1564	2064
Others	4	25	0
Grants Total	2914	5531	5072
Loans	3438	3625	298
Deposits Received	61	99	45
Other Liabilities	123	625	17
Total	6537	9880	5432

Capital expenditure on fixed assets is one of the important components of capital expenditure of the corporation apart from loan repayment and other investments. Among the assets, top priority has been given to construction of roads and bridges followed by construction work on sewerage and drainage and also construction of different buildings. Around Rs 47 lakhs was spent on sewerage and drainage in 2015-16 which increased to Rs 82 lakhs and according to budget estimate for the year 207-18, the estimated figure for sewerage and drainage was Rs 59 Lakhs.

Figure 7: Share of Grants, Loans and Others in overall Capital receipts (In %)

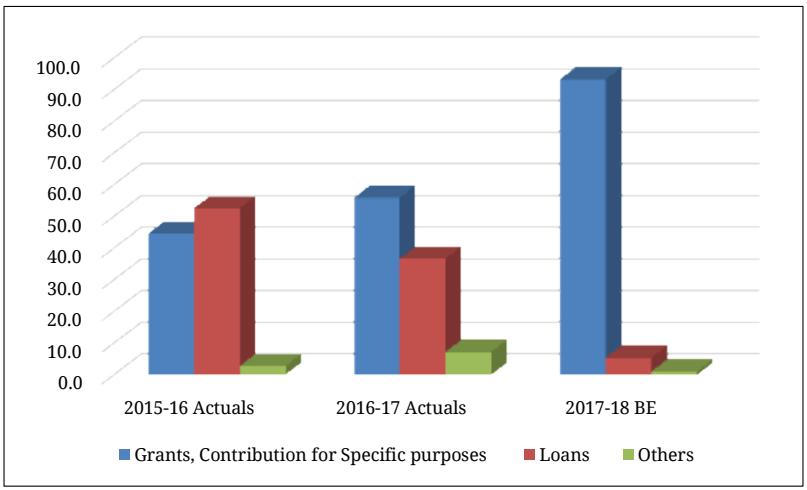


Table 18: Capital Expenditure of HMC from 2015-16 to 2017-18

	2015-16 Actuals (Rs in Lakhs)	2016-17 Actuals (Rs in Lakhs)	2017-18 Estimates (Rs in Lakhs)
Investments- Municipal Fund	32.3	235.2	354.5
Stock in Hand	19.1	12.7	6.5
Loans, Advances and Deposites	110.2	282.9	156.6
Capital Expenditure on Assets	0.0	0.0	0.0
1.Fixed Assets	0.0	0.0	0.0
Land	0.0	0.0	200.5
Buildings	61.1	15.8	28.7
2.Infrastructure Assets	0.0	0.0	0.0
Park &Playgrounds	0.0	3.7	0.0
Lakes and ponds	0.0	0.0	405.0
Statues, Heritage Assets	0.0	8.9	0.0
Roads and Bridges	341.9	196.8	407.6
Sewerage& Drainage	47.1	82.1	59.3
Water Ways	25.2	25.3	29.5
Public Lighting	61.7	77.8	75.5
3.Others Assets	0.0	0.0	0.0
Vehicles	0.0	75.4	30.0

	2015-16 Actuals (Rs in Lakhs)	2016-17 Actuals (Rs in Lakhs)	2017-18 Estimates (Rs in Lakhs)
Office & other equipment	2.0	6.9	2.9
Furniture, fixtures, fittings and electrical appliances	0.0	7.3	4.5
4.Others fixed Assets	71.3	176.2	278.7
Total Capital Expenditure on Assets	610.4	676.1	1522.1
Capital Works in Progress	0.0	283.6	10.2
Total	772.0	1490.4	2049.8

Financial Implications of FSTP Project

Hazaribagh Municipal Corporation has been running on deficit budget with expenditure exceeding the revenue. With meagre resources and limited opportunity to raise revenue it will be a challenge for the Corporation to hold up a big project like FSTP. The initial investment for this project or the capital expenditure has been shared between Central government, State government and ULB as discussed in the earlier section.

Table 19: Revenue Generation and O&M Requirement for New Project

Particulars	2016-17		2017-18	
	In Lakh	Per Capita Rs.	In Lakh	Per Capita Rs.
Operation and Maintenance Charge for FSTP Project	2451	1408	2451	1408
Operation and Maintenance expenditure by HMC	459	264	699	401
Tax Collection by the HMC	280	161	592	340
Tax and Fees Collected by HMC	350	201	652	374

Annual operation and maintenance cost of the project comes to around Rs 2451.43 lakhs which is much higher than O&M cost of ULB as a whole. Moreover, households are already paying tax to the corporation in per capita terms it comes out to be Rs 161 suppose we also add user charges and fees than also in per capita terms it is Rs 201. But O&M cost for the project in per capita terms is Rs1408 which will be levied to the household. The O&M cost of the HMC is already growing over the years. Generation of additional revenue for the FSTP project would add into the already existing deficit of the HMC. Moreover, households are already paying property tax and other kinds of user fee to the corporation. Extra user fee will increase the burden on the consumer. More crucially will the consumer pay the user fee for FSTP at all?

VII. CONCLUSIONS AND RECOMMENDATIONS

1. Hazaribagh is an old Municipality set up during the British period, which has recently been upgraded to a Municipal Corporation. A significant section of the population within the city (87.8 per cent) has private latrines and about 10 per cent are dependent on open defecation. Now under the Swachh Bharat Scheme, a number of new private and community toilets have been built, which should contribute to decreasing open defecation.

2. About 90 per cent of the private toilets are based on the septic tank system. This can be related to the absence of a sewerage system in the city. The septic tanks overflow into the drains, of which 52 per cent are open drains and 28 per cent closed. There is no drainage network in 20 per cent of the city. The small drains either go into open fields or into the many ponds across the city. Many of the drains meet a bigger drain that runs through the older part of the city

3. The discharge of untreated waste water also has an impact on the existing water bodies/sources, as shown by the water quality tests. The piped water supply from Charwa Dam and Hazaribagh Lake are not completely safe. The ponds, which are major source of water recharging, are also in a dismal state. This requires an urgent action on building proper system of waste water management and treatment in the city. A sewerage project was earlier planned but was shelved due to “terrain issues”. Alternatives must therefore be put into place.

4. Desludging of septic tanks in the city is being done both by the Municipality and private operators. HMC has two suction machines, of which one is operational. There are five private operators, of which four are registered with ULB. All of them dispose the sludge on the outskirts at Kheergaon. This site is not too far from the city and is also having a number of vegetable farms, thus posing potential health risks for the city.

5. Now a 32.56 Crores FSTP project for has been initiated in the city under the AMRUT scheme. A 64 KLD septage treatment plant would be built by a private contractor by this year end, for which land has already been acquired. The project is to be completed by the end of 2018. One of the major requirements for both sustainability and financial viability of the project is that consumers get their tanks cleaned frequently. How willing would they be to do this and pay the fees involved is a big question as of now.

6. As such, our review of the budgets and audited reports of the HMC shows that it has been running on deficit budget with expenditure exceeding the revenue. It would be a challenge for the HMC to carry out a big project like

FSTP as the annual operation and maintenance (O&M) cost of the project comes to around 2451.43 lakhs, which is much higher than O&M cost of ULB as a whole. The O&M cost for the project in per capita terms would be Rs 1408, which would be borne by the HMC through user charges and its own resources. This also means an additional burden on the consumer. So, along with sustainability, this brings to the fore concerns of equity in relation to such projects.

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Annexure 3
Mihijam

I. INTRODUCTION

Geography

Mihijam is a Class III town and a Nagar Parishad in the Jamtara block of Jamtara district. It is situated 178 meters above sea level and is located along the National Highway II, also called the Delhi-Kolkata highway. It is surrounded by Jamtara City in the north, Rupnaraynpur in the south and Chittaranjan in the east, where the well known Locomotive Factory is based. It is 30 kms from Asansol, 66 kms from Dhanbad and 212 kms from Ranchi. The Asansol-Chittranjan highway also crosses the town, linking it to other big cities in Bengal. Mihijam has a railway station (Chittaranjan), which connects it to major cities of the country by the Delhi-Kolkata line via Mugal Sarai.

Map of Mihijam

Economy

Agriculture is the most important economic activity in the town and neighbouring areas. Almost 30 per cent of the land area is employed in agriculture. Key crops include Wheat, Maize, Rice, Arhar and Moong, along with vegetables and fruits. Additionally, many people are dependent on livestock. Some are employed in the Chittaranjan Locomotives or the other two industries nearby, Mihijam Vanaspati Limited and Anjali Ferrow Alloys, or have their own small shops/ businesses.

Demography

The following is the demographic profile of the town based on the 2011 Census

Table 1: Total Population

No. of Households	Total Population	Total No. of Males	Total No. ofFemales	Population Density
7941	40,463	21,401	19,062	3699

According to the 2011 Census, the population of the city is 40,463. The total area is 11.02 sq km and density is 3699. In 2001, the population was 33,236, which signifies a decadal growth rate of 21.74 per cent.

Table 2: SC and ST Population

Total SC population	SC Males	SC Females	Total ST population	ST Males	ST Females
5791 (14.3%)	3051	2740	2042 (5.04%)	1014	1028

As given in the table above, the SC and ST population in Mihijamis 14.3 per cent and 5.04 per cent respectively.

Sex Ratio

The sex ratio in the town is 891, which is less than the state figureof 948, but an improvement from 2001 when it was878.

Literacy Levels

The literacy rate is 82.96 per cent which improved somewhat from 81.47 per cent in 2001. The male and female literacy rates are 89.64 per cent and 75.45 per cent respectively.

Urban Population

In 2011, the share of Mihijam in the total urban population of the state was 0.51 per cent.

Slum Population

According to the 2011 census, there were 510 slum households in Mihijam with 2484 residents. In 2008-09, a detailed Below Poverty Line (BPL) survey was conducted of the town by the Mihijam Nagar Parishad for all its 18 wards. As per the survey report, 6539 households are BPL, which is 65 per cent of the total population. Further, there are nine slums in the town with 1391 households and 6962 residents, which is 15.5 per cent of the total population. The slum households are scattered throughout the town area, but most of themare

located along the railway line and major roads, and built largely on land owned by the Nagar Parishad or State Government.

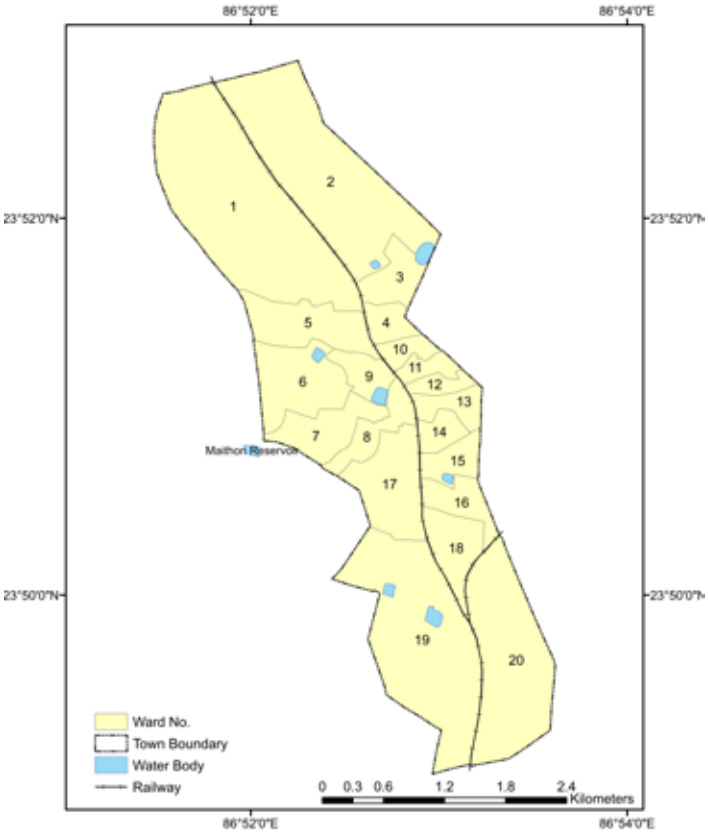
Administration

Mihijam was established as a Nagar Panchayat in 2006 and as Mihijam Nagar Parishad (MNP) in 2015. The Parishad is responsible for establishment, operation and maintenance of all basic amenities like roads, drainage and sewerage, water supply, street lighting and also health, education, housing, slum improvement, urban forestry, environmental protection and conservation. Further, it also needs to implement all government schemes and holdpublic meetings, and public awareness programmes etc.

Office of the Mihijam Nagar Parishad

For administrative purposes, the town is divided into wards. The distribution is based on population, area and land use. Before the 2018 elections, the town had 18 wards, which have now expanded to 20. The ward map is given below.

Ward Map of MNP



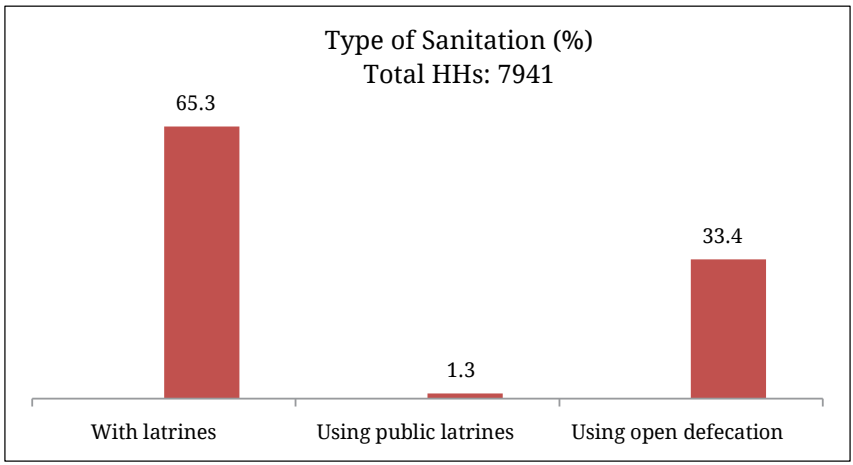
II. SANITATION AND SEPTAGE MANAGEMENT

Status of Toilets

As per the 2011 census, there are 3744 individual toilets in Mihijam. This covers 65.3 per cent of the population. And almost 34 per cent of the households defecate in the open, mostly along drains, railway line, agricultural fields, near the ponds and vacant areas.

Most of those living in slumsare also dependent on open defecation.This can be understood by the fact that until recently there were no community toilets for slum and BPL population of the town. And there was only one public toilet with four seats, maintained by Sulabh Shauchalaya in Hatiya Market, Ward no. 6.

Figure 1: Type of Sanitation in Mihijam



Now, with funds from the Swachh Bharat Mission (SBM), new individual and public toilets have been constructed, which might have curtailed open defecation. However, our field survey reveals that many of these new community and public toilets were not functioning. The data accessed from the Swachh Bharat website (on July 15, 2018) is as follows:

Table 4: Toilets built under SBM

Individual Toilets	1733
Public Toilet Blocks	1 (14 seats)
Community Toilet Blocks	2 (30 seats)

According to the MNP, the target is to have 2100 individual toilets by the end of 2018. At present, nine community toilets are being built (12 seater) with funds available from the 14th Finance Commission. Of these, four are complete and three are under construction. For the other two, there are some land acquisition issues. Most of these community toilets are in poorer areas. Additionally, 10 modular toilets have also been installed in areas where there is no space to construct structures.The per unit Municipal cost for these toilet categories is as follows.

Individual Toilet	Rs 12,000 (Support amount to Individual Households)
Community Toilet	Rs 24,500
Modular Toilet	Rs 9,25,000

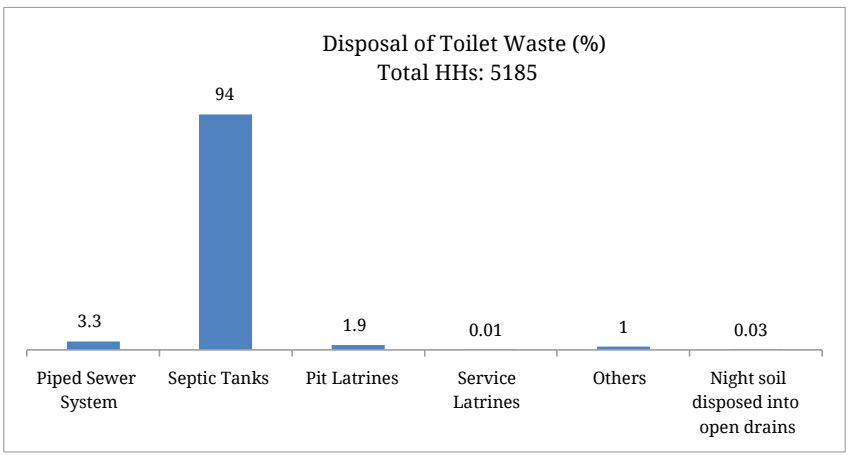
Community Toilet Built under SBM

In the Swachh Survekshan 2018, Mihijam was ranked 129 out of 468 Cities/ Towns/UTs less with population of less than one lakh in the East Zone and 30 out of 32 ULBs in the state ranking.

Sewerage and Drainage

As seen in the graph below, based on the 2011 census, 94 per cent of the households have flush/pour flush toilets connected to septic tank system.

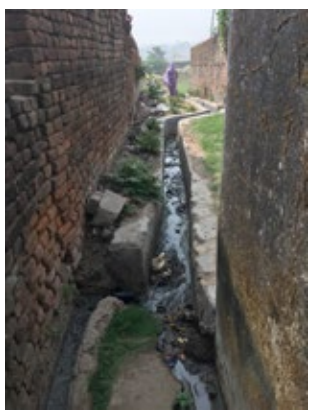
Figure 2: Disposal of Toilet Waste



The private latrines in slums are also only Flush/Pour Flush, according to the 2011 Census, as given in the following table.

Table 5: Type of Latrines in Slums

Pit Latrines	0
Flush/Pour Flush	177
Service	0
Others	0
Community	0



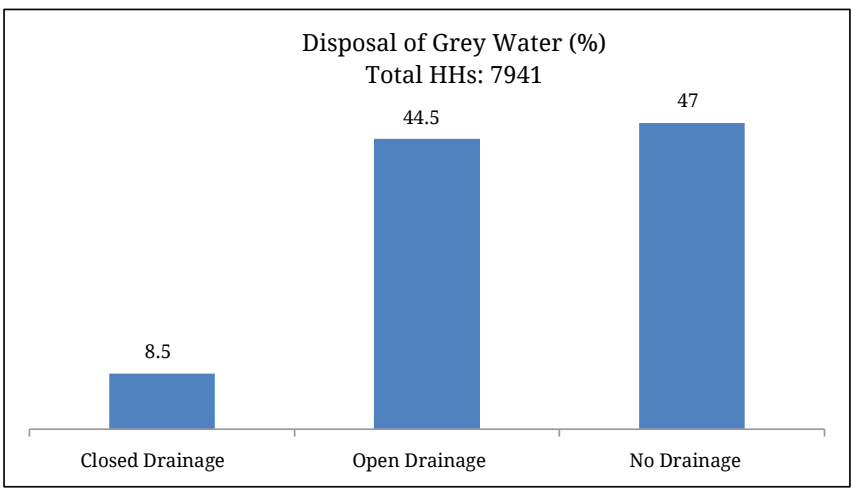
Drains in Mihijam

The prevalence of septic tanks is due to the absence of sewerage network in the city. As the graph above shows, only 3.3 per cent households are connected to

piped sewer systems. However, in our findings, there is no sewerage system in the town. Therefore, a major portion of waste water generated from households normally goes to the existing drains. Many septic tanks do not have soak pits and the existing ones are not always in a good condition. Many households having pit latrines or not having septic tanks facility for the flush/pour flush latrines also discharge the effluents directly into existing drains or open plots. Further, many of the households having septic tanks connected to flush/pour flush latrines system do not clean the septic tank regularly, as a result of which septic tank overflows and raw sewage flows into nearby drains. Untreated sewage flows also outflows onto vacant land and there are also occasional complaints of sewage flowing into wells.

As such, most of the drains are choked with plastic and other waste, causing water logging, especially during monsoons.The MNP cleans the drains only infrequently. Desilting of major drains is done by the Parishad once in a month. After cleaning, the silt is dumped on the outskirts with the solid waste.

Figure 3: Disposal of Grey Water



The road side drains meet bigger drains or *nalas*, and some flow into and contaminate the local ponds contributing heavy organic loads including bacteria, viruses and other harmful pollutant (see section below on Water Quality). There are two major drainage basins within the town on both sides of the railway line, which cuts the town in the middle. In the east part, most of the drains meet River Ajay and one major drain goes to a pond in Chittranjan. Towards the west side, all the drains meet the Maithon reservoir on river

Barakar, flowing through agricultural fields and vacant land. This has resulted in pollution of both the river and the reservoir.

The drainage system however does not exist for the entire town. As the graph below shows, according to the 2011 Census, almost half of the town (47 per cent) has no drainage system. The other half has mostly open drainage system. Less than 10 per cent of the city's households are connected to closed drainage.

According to the MNP, construction of drains is done through State funding. The decision about which drains are to be constructed is taken in the board meeting after due consideration of various proposals by ward members.

Desludging

Given that 94 per cent of private latrines have septic tanks, septage management is an important responsibility for the Municipality. According to the City Sanitation Plan of Mihijam, the projected figure of generation of septage in 2018 is about 29 KLD. The following table gives in brief the present scenario of this work.

Table 6: Desludging Operations in Mihijam

Particulars	Details
Septage Produced	29 KLD (Calculated on the basis of annual projected figure for 2018 provided inthe City Sanitation Plan of Mihijam)
Average Size of Septic tank	Length 10 feet, Breadth 4 feet, depth 7 feet
Connected to Soak Pits	2% of the Households with latrine
Average desludging period	15-20 years
Desludging service provider (Machine based)	ULB has 1 machine, which is non operational; 1 private operator
Average demand in a month	5-6 for ULB and private operators
Desludging cost	ULB – Rs 2500; Private – Rs 2500-3000
Service Lag	3-4 days for ULB, 1 day for private operators
Disposal of Sludge	On outskirts near Rajbadi
Treatment	No treatment facility
Relationship with ULB	Private operator not registered with ULB
Manual Scavenging	Community at Haadi Pada involved in this work

The average size of the septic tank is 10 feet in length, 4 feet in breadth and 7 feet in depth. At present, the MNP has only one suction machine for clearing septic tank sludge, for which it charges Rs 2500 per trip. People have to put in

an application to the Municipality office for availing this service. During the time of field research, this machine was not functioning. According to MNP officials, at least three machines are needed for the town. There is one private operator for septic tank cleaning (based in Chittaranjan) who also has a suction machine and vehicle. MNP officials share his contact with people when they enquire about this service. Both the MNP staff and private operator dispose the sludge from the tank on the outskirts near Rajbari, which is about 2 kms from the town. This is in clear violation of the Solid Waste Management (SWM) Rules 2016.

Manual Scavenging in Mihijam – The Story of Haadi Pada

Given the shortage of machines in the area, people call for services of manual scavengers for cleaning septic tanks. This work is done by members of Haadi Pada basti, near the railway station. It is a poor Dalit community. In terms of basic services, only a few households here have piped water supply. Most of them rely on common public tap and hand pump for water. About 80 per cent have own toilets, a few of which have been built through government support. There is no community toilet in the basti.

The men in the community have been carrying out manual scavenging for generations. No other community in the town is involved in this work. Presently, about 30-40 male members do this work. Most of them are also casual labour (sanitary workers) for the Municipality but they do this on the side to earn extra money. Typically, they get one call in a month or two. About 5-6 workers together go and clean the tanks. The number of workers depends on the size of the tanks as also the payment being offered. The tank is cleaned at an average charge Rs 12,000, which means each workergets about Rs 2000. The work is done during the night.

To clean the sludge, the workers have to get inside the tanks. Given the revolting nature of work, they have to take some form of intoxication to dull their senses. Of course the work itself is not without the risks. The tanks are often full of poisonous gas, which causes health problems. A few years ago one worker felt unconscious while at work and was taken to the emergency room in the hospital.

The sludge is transported in tin boxes in a small truck (model 407) and disposed either on nearby farm lands or in Rajbari. If the client has an adjacent farm land then it is deposited in a pit there itself.

When asked about their views on suction machines, community members said that these machines do not clean as well as manual workers, who get inside the tanks. Also, these machines are attached to a tractor, which cannot enter

into narrow lanes andextract the sludge from a distance of 100 feet. This is why manual workers are still in demand.

Even though the community is aware that Manual Scavenging is prohibited, and consider it as undignified work, but it is also an extra source of income. As someone said, “Today there is food in the house, but tomorrow if there is no food and my children are crying of hunger, then I will not only do this work, but might be ready to do any other dirty work in return for some money.”

As the survey shows, there is an existing demand-supply chain for manual scavengers in Mihijam. However, given that this work is outlawed under The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013, this issue must be addressed at the earliest by the authorities and the workers should get adequate relief under the provisions of this Act.

Solid Waste Management

Solid waste management is poor in Mihijam, with issues of shortage of skilled labour and vehicles, mixing of biomedical waste and slaughter waste with municipal waste and lack of safety equipment for the sanitary workers. Bins and drums have been placed at different points, such as the market area, from which waste is picked up once in every 2-3 days. To transport the waste, MNP has two tractors. It doesn’t however have any treatment facility. The waste is dumped at Rajbadi.

Till recently, there was no door to doorwaste collection system. Since February 2018, a contract has been given to a company called Akanksha Enterprises for both door to door waste collection and treatment. Six tippers are being used for this work. Recently, a Detailed Project Report (DPR) has also been made and tender given for the construction, operation and maintenance of a landfill site and recycling unit at Chandradeepa, 10 kms outside the city. The project is approx of Rs72 crores. The site is a government owned wasteland. However it has not yet started as the villagers in Chandradeepa are opposing the project due to health concerns.

III. WATER QUALITY

Does the present scenario of sanitation have an impact on the water bodies/ sources of Mihijam? In order to investigate this relationship, water testing was done on various sources of surface water (both drinking water and waste water) and ground water.

Various chemical parameters that were tested include:
TDS – Total Dissolved Solids, DO – Dissolved Oxygen, BOD – Biochemical Oxygen Demand, AN – Ammonical Nitrogen, TN – Total Nitrogen

Various biological parameters that were tested include:
TC – Total Coliform, FC – Faecal Coliform, FS – Faecal Streptococci

The parameters and standards taken for the water quality tests have been drawn upon similar studies commissioned by NIUA in the recent past. Even though the Bureau of Indian Standards has withdrawn IS:2296, but this is the standard that is being adopted here to assess water quality, as it is more stringent than the later standards prescribed by the MoEFCC. This is especially in light of the serious impact that diluted standards may have on environmental and human health. Class A water is that which can be used for drinking without conventional treatment but with disinfection and Class C water is that which can be used for drinking with conventional treatment and disinfection.

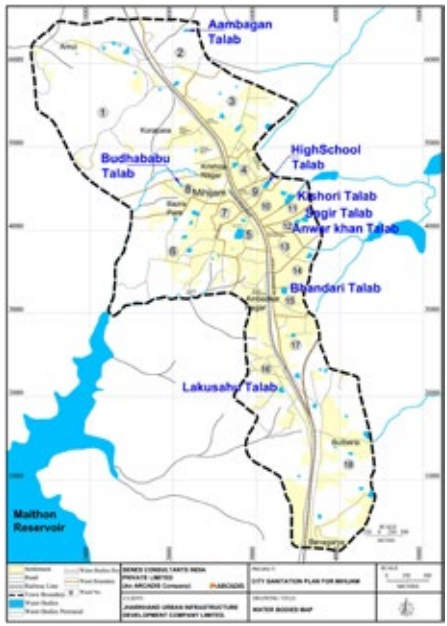
Water Supply

There are two sources of water supply in Mihijam - ground water and surface water. The main source of surface water is the treated piped water supply from River Ajay. This started in 2013 under the Shahari Jal Apurti Yojona. For ground water, about 400 hand pumps have been installed by MNP at different parts of the town. These are mostly located near slum areas and where there is no piped water supply. Many households also have their own borewells and wells. As such, the water table is low in the city (up to 200 feet) so for deep boring it is mandatory to take permission from MNP.

Pollution of Ponds

One of the major issues in the town is contamination of ponds. As given in the map below, there are a number of ponds across the town. Some are natural and some man-made. The latter were developed in a way that in case of over flow during monsoons, the water from one pond could flow onto another. Earlier those ponds were used for bathing and other domestic needs. But over the last few decades the ponds have become extremely polluted, mainly due to discharge of local drains. According to the residents, many of these drains have been constructed and diverted to the ponds by the Municipality itself. Solid waste is also dumped in them, and in many areas open defecation is also observed near the ponds. Now most ponds are covered by watercress, which is a visible sign of contamination.

Location Map of Ponds in Mihijam



Source: City Sanitation Plan of Mihijam

Contamination of Ponds

Another major issue is privatization and sale of pond land. The owners either use the pond for fisheries or reclaim and construct upon it. There is also illegal encroachment of ponds by locals. This has meant during monsoons many ponds over flow and there is no longer a natural route for water discharge. Some ponds have completely dried up, which shows up in low water tables or shallow water levels in the neighbourhood wells.

Pakka drain outflows to a pond

The Municipality cleans some ponds on special occasions such as the 'chat puja'. As such it does not maintain these ponds, except the one seen in the picture on the left. While a pukka drain has been constructed along the boundary to avoid its discharge in the pond, but eventually the drain goes out into an open space, and during the monsoons this water runs off into the pond itself.

To understand how the pollution of pond water impacts water sources, a few tests were carried out, among others.

Water Tests

Pokhartala Pond and Pokhartala Handpump

Pokhartala pond is located in Ward No. 5 of Mihijam. This used to be one of the bigger ponds of the town, which was used by people for bathing, washing clothes, bathing of animals etc. A number of drains flow into this pond, carrying both kitchen and toilet water. There is a hand pump near the well and its water is used for purposes of drinking and cooking. A test was done on both sources to understand if the contaminated water of the pond is impacting the ground water. Following are the results

Pokhartala Pond

Pokhartala Hand Pump

Table 7: Water Testing Results in Mihijam (1)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC		FC	FS
						MPN/100ml			
Pokhartala Pond	478	9.2	3.2	0.02	1.74	920	170		ND
Pokhartala Handpump	1392	6	0.8	0.07	268.6	>1600	>1600		1600
Permissible Value for Class A Water Sources (IS: 2296)	500	6	2	DL 0.001		50	DL 1.8		
Permissible Value for Class C Water Sources (IS: 2296)	1500	4	3			5000			

ND – Not Detectable
DL – Detectable Limit

From the results, a clear relationship between the two sources is not established. However what is surprising is that many of the parameters of the hand pump water are worse than that of the pond. It is alarming to see that the TDS level is very high and DO, BOD, AN and TN levels are also out of range. The biological parameters of the hand pump water are also way beyond the permissible range (more than 1600). This means it is not at suitable for consumption.

Kishori Pond, Well near Kishori Pond and Well near Gate No. 2

Kishori pond and Well near Kishori pond are located in Ward No. 10 and the Well near Gate No. 2 is located in Ward No. 11. Till recently, the Kishori Pond was full of water and used for bathing and fishing. It was a major source of water recharging, but now it is full of algae and has no fishes. It is in fact a waste dump and a number of drains flow into it. The aim of this test was to assess the quality of the pond water and to also know if that has an impact on sources of drinking water nearby. With this intent, one sample well was chosen

in proximity (Well near Kishori Pond) and another 200 metres away (Well near Gate No. 2).

Kishori Pond

Well near Kishori Pond

Table 8: Water Testing Results in Mihijam (2)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Kishori Pond	1174	6	5.6	0.04	4.1	>1600	920	240
Well Near Kishori Pond	838	4	3.6	0	27.4	>1600	540	ND
Well Near Gate no.2	428	5.6	4.8	0.02	260.8	>1600	70	ND
Permissible Value for Class A Water Sources (IS: 2296)	**500**	**6**	**2**	**DL 0.001**		**50**	**DL 1.8**	
Permissible Value for Class C Water Sources (IS: 2296)	**1500**	**4**	**3.0**			**5000**		

ND – Not Detectable
DL – Detectable Limit

The test results show that except DO, all chemical and biological parameters are out of permissible range for Kishori Pond. The well near this pond has similar results, which clearly shows that the contamination of the pond due to waste water is impacting the wells nearby. This relationship is also evident in the fact that the parameters are comparatively better for the well which is at a distance (Gate No. 2), even though they are also not in permissible range, except TDS, DO and FS. The TN level is extremely high, which also makes it unfit for drinking.

Ajay River Pump House and Tap Near Gate No. 2

Ajay River originates in Bihar and flows down near the Chittaranjan side (East).

Bore wells are installed on the river banks in Kushbedia village, from where water comes to the pump house, which is located in Ward No. 3. From here it is sent to the water treatment plant at Bhaga village. The plant has a capacity of 5.5 MLD. The treated water is stored in reservoirs for supply to the town.

This test was done to ascertain the quality of treated water both at the source and the end - as it is received by the households. This was to see whether there is any contamination along the supply line. The two samples were therefore taken from the pump house at Ajay River and a tap near Gate No. 2, in Ward No. 11.

Ajay River Pump House

Table 9: Water Testing Results in Mihijam (3)

Sites	TDS mg/l	DO mg/l	BOD mg/l	AN mg/l	TN mg/l	TC	FC	FS
						MPN/100ml		
Ajay River-Pump House	166	8	1.6	0.02	1.53	>1600	7.8	ND
Tap-Near gate no.2	148	8	2.8	0.02	0.52	>1600	540	ND
Permissible Value for Class A Water Sources (IS:2296) Except for TSS	**500**	**6**	**2**	**DL 0.001**		**50**	**DL 1.8**	
Permissible Value for Class C Water Sources (IS: 2296)	**1500**	**4**	**3.0**			**5000**		

ND – Not Detectable
DL – Detectable Limit

The test results show that except TDS and BOD the chemical parameters of the

water at the pump house are out of permissible range. What is also to be noted is that as this water reaches the households, the BOD, TN and FC levels go up substantially.

Overall, the water testing tests show that the quality of the pond water is really poor, owing to the drains entering in them. This has an impact on the quality of water in the wells around it. Compared to the ground water samples, the piped water supply from the treatment plant has better quality, even though a few of its chemical and biological parameters are also out of range.

IV. SANITATION STAFF

This section lays out the work chain responsible for sanitation in the town. Like all ULBs, the MNP has an elective wing and an administrative wing. The elective wing is responsible for making policy decisions at town level for services and schemes. It is headed by a Chairperson and supported by Vice-Chairperson and Councillors from each ward, who are elected by the town every five years. The Administrative wing is headed by an Executive Officer, deputed by the State, and is responsible for operational planning and management of the Parishad. Other officials in this wing include Engineer, Health Officer, Accounts officer etc, who directly report to the Executive Officer. The following is the Ornogram of the MNP.

Figure 4: Ornogram of MNP

There are 22 sanitary workers for cleaning of streets and drains. While 18 are temporary, four are permanent, who are also the supervisors. Most of the workers belong to Haadi Pada basti. They get a monthly payment of Rs 4000. If they take leave, the salary is deducted. They work in four teams and clean four wards in one day. Most of the drain waste is disposed at Rajbari. As mentioned before, solid waste collection is now managed by a private company. They have 32 workers, out of which eight are women, and two are supervisors.

According to MNP officials, the number of workers for cleaning the streets and drains is not sufficient. The Parishad needs at least two persons per ward (total 40). But there is not enough funding for the same. The MNP has to generate own

funding for temporary staff, through holding tax, trade license fee, town hall rent etc. Funds for permanent staff come from the State.

Table 10: Sanitation Staff of MNP

Post	Staff
Executive Officer	1
City Manager	1
Health Inspector	1
Sanitation Inspector	1
Sanitary Supervisors (Permanent)	4
Sanitary Workers for cleaning drains (Contractual with ULB)	18
Sanitary Workers for door to door collection and sweeping (With private contractor)	32

Source: Mihijam Nagar Parishad

V. UPCOMING SANITATION PLANS

To address the sanitation issues of different ULBs in the State and in line with the Government policy of sanitation, in 2016, the Jharkhand Urban Infrastructure Development Co. Ltd (JUIDCO) based in Ranchi, prepared a City Sanitation Plan (CSP) for 24 towns of Jharkhand. Mihijam was one of these towns. The CSP for Mihijam provides an integrated action plan to achieve universal sanitation access as envisioned in Government of India's National Urban Sanitation Policy (NUSP). The CSP identifies issues, priorities and actions for five major sanitation components and other related components. The major components are i) water supply, ii) access to toilet, iii) waste water management, iv) storm water drainage and v) solid waste management. Following are some of the measures suggested in the CSP of Mihijam in order to improve the sanitation scenario of the town.

Table 11: Recommendations in the City Sanitation Plan

Sector	Short Term (2017-2020)
Water supply	Finalization of DPR for water supply / completion of water supply works Detail survey of the town to identify water source contamination points and mapping Augmentation of surface water source
Drainage Network	Strengthening of the Existing Storm Water Network Desilting of existing drain Removal of encroachment from existing drains Integration of existing ponds and water bodies in the town in the storm water drainage network

Sector	Short Term (2017-2020)
Access to Toilet	Detail survey of the town to identify actual coverage of toilets Initiate IEC and awareness campaign
	Conversion of single pit latrine to twin pit latrine Conversion of insanitary latrine to sanitary latrine 100% coverage of individual toilets based on septic tanks Construction of community toilets for slum areas and urban poor Construction of public toilet for existing floating population Procurement of suction machines Development of septage management site
Waste Water Management	100% on site sanitation coverage – individual and community toilets

Sector	Medium Term (2020-2025)
Water supply	Finalization of water supply construction works Increasing number of water connections
	100 % collection of water supply charges as per new regulations provided by Government of Jharkhand
	Per capita water supply of 135 LPCD Initiate metering of water supply connections
Drainage Network	Integration of minor and major drains Detail topographic survey of the town Finalization of DPR for storm water system Finalize procurement of the maintenance equipment Construction of New Storm Water Drainage system
Access to Toilet	100% coverage of individual toilets 100% disposal of faecal sludge
	Construction of public toilet for increasing floating population
Waste Water Management	Preparation of DPR for extensive sewerage system Finalization of collection & conveyance system Initiate the Treatment and Disposal mechanisms –sewerage zone wise Initiation of sewerage network construction work Construction of DEWAT system for slum areas
Solid Waste Management	Initiate door to door waste collection system Segregation of waste at the dumping site
	Augmentation of waste collection and transportation equipments and vehicle Formation of Customer complaint / Grievance Redressal Cell Initiate waste collection charges Initiate works for transfer station and sanitary Landfill site

Sector	Long Term (2025-2045)
Water supply	100% coverage of water supply connections Per capita water supply of 135 LPCD 100% coverage of water supply meters 24X7 water supply to households
Drainage Network	Augmentation of the SDM system to meet the demands of developing city Replacements of components as per the maintenance plan Source Control and Ground water recharge initiatives to be developed for storm water drains
Access to Toilet	100% coverage of individual toilets Construction of public toilet for increasing floating population
Waste Water Management	Construction of centralized sewerage system connected to households Initiate collection of sewer charges Augmentation of the sewerage system to meet the demands of developing city Replacements of components as per the maintenance plan
Solid Waste Management	100% door to door waste collection Waste segregation at sources Scientific disposal and processing of waste at landfill site Cost recovery from SWM services and efficiency in collection of SWM charges

Source: City Sanitation Plan of Mihijam, 2016

Discussion with the officials of the Nagar Parishad and the field survey reveals that not much has happened in regard to the short-term measures suggested in the CSP. Some repairing and construction of drains has taken place in different parts of the town. There has been some progress on the construction of individual, public and community toilet under SBM. However, there has been no survey to identify actual coverage of toilets or about any IEC and awareness campaign. Also, no action has been taken yet to develop septage management site.

VI. REVIEW OF MUNICIPAL FINANCE OF MIHIJAM NAGAR PARISHAD

This section makes an analysis of the financial status of Mihijam Nagar Parishad (MNP) by reviewing its three year budget documents and audited financial reports from 2015-16 to 2017-18.

The financial situation of Municipality typically involves revenue and capital account transaction. In Mihijam Nagar Panchayat (MNP) the revenue receipts, which indicates money received under revenue account have increased from Rs 127 to Rs 338 lakhs. Even in case of revenue expenditure there has

been an increase for the same period. The balance between the two shows a positive outcome which means revenue income of the Nagar Parishad has been higher than expenditure for the given period. In case of capital account, there has been decline in capital receipt from Rs 1292 lakhs in 2015-16 to Rs 914 lakhs in 2016-17. In the last two years capital expenditure has been higher than capital receipts leading to capital deficit of Rs 490 lakhs and Rs 85 lakhs respectively.

Table 12: Overall Finances of MNP from 2015-16 to 2017-18

Item	2015-16 (In Lakhs)	2016-17 (In Lakhs)	2017-18 (In Lakhs)	Per Capita for 2017-18*
Revenue Receipts	127	296	338	729
Revenue Expenditure	79	154	259	745
Revenue Surplus	48	142	79	
Cap Receipts	1292	914	1398	3016
Cap Expenditure	405	1404	1483	3199
Cap Deficit	887	-490	-85	

Source: Annual audited Financial Account and Budget for Various years

*Population was extrapolated using the growth rate between 2001 and 2011

Table 13: Revenue Receipts of MNP from 2015-16 to 2017-18

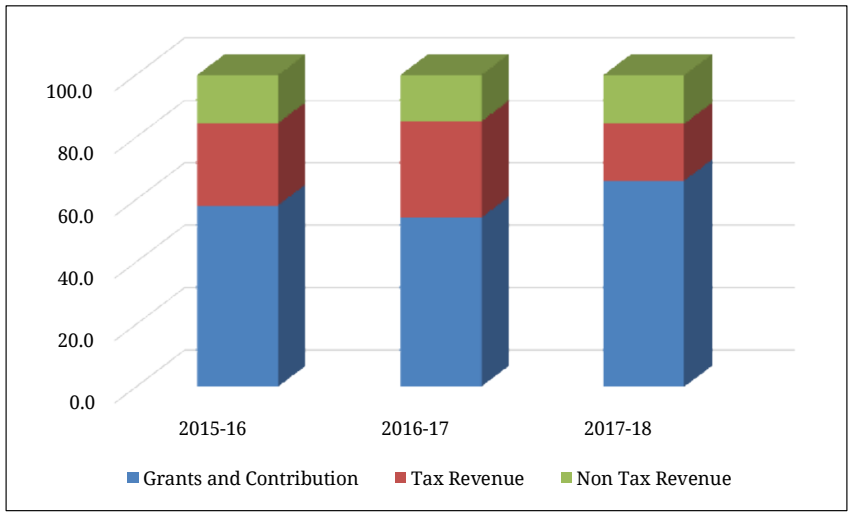
Revenue Receipts	2015-16 (In Lakhs)	2016-17 (In Lakhs)	2017-18 (In Lakhs)
Own Source			
Tax Revenue	33.5	91.2	61.5
Rental income - Municipal Properties	0	0.4	3.1
Fees and User Charges	0.7	26.7	34.6
Sale and Hire Charges	3.9	8.6	11
Others	14.9	8.2	3.9
External Source			
Revenue Grants, Contribution and Subsidies	74.1	160.7	223.6
Total	127.2	295.9	337.7

Source: Annual audited Financial Account and Budget for Various years

Grants and contribution are one of the important components of overall revenue collected by the Parishad as given in the table below. Other important sources of revenue include tax revenue and fees and user charges. Revenue of MNP is highly dependent on external grants, which has remained higher than 50 per cent in all the three years (Figure 4). It clearly indicates the

financial vulnerability of the ULB without grant support from State and Central government.

Figure 4: Share of Grants and Contribution, Tax Revenue and Non-tax Revenue in Overall Revenue of MNP (In %)



Source: Annual audited Financial Account and Budget for Various years

Among all the components of municipal revenue expenditure, the expenditure on establishment which includes salaries and other related benefits acquire prime importance in all three years. Although expenditure under revenue grants and contribution show a significant increase from Rs 18 lakhs in 2015-16 to Rs 88 lakhs in 2017-18. But a major chunk of that money goes as salary. Administrative as well as operation and maintenance expenses is very low barring in 2017-18. Share of administrative expenses in 2017-18 was 11 percent and that of operation and maintenance stood at 8.7 per cent, clearly indicating low allocation to these activities and overall budget constraint of the Nagar Parishad.

Grant for specific purposes is the main source of capital receipts for the Parishad for all three years. Their share is more than 85 per cent in all these years. Nagar it hasreceived grants from both Central as well as State government. In 2015-16 the share of Central grant was almost the same as State government, but in other years the share of State government has shown an increase.

Table 14: Revenue Expenditure of MNP from 2015-16 to 2017-18

Expenditure Heads	2015-16 (In Lakhs)	2016-17 (In Lakhs)	2017-18 (In Lakhs)
Establishment Expenses	49	51	46
Administrative Expenses	4	12	28
Operation and Maintenance	4	4	23
Interest and Finance Charges	2	3	3
Revenue Grants, Contribution and Subsidies	18	64	88
Others	1	20	72
Total	79	154	259

Source: Annual audited Financial Account and Budget for Various years

Table 15: Capital Receipts of MNP from 2015-16 to 2017-18

	2015-16 (In Lakhs)	2016-17 (In Lakhs)	2017-18 (In Lakhs)
Grants, Contribution for Specific purposes			
Central Govt	594	293	300
State Govt.	588	286	532
Others	0	209	453
Grants Total	**1182**	**788**	**1285**
Loans	20	20	20
Others	90	106	94
Total	1292	914	1398

Source: Annual audited Financial Account and Budget for Various years

Capital expenditure results in the acquisition or increased value of a capital asset (e.g. land, land improvements, infrastructure, equipment). Overall capital expenditure on assets has increased from Rs 195 lakhs in 2015-16 to Rs943 lakhs in 2017-18. Among different assets, capital expenditure on buildings, and roads and bridges havereceived prime importance followed by sewerage and drainage.

The review of finance of Mihijam Nagar Parishad suggests that while revenue income is higher than the expenditure, the capital receipts are lower than the capital expenditure from 2015-16 to 2017-18. It also shows that the Parishad is highly dependent on external grants. This dependency has been gradually increasing over the years. The major chunk of the revenue goes for the salary of staff. The expenditure on operation and maintenance is extremely low. There

is a major increase in the capital expenditure on assets mainly on buildings, and roads and bridges followed by sewerage and drainage. In other words, despite the City Sanitation Plan and its subsequent Action Plan, sanitation has not received any significant attention in the Municipal budget yet.

Table 16: Capital Expenditure of MNP from 2015-16 to 2017-18

Item	2015-16 Actuals (Rs Lakhs)	2016-17 Actuals (Rs Lakhs)	2017-18 Actual (Rs Lakhs)
Investments- Municipal Fund			223
Loans, Advances and Deposites		2	289
Capital Expenditure on Assets			
1.Fixed Assets			
Buildings			479
Park &Playgrounds			4
Roads and Bridges	142		179
Sewerage & Drainage	24		57
Water Ways	4		
2. Others Assets			
Plant & Machinery	1		
Vehicles	13		
Furniture, fixtures, fittings and electrical appliances	1		12
3. Others fixed Assets	9		12
Total Capital Expenditure on Assets	195	996*	743
Capital Works in Progress	210	406	227
Total Capital Expenditure	405	1404	1483

Source: Annual audited Financial Account and Budget for Various years

*The disaggregated date on expenditure of fixed assets was not available.

VII. CONCLUSIONS AND RECOMMENDATIONS

1. Mihijam is a Class III town and a Nagar Parishad in the Jamtara district of Jharkhand. About 65 per cent of the households have toilets and 35 per cent defecate in the open. Now a number of individual and community toilets have been built under the Swachh Bharat Mission, which might have curtailed dependence on open defecation.

2. Almost 94 per cent of the private toilets are based on the septic tank system. The prevalence of septic tanks is due to the absence of sewerage network in the city. A major portion of waste water from the households goes into existing drains, which are mostly open and cover only about half of the town (53 per cent). Often the water from septic tanks also flows into these drains, either because the tanks do not have soak pits, or existing ones are not in a good condition or even because the tanks are not cleaned regularly. Untreated sewage flows also outflows onto vacant land and there are also occasional complaints of sewage flowing into wells.

3. The drains are not cleaned frequently, and as such meet bigger drains or nalas, and some flow into and contaminate the local ponds contributing heavy organic loads including bacteria, viruses and other harmful pollutants. This is evident from our water tests. What is also revealed that the contamination of the ponds due to waste water also has an impact on the quality of water in the wells in the vicinity. Urgent action is therefore required on conserving the ponds and for treatment and safe disposal of waste water. Compared to the ground water samples, the piped water supply from the treatment plant is better in quality, even though a few of its chemical and biological parameters are also out of range.

4. Desludging of the septic tanks is carried out by MNP (which has one suction machine, currently non functional) and one private operator. However, the town also relies on the services of manual scavengers. Most of them are employed with the Parishad as sanitation workers but do this work on the side for extra income. This is a serious issue that needs to be addressed given that the practice is outlawed under the “Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013.”

5. Apart from a plan on building an integrated solid waste management site, the Parishad does not have any big projects on sanitation. CSP was made for the town by JUIDCO in 2016. It had a series of short and long term recommendations, which, as the survey shows, are yet to be implemented.

6. Central to sanitation planning is the availability of funds. An analysis of Municipal finances between 2015-16 and 2017-18 shows that there has

been an increase in both revenue receipt and revenue expenditure for MNP. While revenue income has been higher than expenditure for the same period, but there has also been an increase in capital expenditure leading to capital deficit. Further, grants and contribution (66.2 per cent) are one of the important components of overall revenue collected by the MNP, reflecting high dependency on external sources. Given this fact, it is difficult to see how the Municipality will be able to channelize sufficient funds for the implementation of the City Sanitation Plan.

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