

Urban Solid Waste Management: Myth or Reality? A Case Study of Hengrabari, Guwahati

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Abstract - Solid Waste Management refers to the process by which solid materials that are no longer useful or have served their purpose are collected, treated, and then discarded. Due to the ever-increasing population, particularly in urban residential and commercial areas, improper disposal of waste is a recurring phenomenon, thereby harming the environment and impacting both humans and animals. However, it is often neglected. Thus, solid waste management becomes a crucial part of any urban ecosystem. This research seeks to explore whether the practice of solid waste management is just a myth or reality, focusing on Hengrabari, an urban residential and commercial complex in the heart of Guwahati city of Assam. Data were collected using questionnaires from 47 respondents belonging to various sections, viz. members of households, tipper workers, sweepers, ragpickers, and municipal corporation officials as well as through direct observation at waste disposal sites. The study also aims to assess the awareness and compliance of individuals with the Solid Waste Management Rules of 2016 and initiatives such as the Swachh Bharat Abhiyan of 2014. Results reveal that while the majority of respondents have heard of the rules and initiative, actual compliance was limited. Findings also reveal that while a large majority of respondents are aware of the health and environmental risks associated with improper waste disposal, they voluntarily did not contribute much to minimizing this impact. They often had partial knowledge and showed disinterest in awareness programs. Positively, a few respondents agreed to follow certain responsible waste disposal techniques, such as segregating waste before dumping, and cooperating with workers. Waste workers reported a lack of protective equipment, low income, and frequent exposure to health ailments. Municipal officials claimed to follow necessary steps to increase efficiency, but practical implementation was very often lacking. Suggestions included increasing awareness, enforcing laws with fines, organizing local campaigns, and motivating community participation. The study highlights that although awareness of waste management issues is present, significant gaps exist in its implementation in reality. Bridging this gap is necessary through public awareness and community involvement for effective solid waste management and sustainable environmental health.

Index Terms - Solid Waste Management, Urban Waste Disposal, Waste Segregation, Policy Implementation Gaps, Ground-level Realities, Community Involvement, Environmental Health. (*key words*)

I. INTRODUCTION

Improper solid waste disposal is a serious problem facing urban areas in the current Anthropocene era, particularly with the rapid pace of urban growth. Irresponsible disposal of wastes - both recyclable and unrecyclable, toxic and hazardous - without segregation not only poses threats to human and animal health alike, but also significantly impacts the environment. This is one of the most neglected threats that has the potential to cause severe harm. Solid Waste Management has become the need of the hour in urban landscapes.

Solid Waste Management (SWM) is the process of collecting, segregating, transporting, treating, and disposing of solid wastes, including household garbage, construction debris, latex paints, discarded appliances, vehicles, scrap metals, and numerous other products systematically. "Solid waste management includes all activities that seek to minimize health, environmental, and aesthetic impacts of solid waste" (Zhu, D. et al., 2008).

In urban landscapes, effective Solid Waste Management (SWM) is critical not only for maintaining personal health but also for ensuring social, economic, and most importantly, environmental well-being. As stated in the Solid Waste Management Rules, 2016: "Every urban local body shall, within its territorial area, ensure segregation of biodegradable and non-biodegradable waste, facilitate door-to-door collection, and prevent littering on streets." (Ministry of Environment, Forest and Climate Change, 2016)

Complying with this context, the Swachh Bharat Abhiyan (Clean India Mission) was launched by the Government of India in 2014. It is a nationwide campaign aimed at improving sanitation, putting an end to open defecation, as well as ensuring effective waste management.

Despite efforts made under these mandates to bring waste management into mainstream public discourse, many rapidly expanding urban zones such as Hengrabari still struggle with its proper implementation and compliance. Numerous studies provide a comprehensive understanding of various dimensions of solid waste management in an urban landscape—from challenges to potential solutions. Incorporating these insights helps enhance the depth and relevance of the research.

This research aims to reveal a unique perspective on the practice of solid waste management at a micro-level locality like Hengrabari, which possesses the characteristics of a small town with a blend of residential as well as commercial land-use and has been facing the growing problem of indiscriminate waste dumping with the changing dynamics of population accumulation. One of the significant consequences of this irresponsibility is the frequent occurrence of vector-borne diseases. Additionally, another problem which has been creating havoc is the clogging of drains, creating foul odour in the neighbourhood and also resulting in flash floods, especially during monsoons, severely impacting daily life.

Here, personal interactions have been conducted with residential households, tipper workers, ragpickers, sweepers, and Municipal Officials to gain a comprehensive understanding and real-world insights from those directly involved in waste management. This grassroots-level approach is particularly adopted to address whether the practice of solid waste management is a myth or reality in an urban setting like Hengrabari, by exploring how the awareness and compliance with the SWM Rules of 2016 and Swachh Bharat Abhiyan actually play out at the community level, and examining whether these regulations lead to tangible improvements or remain theoretical ideals.

II. REVIEW OF RELATED LITERATURE

Being a topic of major significance in the current scenario, numerous works have been conducted on Solid Waste Management. Solid waste has been identified as one of the key problems in most cities around the globe and has been placed as the second most difficult issue modern cities face today by the UNDP (Kashyap, A. et al., 2010). In urban areas, particularly in rapidly urbanising cities, the issues of municipal solid waste management are of immediate importance (Zhu, D. et al., 2008, p.1). A study reveals that the average generation rate of municipal solid waste (MSW) in Guwahati is 0.7 kg/capita/day, which has the potential to generate power of 30 MW (Pradhan, P. K. et al 2012).

It is often argued that “The core of improper waste disposal is man, and it is of utmost importance that proper cooperation, active participation, and a sense of belonging be inculcated among citizens” (Gogoi, 2013, p. 58). It is also an undeniable fact that the lack of proper segregation at source and door-to-door collection continues to be a major bottleneck for effective solid waste management in a city like Guwahati (Goel et al., 2018, p. 3). A study by Rani et al. (2022) also reveals that many people dispose of household waste by just throwing it outside their homes. Improper waste disposal causes infectious diseases, unpleasant odour, and unclean surroundings (Rani et al., 2022). It is also very true that public awareness and attitudes towards waste can affect the entire solid waste management system- both its success and its limitations (Zhu, D. et al., 2008).

Work by Coffey, M. (1999) highlights that in low-income countries, “wastes are wetter, heavier and have a higher content of organic material,” making them prone to decay and leading to health hazards (Coffey, 1999, p. 24). The management of municipal solid waste, which consists of waste generated by domestic households, commercial and industrial enterprises, and healthcare and institutional activities, as well as on the streets, is most often the responsibility of municipal or other governmental authorities (Zhu, D. et al., 2008).

As per the Solid Waste Management Rules, 2016 (MoEFCC, Government of India), Rule 15(zf) states: “*The local bodies shall frame bye-laws and implement waste segregation at source, processing, and final disposal.*” It also mandates that every generator shall segregate and store the waste generated by them in three separate streams- biodegradable, non-biodegradable, and domestic hazardous wastes (MoEFCC, 2016).

Works have been done to examine the existing SWM infrastructure in Guwahati, identifying gaps in collection, transportation, and disposal systems. Several researchers emphasize the need for systematic processes, including waste segregation at source, primary collection, and proper disposal mechanisms. For instance, the existing landfill site of Guwahati, located in Boragaon, does not fulfil the prescribed parameters listed by the Central Public Health Environmental Engineering Organisation (CPHEEO) and the Central Pollution Control Board (CPCB) (Hazarika, R., & Saikia, A., 2020). Infrastructural innovation such as the installation of geocells at landfill sites can help to not only save time and money but also support the reuse of waste for energy generation and road construction (Chakraborty et al., 2014, p. 6). Other researchers also discuss the potential of converting MSW into energy through methods like biogas production. They analyse the feasibility of waste-to-energy facilities in Guwahati, considering the city’s waste generation patterns and energy needs (Palacio, J. et al., 2019).

This research is distinctive on the front that it focuses on the lived experiences of local stakeholders - households, waste workers, and municipal staff - in assessing the realities of solid waste management. By shifting the focus from policy frameworks alone to on-the-ground practices in Hengrabari, it tries to address a crucial gap in existing literature, which often overlooks micro-level urban dynamics. The study ultimately aims to bridge the gap between policy intent and ground realities, and provide a more in-depth and grounded view of solid waste management by offering context-specific recommendations for sustainable waste management in in urban environments.

III. OBJECTIVES

- To assess patterns of solid waste generation and disposal, and to examine the major health and environmental implications associated with improper waste disposal in Hengrabari.
- To evaluate the perceptions, lived experiences, and awareness related to Solid Waste Management among households, tipper workers, sweepers, ragpickers, and Municipal Corporators.
- To identify the gaps between policy initiatives and their practical implementation at the local level.

IV. ABOUT THE STUDY AREA

The study area, Hengrabari, is located in the capital city of Guwahati within the Kamrup Metropolitan district of Assam. The word 'Hengrabari' originates from the Boro language, comprising two parts - 'Hengra' meaning barrier and 'Bari' meaning forest.

Hengrabari falls under the physiographic region of the Brahmaputra Valley Plains. Its geographical coordinates are 26°08'59.4312" E and 91°48'03.8268" N, with an elevation ranging from approximately 51 to 66 meters above sea level. The area spans over 5.59 square kilometres and is divided into two parts - Upper Hengrabari and Lower Hengrabari. Upper Hengrabari is bordered by Borbari, with a small hillock named Thamaktilla situated on its southern fringe.

Historically, Hengrabari was a forested region with dense vegetation, tall trees, wild bushes, and surrounding hillocks. Over the past few decades, increasing human interference has led to widespread deforestation, with forests burned and cleared, hillocks levelled, and agricultural land filled in to make way for houses and commercial establishments. As the population grew, Hengrabari rapidly transformed into a small-town-like urban area dominated by residential complexes. A key ecological feature is the 620-hectare Hengrabari Reserved Forest, often referred to as Guwahati city's lungs and home to the Assam State Zoo. Despite rapid urbanisation and associated threats like deforestation and encroachment, the forest remains a striking example of an "urban jungle", supporting diverse flora and fauna. A small stretch of the Bharalu River also flows through Hengrabari - not as a river, but functioning as a drainage system - and is considered one of the most polluted and contaminated water bodies in Guwahati.

Hengrabari is one of the most densely populated areas in the city, resembling a small town with a population density of 8,087 persons per square kilometre. The total population is 45,180, comprising 23,240 males and 21,760 females. The local population is primarily engaged in secondary and tertiary sector activities. The area hosts a range of commercial establishments including offices, apartment complexes, grocery stores, restaurants, hotels, automobile repair shops, and apparel stores. Small market pockets also support the daily needs of the residents. Numerous healthcare centres and educational institutions are present in the locality. The area is well-connected by roads, with the primary route being the Hengrabari Road. The recent construction of a highway passing through Upper Hengrabari and Borbari has further accelerated its development, positioning the area as a rapidly emerging commercial hub.

The following photograph illustrates the rationale for selecting the locality of Hengrabari as the study area of this research, highlighting improper waste disposal in a restricted area driven by public negligence that contributes to such practices.





Photograph depicting public negligence: Garbage dumped at a prohibited site in Hengrabari

Source: Photographed by author

V. METHODOLOGY

Structured interviews with 47 respondents belonging to different categories were conducted - viz. household residents, tipper workers, ragpickers, sweepers, and municipal officials - who are the major stakeholders in the locality. A set of structured questionnaires consisting of both close-ended and open-ended questions was employed, allowing respondents to provide quantitative data (e.g., frequency of waste disposal) and qualitative insights (e.g., attitudes towards waste segregation). Interviews with municipal officials were conducted to gather detailed information on policies, rules, and regulations surrounding solid waste management practices in Hengrabari. These interviews were intended to gain official insights into the implementation of the Solid Waste Management Rules of 2016 and the Swachh Bharat Abhiyan, as well as the issues hindering their enforcement at the grassroots level.

On-site observations were also carried out in various locations within Hengrabari, such as public spaces, streets, dumping grounds, and waste bins, to assess real-time waste disposal practices.

VI. RESULTS AND DISCUSSION

Household Waste Generation and Disposal Practices

The study with household residents of the area revealed that households in Hengrabari, typically consisting of 3-6 members, generate around 2-5 kgs of waste daily. Segregation practices remain inconsistent - most households, except a few, lack separate bins for wet and dry waste. The waste generated is primarily disposed of through local collection points or handed over to individual collectors. While municipal waste collectors generally maintain regular schedules, there are often limitations in public cooperation, which significantly hampers effective waste handling. For instance, many households, instead of properly packing their waste and handing it over to collectors, simply dump it on the roadside or into drains. This often leads to clogged drainage systems, causing havoc during heavy rainfall. Health concerns related to improper waste disposal are frequently overlooked, particularly by newer residents, despite recurring illnesses reported among some long-term inhabitants of the area.

However, there are also households that follow responsible waste disposal practices and show a strong willingness to participate in awareness campaigns for promoting such efforts across the locality. Unfortunately, such awareness campaigns are rarely organized, and when they are, they often remain unattended by the majority of residents. As stated by one of the respondents: *“Once a cleanliness drive was conducted in our society. Only a few people actively showed up. Many felt that conducting such drives in a society like ours wouldn’t bring about any change on a larger level, as most of our residents believe our society is already clean. That was the last time any such event was held here.”*

Overall, although there are responsible households, solid waste management practices remain significantly inconsistent across the community.

Working Conditions and Challenges witnessed by Waste Workers

Interaction with waste workers revealed that the major issue they face is functioning under informal, poorly regulated conditions. Tipper workers reported that they collect up to 1000 kg of waste daily, and one of the recurring issues they observe is the absence of waste sorting by the majority of households, which adds significantly to their workload. While tipper workers employed under the Guwahati Municipal Corporation (GMC) expressed general satisfaction with their pay scale and services, those working informally reported several challenges, including the lack of protective gear such as gloves and masks, along with constant struggles related to low wages.

Ragpickers, earning as little as Rs. 30-50 per day, play an indispensable role in the recycling of wastes. However, they often work in hazardous conditions and are highly vulnerable to health issues, with only a few having access to medical support. One ragpicker stated:

“We go to places to pick objects that people throw away as useless and valueless. What is waste for others is a source of livelihood for us. While working, we often get physical injuries such as cuts and burns, and come into contact with toxic substances. But we have to work, or else we won't be able to afford food for the day.”

Sweepers, too, struggle due to the lack of cooperation from the public, especially when it comes to indiscriminate littering, along with inadequate safety measures provided to them. All three categories of respondents contribute immensely to solid waste management, yet their contributions remain largely unrecognized.

Their suggestions included the need for safety equipment such as masks and gloves to be made readily available so that health risks can be minimized, even if not fully eliminated. These interactions with them raised doubts about the popular belief that frontline waste workers are well-supported.

Municipal Governance in Waste Management: Roles, Gaps and Contradictions

Interviews with municipal corporation officials revealed that around 100–260 workers are employed for tasks related to waste management. Officials claimed that paid leave and occasional health benefits are provided to the workers. However, regular health check-ups were found to be rare. They also mentioned conducting awareness campaigns, but responses from households contradicted these claims, indicating a communication gap. This gap is primarily due to the lack of impactful announcements or advertisements prior to such campaigns. Even when these awareness drives are conducted, very few residents actually attend. Enforcement of the Solid Waste Management Rules (SWMR) 2016 remains partial. Although fines are in place, their implementation is inconsistent. A major issue, as identified by the officials, is the general lack of adherence to rules by the public and the absence of initiative towards responsible solid waste management.

While officials expressed that they are doing their level best, they also acknowledged the need for stricter enforcement of certain rules and regulations.

Bridging the Policy-Practice Divide: Key Insights and Recommendations

Awareness among respondents about the Swachh Bharat Abhiyan (SBA) was widespread, though only 73% agreed that they had observed any significant change in hygiene or cleanliness. Awareness of the Solid Waste Management Rules (SWMR) 2016 stood at 83%, primarily among graduates and municipal staff. The remaining respondents, regardless of educational background, showed partial or no understanding. Many also expressed confusion or scepticism regarding the rules and their applicability.

Both municipal officials and community members emphasized the need for periodic local-level awareness campaigns, particularly on weekends, supported by effective media outreach.

The findings do highlight a clear disconnect between policy-level frameworks and ground realities. Despite the promises of SWMR 2016 and SBA, effective implementation remains hindered by infrastructural gaps, informal labour conditions, lack of sustained awareness, and weak policy enforcement.

Recommendations for bridging this divide include not only administrative reforms and institutional engagement but also active community participation, inclusion of informal workers in planning, and stronger mechanisms for public accountability.

VII. CONCLUSION

The research aimed to study the integration of various factors related to Solid Waste Management in the urban locality of Hengrabari. Community participation, ill-effects of improper waste disposal, environmental implications, awareness about initiatives such as Swachh Bharat Abhiyan and the Solid Waste Management Rules of 2016, etc. were all taken into consideration, to examine the scenario of Solid Waste management practices in the locality. Ground realities and various perceptions and ways of thinking of the people living in the surveyed area- either as households or for the purpose of work about the topic were observed and recorded.

The study highlights the gap between the perceived efficiency of solid waste management and its ground realities. There exists negligence on the part of the majority of residents towards proper waste disposal mechanisms. Despite knowing the risks of improper waste disposal and littering such as vector-borne diseases and environmental pollution, many residents still engaged in improper waste dumping, and community efforts towards efficient solid waste management was low.

While a large number of respondents were aware of the Swachh Bharat Abhiyan and the Solid Waste Management Rules, 2016, their actual compliance with proper waste disposal practices remained limited, revealing the gap between awareness (myth) and action (reality). Partial knowledge and disinterest in participating in awareness drives further reflected this gap. However, on a positive note, many people did claim to dispose waste responsibly, and several categories of workers including tipper workers and sweepers acknowledged cooperation from a minute percentage of residents. However, this cooperation was not widespread enough to ensure efficient management.

Municipal corporation officials claimed that they were following all necessary steps to improve the scenario, however, the actual implementation at ground-level was found to be inconsistent. Some respondents pointed out the absence of separate wet and dry bins and even if such bins' existed people do not consider segregating the wastes before disposing. People also raised concerns about the inexistence of awareness campaigns at regular intervals and the lack of awareness of such events being held too. Although residents and workers did acknowledge certain measures by the Municipalities for stricter rule enforcement, the efforts not fully realised on the ground always.

Many practical suggestions from respondents were also brought forth through the research. The most common recommendation was to increase public awareness about the seriousness of the issue. Stricter enforcement of laws, imposition of fines, organising local and community-level awareness campaigns, encouraging public participation and providing necessary safety equipment to workers were suggested.

Improper solid waste disposal is a growing concern, not only in Hengrabari but in many urban localities. It poses significant negative impacts to public health as well as the environment. The study does confirm that while the awareness and systematization exist, the reality reflects inconsistent practices, informal waste workers struggle, and poor enforcement. A mass-scale shift to better waste management mechanisms, aided by continuous public engagement, stricter policy execution and recognition of informal labours needs is of vital importance for translating it into reality. Only through sustained efforts at both institutional and community levels can the solid waste management scenario in Hengrabari shift from merely a perception to actual reality.

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