

# Solid Waste Management Practices and Raising Environmental Concerns: A Case Study of Gangtok Municipal Corporation Areas, Sikkim

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**ABSTRACT** Municipal solid waste is a growing concern in the urban localities across the nations. In recent years, urban local bodies have shown considerable importance to address the issue of solid waste management. The paper attempts to understand the role of Gangtok Municipal Corporation (GMC) in collection, transportation and disposal of solid waste, the nature of its collaboration with Non-Governmental Organisations (NGOs), people's participation in handling waste and its consequent effect on the environment. The study was carried out by using qualitative research design, employing interviews, focus group discussion and in-depth observation methods with all the important stakeholders such as GMC officials, workers, NGOs, and households. The study finds that the primary focus of the corporation remains on collecting and transporting largely unsegregated mixed waste from the main roads, markets, and other visible places. Although the corporation is working in partnership with the NGOs, it is struggling to implement the SWM rules and failed to collect the user fees efficiently. Findings suggest that even though majority of the people are aware of the ill-effects of burning and dumping garbage, yet people's participation in SWM related activities is still limited.

## INTRODUCTION

Rapid industrialisation, urbanisation, and population explosion have triggered large scale generation of waste materials globally. In fact, National Environment Policy (2006) highlighted that indecorous production and consumption practices are the instantaneous cause of environmental degradation. Economic development and the subsequent improvements in living standards of people have also caused an incremental rise in both the quantity and complexity of solid waste (Grazhdani 2016; Li et al. 2020). Market system in 'consumer capitalism' backed by multinational corporations also entices buyers to lead a consumerist lifestyle (Kennedy and Krogman 2008) by deployment of 'sophisticated advertisements' (Warde 1990). In such a system, the middle-class families become more susceptible and the majority of them spend their income in acquiring articles to enhance the display of their social status and prestige, which Veblen (1899) termed as 'conspicuous consumption,' leading to the generation of humongous amounts of solid waste on a daily basis. The present trend of consumption practices with unlimited extraction of resources have tremendously degraded the environment at an alarm-

ing rate (Gutberlet 2016). Such lifestyles have also led to maximum use of plastics as plastic has replaced other forms of packaging (Yoda et al. 2014).

A common myth around waste generation is often linked with household size and income. However, Wang et al. (2020) quantitatively explore the relationship between various influential factors in the generation of kitchen solid waste (KSW), where they found that there is no linear relationship between KSW generation and household size as well as household income. Yet, direct relation was observed in relation to the habit of ordering takeout, district of residence, and meticulous consumption culture, which points toward the consumerist lifestyle that we happily engage in. Although such factors contribute to the generation of waste, nonetheless, Azevedo et al. (2020) discuss the issue in terms of mismanagement and shows how unclear laws, absence of public awareness campaigns, and uncharted/undefined fees methodology significantly contribute to the accumulation and littering of Municipal Solid Waste (MSW). Ferronato and Torretta (2019) argued that one of the main reasons for environmental contamination is the mismanagement of solid wastes related to open burning and dumping.

The unsustainable management of solid wastes is observed to be common among the developing as well as transitional countries. Ramachandra et al. (2018) critically discussed how such mismanagement and unscientific ways of disposal of MSW is causing degradation of environment and emissions of greenhouse gas in urban localities.

The state of Sikkim has undergone rapid urbanisation, and infrastructural development and modernisation process in its post-merger phase with India. It has encountered a perceptible shift from a sustainable agrarian economy to a service-oriented one, especially in the capital city of Gangtok. The concentric population living in high rise concrete jungles has generated copious amounts of wastes (GoS 2019). Additionally, being a popular tourist destination receiving twice the size of its population annually (GoS 2018) has also contributed to the generation of copious amounts of waste materials (Singh 2001). Toxics Link (2014) report revealed that extruded food – instant noodles, chips, and various forms of packaged snacks consumed in the state alone generates 3.47 crore pieces of plastic waste. However, since the mid-1990s, the state has taken pro-environment initiatives, and as a result, the use of non-biodegradable materials like plastics, polythene-bags, and biomedical/chemical wastes was banned through legislation in 1997 (GoS 2016). Further, following the instructions laid down in the Municipal Solid Waste (Management and Handling) Rules, 2000 for monitoring of MSW, the State Policy on Solid Waste Management Strategy, 2019 emphasised that MSW has emerged as an endangerment to both the environment and human settlements. Most MSW in Sikkim are generated from households, hospitals, educational institutions, construction sites, hotels, tourist spots, and other commercial establishments, including kitchen and sanitary waste. For successful management of MSW, Urban Local Body (ULB) or Municipal Corporations play a pivotal role in mandatory implementation of Municipal Solid Waste Rules, 2000, amended in 2016, by the Ministry of Environment and Forests, Government of India. In this context, the paper endeavours to explore the various dimensions concerning Solid Waste Management (SWM) in Sikkim in terms of clearly defined laws, sensitisation campaigns, aware-

ness among people vis-à-vis waste segregation and collection, the participation of NGOs (Non-Governmental Organisations) and SHGs (Self-Help-Groups), and how it is affecting the pristine natural environment of Sikkim and its consequences on human life. The rationale behind the conceptualisation of the study is the paucity of academic engagement and scholarship in understanding of SWM in Sikkim, and the multifarious roles played by the Gangtok Municipal Corporation (GMC), NGOs, and environmental activists in addressing the management of solid waste.

### Objectives

The study examines the various roles played by GMC in maintaining cleanliness, health and sanitation, and beautification of the Gangtok town. The dedicated effort of GMC has been recognised in the Swachh Survekshan-2017 which has declared Sikkim as the 'cleanest state' of the North-East region. It also attempts to study the generation and management of MSW in Gangtok. The objectives of the study are as follows:

1. To find out the role of GMC in accomplishing the requirements of collecting, transporting and disposal of solid waste management in Gangtok and its surrounding areas.
2. To identify its linkages with the Non-Governmental Organisations (NGOs) and the constraints and challenges faced by the corporation.
3. To examine the awareness among people and their participation in the segregation of the waste generated and its disposal.
4. To explore some of the growing environmental concerns in Sikkim.

### MATERIAL AND METHODS

Sikkim, with a total population of 6,10,577 (2011 census) has an average population density of 86 persons per sq. km. However, the population density in the Gangtok area is above 7,000 persons per sq. km. GMC being an ULB acts as the nodal agency for the execution of various policies and programmes of the government concerning effective urban planning and management. Some of its activities involve trade licens-

ing for commercial establishments, operation and maintenance of community sanitary complexes, levying fines and penalties, and most importantly, management of waste. For this reason, GMC has been taken up as a unit for a case study for the present paper. The study employs qualitative research methods to explore the nature of waste management practices implemented for collection, treatment and disposal. All the stakeholders such as GMC officials, including both the staff and contract workers, NGOs, SHGs, and households have been taken into account. The samples were selected using a non-probabilistic purposive sampling method. Field data has been collected using the interview schedule as well as informal discussion. Further, to substantiate the collected information, focus group discussion was also held with resident householders for an in-depth comprehension of their awareness level and participation in the proper segregation and disposal of waste materials. The studied phenomenon, being a part of the everyday lived experience of the researcher, participatory observation was methodically employed to substantiate or refute the arguments presented by various stakeholders.

## RESULTS

### Gangtok Municipal Corporation

In Sikkim, two corporations, namely GMC and Namchi Municipal Corporation (NMC) located in East and South District respectively function. GMC, a unit of Urban Development and Housing Department (UDHD), Government of Sikkim (GoS), was formed under Sikkim Municipalities Act, 2007 and established in August 2010. GMC had its first election on 27<sup>th</sup> April 2010 in 15 wards, which was increased to 17 in 2015. It also has two nominated councillors, each representing the Tibetan and Mohammedan community. Prior to the establishment of GMC, UDHD managed the collection of garbage in the main market area with one vehicle which later was increased to seven. The rapidly accumulating MSW was handled in a short-sighted measure with unplanned dumping at Marchak, near present day 'Smile Land', around 14 km away from the capital town. However, with the establishment of GMC, the corporation started han-

dling the collection, transportation, and disposal of MSW away from the Gangtok area to the present-day landfill at Martam, East Sikkim, popularly known as '*batish number*' or 32 Mile. Initially, the landfill was under UDHD till it was handed over to GMC in 2017. GMC's jurisdiction stretches from Bojoghari to Ranipool with a distance of approximately 19 km. The corporation's record shows that on an average Gangtok city generates approximately 50 metric tons MSW per day, with 57 percent biodegradable and 43 percent non-biodegradable waste. Comparatively, the amount of biodegradable waste generated in the state is less than what the study by Ramachandra et al. (2018) argued to be >70 percent in developing regions. Thus, this also means that there is a jump of more than 13 percent in non-biodegradable waste materials in Sikkim, which itself is alarming in nature and can cause environmental disaster, if not cautiously managed.

### Infrastructure and Manpower – the 'Gangtok Beautifiers'

The corporation presently has 30 trucks of different sizes for the collection and disposal of MSW and two compactors, acquired through funding from the Asian Development Bank (ADB) in partnership with the North Eastern Council (NEC). GMC is also in acquisition of a baling machine presently installed at Martam landfill for assortment and compression of different materials, such as plastic, aluminium or steel cans/scraps, textiles, and other recyclable waste. Small-scale composting machine is also installed in the Kanchanjunga Shopping Complex, which was sponsored by Rockefeller Foundation, ICLEI (International Council for Local Environmental Initiatives), Local Government for Sustainability, South Asia. The officials highlighted that the manure generated from the unit is either sold or used for beautification of Gangtok town. However, field interaction with local environmental activists and NGOs revealed that the quality of organic manure produced from the unit is not suitable for organic use as it contains lots of micro residues of non-organic compounds and other pollutants. Besides, the unit remains non-functional often due to the unavailability of skilled repairing workers, which also

remains true for other machines. It is also not an economically viable venture as it does not generate sufficient funds to remain operational.

In relation to the workforce of GMC, as per 2018 data, 122 workers are employed, which includes drivers, supervisors, and *safai-karmacharis* (cleaners), of which 107 are male and 15 are female. In response to the question of gender disparity in employment, the GMC officials informed that this is largely due to the nature of work involved. They argued that, Gangtok being a mountainous city, motorable lanes and streets connecting the colonies are limited, therefore, the solid wastes are collected by the workers on *doko* (basket) or plastic drum from the households, which are later carried on their back to the nearby collection point to be loaded on the truck. Such labour-intensive tasks require physical prowess which women lack in most cases. Hence, female workers are mostly engaged in sweeping and cleaning tasks. GMC officials also stated that the total number of workers and the gender ratio keeps on changing as the workers often leave for better opportunities. GMC employees are of two types – regular and contractual. Regular employees are paid in accordance with government pay structure; while the contractual workers are paid a lump sum amount of Rs. 9,000 per month. The reporting time of the workers is 4.30 am with 7-8 daily working hours for collection, transportation, and disposal of waste, and cleaning of the vehicles. During field interaction, those workers who are engaged in transportation of the MSW to designated landfill informed that on most days they have a single trip. The workers are also provided uniforms consisting of jacket, boots, and raincoat twice a year, and hand gloves and masks on a regular basis. The fluorescent orange colour jacket, embossed with the word ‘Gangtok Beautifiers’, refers to the GMC workers in Sikkim. They are given festival bonuses and have been provided health insurance for themselves and their family in Sikkim Manipal Central Referral Hospital. On 2<sup>nd</sup> October, they are also given gifts by the department in appreciation for their contribution in maintaining a clean and hygienic environment in and around the city. They indeed are Gangtok Beautifiers, the most deserving crew for the ‘cleanest state’ of the North East region.

### Collection and Segregation of Waste

For efficient collection of MSW, GMC has installed colour coded garbage bins of blue and green colour at multiple points of the 19 km stretch; whereby, green coloured bins are meant for biodegradable wastes while the blue for non-biodegradable. At the household level, the same colour-coded bins of approximately 20 litre size are provided to encourage the segregation of dry and wet MSW. In fact, State Policy on Solid Waste Management Strategy pointed out that “segregating waste into biodegradable and non-biodegradable (Wet and Dry) itself solves about 60-70 percent of waste problems” (GoS 2019: 9). GMC has also opened a separate e-waste collection centre at its premises for proper disposal. From the collection points, the workers load the MSW to the municipal vehicle, the arrival of the vehicle is announced by blowing whistles or ringing bells. However, in 2019, GMC removed some of the community bins from a few selected locations due to complaints raised by some of the residents with possible conflict. They narrated that by the time municipal vehicles arrive, the bins overflow and the garbage gets littered by scavenging animals and birds. Therefore, the residents, whose houses are located near such bins, demanded shifting them elsewhere on the grounds of health and hygiene. Problems related to traffic issues were also raised, not only by the residents but also by commuters, as the garbage truck passing through the narrow highway between 6 to 10 am for loading the MSW blocked the vehicular movements during rush hours.

On the other hand, many residents also complained about not having a place to dispose of their household waste, as the municipal vehicle arrival time coincided with their children’s school timing as well as their own office timing causing inconveniences. Nonetheless, GMC has turned deaf ear to the pleas for reinstating the community bins and further notified people to dissuade from open dumping and burning. People are persuaded to directly deposit the waste after segregation to the pickup truck only. To monitor strict compliance, GMC started sending inspection squads along with installation of surveillance cameras at some notified places. People who were caught dumping at the wee hours were fined and, in some cases, issued warnings for imprisonment.

Presently, the mammoth task of segregation of MSW remains with GMC, although, the corporation has issued notice with warnings to the residents for segregation of MSW at source, as discussed earlier. However, people are refraining from doing so. Therefore, minimal segregation is undertaken by the workers in the truck. Interaction with the workers revealed that it is a difficult task as well as hazardous for them to hand check individual packages as it contains stale foods, broken glass, soiled sanitary pads and diapers with faeces. Nonetheless, visible changes have been noticed recently in the working style of the workers in the pickup truck. The collection truck is divided into two sections, one for wet and the other for dry MSW, which is also mentioned at the back of the vehicle. In practice, they put all the saleable or recyclable items such as plastic containers, glass bottles, cardboards, metals on one side and the rest of the unsegregated waste on the other side. They informed that they are permitted to extract saleable waste from the collected MSW, through which they are able to earn an extra income of around Rs.150 to 300 per day based on the quality of waste, and then distribute among themselves. Likewise, scraps like newspapers, notebooks, beer bottles, metals, cardboards, which have some values are segregated at the household level and later sold to scrap dealers or *kabadiwala*. Scrap dealers are issued identity cards by GMC for visiting households. The collected items are kept in selected locations in different parts of the city and sent to Siliguri for processing and recycling.

### **Public Private Partnership (PPP) and the Role of NGOs**

As pointed out earlier, being a mountainous region, motorable roads reaching every nook and corner of Gangtok town is limited. Therefore, for effective measures, following the guidelines of Swachh Bharat Mission, MSW Management Manual, 2016, GMC has partly outsourced the collection of MSW to local NGOs and SHGs (to be referred as 'party', henceforth), under the PPP model. As per the agreement, the party is responsible for door-to-door collection of waste using their resources, contacts, and advocacy and deposition of MSW to collection points from where the municipal vehicle picks

the waste up to be taken to landfill. As a part of the contract with the GMC, the party is required to deposit a certain amount as contract fee to the corporation depending on the area under their control. The party is authorised to collect user charges/fees from the households for the service they provide. The corporation fixes the rates for availing the garbage collection services for households and firms. The service charges from business establishments are linked with "Trade License Fee" and are collected at the time of issue and renewal of license directly at the office whereas for households an amount of Rs.100 per month is charged. However, many residents complained that the monthly fee is not fixed, the party charges between Rs.100 to 200 depending on the distance from the main collection point.

In some places, it was found that residents have developed their own mechanisms of collecting fees, where the local leaders voluntarily collect from each household and deposit directly to the corporation's office. However, it was also found that such practices increase conflict of interests between the residents and the parties engaged, with some individuals pocketing the money charged for the service. The corporation concedes that they are unable to collect the user fees, especially from households due to the lack of adequate labour and infrastructure. They defended their position by stating that their responsibility is limited to transportation of MSW from the collection point to landfill and its disposal.

Besides the PPP practices for collection of MSW, there are also other NGOs who are proactively working for environmental conservation and protection. Among such, the activities of four prominent NGOs are being discussed. The Ecotourism & Conservation Society of Sikkim (ECOSS) carry out advocacy activities related to waste which led to the formulation of "The Sikkim Tourism Policy, 2018" in collaboration with the World Wildlife Fund (WWF), Sikkim. The organisation articulated that:

*Modern consumer products are designed to create more non-biodegradable waste. The flaws in packaging have generated a tremendous amount of plastic waste, posing a serious threat to the sustainability of the natural environment not just in Sikkim but globally. Exam-*

*ples are biscuit manufacturers who packed their products with multi-layered plastic covers within which containing smaller sachets of plastics wrapping each piece which itself is totally unnecessary. These are just marketing gimmicks to attract the consumers and also to raise their sale value. This also remains true with other consumer products like chocolate, cake, toffee, soap, tetra pak items.*

A similar view was also expressed by another activist who works for WWF, Sikkim. She opined that:

*Neoliberalism has pushed people to change their consumption behaviour. Many Multinational Companies are engaged in overproduction of goods and cleverly strategizing people to buy more than what they need through advertisement. In terms of consumption patterns, India is catching up fast at par with western countries. Similarly, rural India is also in competition with the urban areas in this sphere. As a result of such consumption behaviour and unregulated mass tourism, we are encountering accumulation of garbage near the holy lake of Gurudongmar, Khecheopalri, and Tsomgo. What is worrisome is plastic sachets and wrappers which do not have value anymore are littered everywhere causing environmental pollution. The streets of Gangtok are mostly kept clean, however, if we see the streams and springs which people earlier used as their alternate source of water are now all polluted due to dumping of garbage and sewage causing water shortage in and around the city areas.*

The activists and volunteers of the mentioned organisation also work together with the Zero Waste Himalaya (ZWH), which is the third organisation in the discussion. ZWH addresses issues related to the vulnerability of the mountains and its populace. The organisation also collaborates with several other environmental organisations like Thanal in Kerala, WWF Sikkim, etc. They have been conducting workshops, awareness programmes, initiating pan-Himalayan clean-up campaigns, organizing zero waste events, and exhibitions in various parts of Sikkim. They organised the “International Straw Free day” campaign where their volunteers went around hotels and restaurants in Sikkim requesting not to use plastic materials and to systematically reduce the volume and stop the harmful-

ness caused by plastics and other hazardous waste materials.

United Arithang Development Society (UADS) is the fourth NGO which we have interacted with. The treasurer of the UADS, Vivek Chettri, revealed that many people used to dump their garbage directly into the streams in his locality. Hence, UADS in association with GMC took up the responsibility of garbage collection and discouraged people from illegal dumping with imposition of fines. The organisation has also opened a redressal cell for grievances related to waste. The activist revealed that the situation is alarming, as plastic waste seems to be part of almost all the waste generated at home. He highlighted that:

*Our volunteers have been undertaking clean up campaigns and awareness programs regularly. We are concerned about the prevailing situation in the state. The government's focus seems to be only on sweeping the streets and taking the waste from point A to B. However, what is happening to the waste at point B bothers no one. There are a lot of gaps in the present methods of disposal, which we have been pointing out. However, the bureaucrats and politicians are not willing to listen, rather they think that we are making a nuisance and interfering in their work. Sometimes, poignantly, we feel that our efforts and works are like garbage only which will eventually land up in the landfills, becoming invisible.*

### **Awareness and Participation of People**

As already highlighted, segregation of waste at source remains the primary challenge for the GMC and even for the parties involved in the PPP venture. Management of waste can be efficiently attained if it is segregated properly. However, despite the fact that GMC has issued warnings, many people are still not segregating the waste at the source, and some still prefer to dump the waste in the streams, rivers, and other water bodies. On the brighter side, with the growing awareness about the harms of unmanaged disposal of waste, people have minimised burning of wastes including plastics, at least in the city areas under GMC jurisdiction. Exploring the matter further, during an interaction with a well-educated resident from the Upper Tadong area,

whose rented house is located away from the main road, narrated about his practice of segregating garbage and its disposal. He revealed that:

*All the dry wastes which have some use value and are saleable are kept separately while the non-saleable waste is deposited in the community bin or garbage truck. I am conscious about the harms of dumping waste in water bodies and forest areas; therefore, I do not dump any dry waste. Besides, the dry waste need not be disposed of every day and can be collected for a week or a month, which I usually do. However, with the wet waste, I am left with no option as it starts emitting foul odour. Therefore, I come out at midnight to dump the wet waste in the streams as I cannot wait for the municipal truck to arrive.*

Such practices are also evident in other parts of India. Doron and Jeffrey's (2018) study found that water bodies throughout the country are one of the first places where citizens throw away things when they do not have any places to throw them. Another respondent from Samdur area expressed that:

*I need to walk uphill for more than half an hour to reach the roadside. Hence, all the wet waste like food waste generated from the kitchen is openly dumped in the forest areas while dry wastes including plastic bottles, packets, containers of medicines, toiletries are burnt in a vacant plot located near my house.*

On the contrary, Rinkila Bhutia, a 59-year-old housewife from Fifth Mile shared her experiences, stating that

*All my kitchen waste, vegetables, and food waste are given to my neighbours who collect it to feed their livestock, particularly pigs and cows.*

As deliberated earlier, GMC's withdrawal of community bins from some places and the subsequent notification for direct deposition of MSW to the garbage truck after segregation by individual households, and the follow up surveillance and fines has brought another set of problems and confusions. Bimal Thapa whose house is located half a kilometre away from the main road has bawled his grievances,

*I am facing lots of difficulties in disposing of waste as, firstly, I am not allowed to dump the waste where the community bins were earlier, secondly, no GMC workers come to my locality*

*for collection, and thirdly, I do not have time to wait for the collection vehicle to arrive. I have other important matters to attend to, as dropping my daughter at school and going to the office.*

Another respondent from Rai village confided

*I put all the household waste together in a sack and dumped at night at the place where the community bins were located earlier. I am afraid of being caught and indicted fine, but I do not have any other way out. Once, a friend of mine was caught throwing garbage and had to pay Rs.500 fine.*

The narrative accounts show the various modalities of practices among the people when it comes to segregation and disposal of household waste. Even if the bins were removed from the roadsides, for various reasons, people are still dumping at those very spots. Some people, who were unaware of the notification, had to pay penalty for dumping waste at the undesignated places. Basically, people are clueless and helpless in finding alternative ways of disposing garbage. The residents revealed that even if they want to throw the waste in the garbage vehicle, they cannot do so because the vehicle comes in their areas only once in a week while in other areas such service is not even available because of the absence of motorable (inundated) roads. They further said that dry solid waste is not an issue in urban areas as one can wait for the garbage vehicle to come or they can deposit it to the garbage bin but storing the wet waste for a week becomes very difficult as it starts emitting foul odour with worms coming out of the bin. Further, focus group discussion with residents revealed that it is not just the awareness about the harms of burning plastic that stops them from doing so, but it's mainly because their neighbours complain and lecture about the harmful effect on public health and the environment. Nonetheless, still burning and dumping of waste including plastic occurs in certain areas where the facility of municipal vehicles is not available.

## DISCUSSION

Globally, nations across struggle for the improvement of SWM practices, in which developed countries are able to achieve good results,

whereas developing countries like India still struggle either due to lack of proper policy measures or mismanagement in the implementation process. Addressing the issue, Azevedo et al. (2020) carried out a comparative study between a German and a Brazilian city, one a developed country and the other a developing one, respectively. Their findings revealed that Brazilian waste management system can be significantly improved by adopting the three systems of SWM employed in Germany, which are clear laws, regular public campaigns, and the fees methodology. Contextualizing the SWM in Sikkim within the aforementioned three domains, it was found that Sikkim lacks clearly spelled out rules and regulation in matters related to collection and segregation of waste, although the Solid Waste Management Rules, 2016 clearly notified the segregation of waste into four categories at the source, such as biodegradable or wet waste; non-biodegradable or dry waste; domestic hazardous wastes; and wastes generated from construction and demolition, which is applicable “to every urban local body, all statutory towns, outgrowths in urban agglomerations as declared by the Registrar General and Census Commissioner of India” (Krishna 2017: 95). The notification primarily shifted the onus of segregation onto the household (Wadehra and Mishra 2017) emphasising its proper treatment through composting and recycling (Srinivasan 2006). The major challenges, which the study found is in relation to the segregation of waste at source. Despite multiple warnings issued by the GMC and NGOs for segregation of garbage, people have failed to do so, owing to the various reasons related to distance from the pickup point, time constraints, unavailability of the facility of house to house collection of garbage on an everyday basis, and lack of proper monitoring. These suggest that the full participation of all stakeholders is absent. As a result, the workers had to undertake the segregation process themselves. Similar practices are also evident in Pune (Shankar and Sahni 2018) and other major cities of India (Ahluwalia and Patel 2018). As per the news report published in *Sikkim Chronicle*, the Municipal Commissioner admits that source segregation of waste is the main problem in Gangtok hindering its successful management.

Although GMC officials blamed the householders that despite the free distribution of two bins for separate collection and segregation of biodegradable and non-biodegradable waste, people bring out only one when they come to dispose of the waste, showing the lack of personal responsibility. However, in contradiction to GMC’s claim, majority of the respondents pointed out that the GMC has neither conducted any awareness programme on the method and process of segregation nor has provided separate bins to all the households, especially to those who are staying in rented houses. Some individuals have also contended that initially they used to meticulously segregate the waste, however, seeing the GMC workers ultimately dumping the separately collected garbage in the pickup truck without any segregation, they found their efforts pointless. In this context, there is a need for both the public as well as GMC staff to be sensitized in handling waste. Wang et al.’s (2020) study suggests that both the generation and segregation of KSW can be improved significantly by means of improvement in the public awareness about waste. Further, the GoS, through its State Policy on Solid Waste Management Strategy 2019 in consultation with Plastic Waste Management Rules, 2016, E-Waste Management Rules, 2016, and Hazardous Waste Management Rules, 2016 shifted the liability and responsibility of “collection, sorting, transportation, storing and recovery of plastics, e-waste, hazardous waste and absorbent hygiene products” to “the manufacturers, brand owners and distributors” in the form of EPR (extended producer responsibility) (GoS 2019: 7). However, the government is unable to provide a well charted plan on the implementation of how the manufacturers and distributors are to be made accountable for the collection and disposal of the assortment of wastes.

The GMC officials also recognised the challenges in management of MSW. Their reasons are mainly financial and infrastructural constraints, shortage of trucks, lack of recycling and composting machines, road and transportation issues. The officials further pointed out that despite the engagements of NGOs and SHGs, the corporation is unable to efficiently collect the user fees from the households due to inadequate manpower and proper collection system.

Corroborating the point, NGOs activists argued that there are few householders who need to be persuaded to pay up the user fee. The householders, on the other hand expressed their indignation on the method of fee collection and the difference in amount from household to household in some areas. Few of the householders are exasperated by the fact that in the main market areas, and in the localities near highway, waste collection and transportation are carried out on a daily basis whereas in other places it is on a rotational basis either on alternate days or weekly and even fortnightly, but the amount of user fee is either same or sometimes higher than usual owing to the distance factor. Such fee methodology appears problematic to some users. Relatively, Krishna (2017) contended that most rules related to user fee are arbitrarily set without clarifying whether it will be based on the quantity or type of waste generated.

Further, the study finds that most of the transported MSW to landfills are not managed properly. In fact, Toxics Link's (2014) study claims that the transported MSW are often found to be dumped at nearby rivers, 'jhoras' (streams) or at the countryside. They are often subjected to burning. Environmental activists and NGOs are critical about the modalities of operation in SWM by GMC, and has pointed out that the government is interested only in cleaning up important areas and beautifying the main town alone without showing any concern about what is happening at the landfills. Doron and Jeffrey (2018: 146) in relation to mismanagement of landfill writes, "Landfills seem to provide a complete fix to a complex problem. "Someone" takes waste far away from households and businesses, carries it to an unseen place, and makes it the problem of other people." While the NGOs complain about lackadaisical, non-serious, and non-commitment attitude of the government, the latter bleats about the interference of such activists in official matters. In bits and pieces, everyone is performing their roles, for instance, NGOs are conducting awareness and sensitization programmes, banning Styrofoam and minimising the usages of plastic water bottles. Their biggest target is to drastically cut down the consumption of one time use plastics by the people. The government, on the other hand, helps in funding the NGOs, formulating policies and pro-

grammes, such as adoption of 'Zero Waste' concept in State Policy on Solid Waste Management Strategy (GoS 2019). The contributions made by the local NGOs are commendable. Such minor conflicts and disagreements existing between the government and NGOs serve as mutually benefitting. Their dialectical relations help in symbiotic evolution and betterment of society. Having said so, there is a need for a proper mechanism to check the performance and accountability of one another. Most importantly, each other's voices need to be heard and supported.

### CONCLUSION

Overall, GMC has been performing their task quite satisfactorily. Yet, the corporation is suffering from the problems of inadequate infrastructure, insufficient working capital, lack of transportation vehicles, and recycling and composting machines. Moreover, non-cooperation of the public in taking responsibility for segregation of waste as well as in payment of user charges, and their limited participation in awareness programs have affected the efficacy of the SWM in the city. However, in spite of the knowledge of inefficiency of current practices, GMC remained unsuccessful in reforming the methodology of collection and disposal of segregated waste. Though the government legislated the zero waste policy in the state, yet the necessary steps to spread mass awareness and to change the attitude of people to imbibe the cultural values are missing. Successful execution of SWM is not only the responsibility of government, but it also crucially relies on the changes in people's attitude and behaviour. Proper segregation of waste is also cost effective as it helps to reduce the cost of transportation and labour charges associated with the disposal of waste, at the same time beneficial for the environment as wet waste can be easily converted to manure.

To conclude, one can say that as a whole, the responsibility of providing basic service relating to waste management lies on the GMC, hence they need support from the local people, NGOs/SHGs as well as from the state government. Importantly, the GMC also needs to understand the genuine problems faced by the people, NGOs, and need to accommodate their concerns. The state is prone to landslides being

a mountainous region and limited land is available for landfill. Although, quantitatively, the generation of solid waste in the state is less compared to other major cities of India, nonetheless, it can have serious implications on the fragile mountain ecology, if not properly segregated and disposed of. Recycling of waste can be undertaken by means of employing suitable technology and scientific methodology in the treatment of the MSW.

### RECOMMENDATIONS

The findings of the study suggest that GMC, from time to time, should widely circulate the notifications of various rules and regulations regarding segregation and disposal of MSW to be practiced by the householders. This can be undertaken through advertisements in various local newspapers, popular radio programmes such as 'Prabal Show' in local FM channels, and even in local cable networks. Further, GMC should conduct public awareness campaigns on a regular basis to sensitise the people and to eradicate the confusion surrounding segregation, dumping, and transportation of MSW, which can be done by supporting or working in association with NGOs, SHGs and local leaders. At the policy framework, the government should look into economic incentives for segregation, like guaranteeing buyback for recyclable materials. The Sikkim government also can think about installation of 'Swachh Bharat bottle recycling machine' or 'reverse vending machine' as installed in Mumbai and Delhi, respectively. Besides the services of NGOs and SHGs, the concerned authority can also think of setting up composting plants at every colony or village to be self-managed by the householders, which will uphold the true spirit of decentralisation in the management of waste.

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### NOTES

Fictitious names have been used while describing the narratives of the respondents.

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