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Abstract

This paper aims to examine the role of civic activism in urban waste management in Bengaluru city. It explores the present status of waste management in the city and civic involvement in improving the city environment by gradually turning it into an environmental movement. Lately, civic groups have played a significant role in community interests where the ecology and environment are central concerns. Given this backdrop, this paper documents initiatives taken by environment activists and their partnerships with the city corporation in promoting effective governance, specifically in managing the waste of the city. Furthermore, the paper also examines how the groups negotiate with the government and other agencies for the adaptation of sustainable initiatives and policies to manage the urban waste in the city.

Keywords: urban waste-related movements; urban environmental movements; urban waste; civic groups

Introduction

In recent years, different groups in urban areas have been showing rapidly increasing interest in social movements or civil society movements. Their interest has been reflected in participation of local activists in the urban governing process. Besides, urban politics has played a significant role in policymaking through participation and legal tools (Bitusikova, 2015). To raise their voice and bring attention to community interest, they employ methods related to urban mobilisation. Different types of urban mobilisation are carried out by many civil society organisations. For example, Resident Welfare Associations (RWA), neighbourhood development groups, religious-cultural and political oriented groups, local interest groups and protest organising groups (against the policies or decision for privatising the common resources). This community interest acts as a driving force in changing the urban system and can be described by the concentration of urban problems (Castells, 1983). With increasing urbanisation and the resultant population expansion and accretion of economic activity, the urban problems are securing central attention from the policymakers, urban planners and civil society organisations.

Environmental movements in the urban areas in India are seen much later compared to rural areas. But in recent days, various protests and agitations have been observed in the urban areas across the country as various studies found that rapidly growing urbanisation harms the environment (Kundu, 2007; Sridhar and Kumar, 2013). These agitators have drawn special attention to poor sewerage and sanitation facilities, lack of proper management of water bodies, urban waste, lakes and open space. In September 2019, various student groups protested in Chennai, Bengaluru, Mumbai, Kolkata, and Delhi responding to teen activist Greta Thunberg's call for action against climate change. The capital city of Delhi has seen various protests in 2019 and in earlier years against air pollution. Various social groups, activists, student organizations, and NGOs have participated and raised a slogan demanding the 'Right

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to Breathe'. Residents of Uruli Devachi and Phursungi in Pune, Maharashtra have continuously protested from 2015 against the illegal landfill in their area and in 2017 they held a strike and prevented the entry of garbage loaded truck into the landfill. A similar kind of protest was observed at Kodungaiyur area in Chennai against the dumping of garbage by local contractors as the residents face various health-related issues due to this landfill (EJ Atlas). Similarly, Bengaluru city has seen numerous protests organized by people, RWAs, activists, and NGOs against the city government for proper management of urban waste and protection of urban lakes. Some of the protests have drawn huge attention at the regional level as well as national levels, such as Mandur and Mavallipura waste-related protests and Bellandur and Varthur lake-related protests.

Urban Environmental Movements in the City of Bengaluru

The city of Bengaluru is one of the fastest-growing million-plus cities in India as well as in Asia. This rapid growth and urbanization have led to a concentration of economic activities in the city. As per the census data 2011, 84.4 lakh people are living in this city with a population density of 4,381 persons per sq. km.[3] This unprecedented rapid urbanization and economic development in the past few decades have led to the rise in several environmental problems across the city. This city has become a platform of socio-economic-political and cultural transformation due to the increase in mobility. However, this diversity helps city dwellers to change their traditional ideas and accept the new policies and ideas (Sassen, 2002).[4] It makes the city environment a productive floor where the traditional and new civic engagement can spread easily. The ecology movements in India are the appearance of protest against the demolition of the two vital economics of natural processes and survival from the disorder of development, based mostly on market-oriented economy (Bandyopadhyay and Shiva, 1988).After the post-liberalization period, several multinational companies and economic activities have been concentrated in Bengaluru. The ecology movements are enlightening on how the resource demand of the present growth model has environmental damage and economic deficit built into them (Bandyopadhyay and Shiva, 1988; Karan, P. P. 1994). In India, most megacities face various issues, such as pollution, overpopulation, waste disposal, loss of biodiversity, reduced open spaces, urban lake pollution and public health-related issues. Given this backdrop, the objective of this paper is to document some of these initiatives/protests and a partnership that showcases civic activism in Bengaluru city and its influence on waste management and urban governance.

[3] (2014). District Census Handbook, Bangalore: Village and Town Dictionary. Bangalore: Directorate of Census Operation, Karnataka.

[4] Sassen, S (ed) (2002). Global networks, linked cities. Psychology Press.

Waste Management Status in Bengaluru

The city generates more than 5,757 tonnes of solid waste per day and according to Bengaluru Master Plan 2031, the amount of waste generated per day will go up to 13,911 tonnes (The Times of India, December 1, 2017).[5] The Bruhat Bengaluru Mahanagara Palike (BBMP) is responsible for the collection, transportation, processing and disposal of municipal solid waste from the different originators. But, out of the total amount of waste, only 30 per cent of waste is collected by BBMP directly and 70 per cent of municipal solid waste is collected and transported through a contractor (Naveen & Sivapullaiah, 2016). Proper collection and management of municipal waste are taken care of by several Pourakarmikas, drivers, and supervisors engaged with the BBMP (see annexure 1).To manage this huge amount of municipal solid waste, BBMP has created several waste processing plants in different parts of the city. The role of this waste processing plant is to segregate the mixed waste and generate economic value from the waste after segregating it; only non-recyclable waste is eligible to go to a landfill (see annexure 2). With proper utilization of urban waste and to generate economic value from it, the city government has taken several policies regarding energy creation from the waste. On March 9, 2018, the BBMP signed a partnership agreement with a French company to set up a waste-to-energy plant. Earlier also, the BBMP had set up a few waste processing plants to generate energy from waste, but the power output (MW/Hour) was less due to a lack of infrastructure (annexure 3).

As mentioned earlier, 70 per cent of the total amount of solid waste is handled by the contractors. There are serious concerns as there is a lack of transparency and accountability, poor guidelines, and loopholes in agreements and arrangements. All this has resulted in poor management of waste.

Table 1: Waste Management Status in the City of Bengaluru

Sl. No.	Waste Management Programme	Present Status
1	Segregation of waste at source	The segregation level has failed to cross 50%
2	Collection of sanitary waste separately	Yet to pick up speed
3	Dry Waste Collection Centres (DWCC) to directly collect dry waste door to door	On 65 wards; MoU is being negotiated for another 70 wards
4	New garbage tender/micro plans/cooperative societies	New tender and cooperative societies pending approval from the council
5	Moving Refuse Derived Fuel (RDF) backlog from the processing unit	In progress; expected to be completed in July
6	2,000 bins on city streets; 250 semi-buried bins	2,000 bins to be installed in a month; semi-buried bins to take six months
7	Clean-up marshals	Pending approval from the council
8	Shuchi Mitras	BBMP invited applications recently, two years after the proposal
9	Waste to energy plant	Five plants in the pipeline, work yet to begin
10	Bio-remediation in Mandur and Mavallipura	Only one bidder for tender for Mandur
11	Dedicated plant for construction and demolition waste	The tender process for three plants is in progress
12	Dedicated processing plant for animal waste	Choice of technology finalised, tender yet to be called

Source: The Hindu, June 7, 2017

[5] B R Rohith, (2017, December 1). Bengaluru's daily garbage generation will touch 13,911 tonnes by 2031. Retrieved from The Times of India: https://timesofindia.indiatimes.com/city/bengaluru/bengalurus-daily-garbage-generation-will-touch-13911-tonnes-by-2031/articleshow/61873003.cms

Without proper disposal of solid waste, it pollutes the vital elements of the living environment like air, land, and water. On paper, there are several policies related to municipal solid waste (MSW) management, but on the ground, there are many problems with its implementation. This lack of proper management of urban waste creates various issues and as result, the government faced various types of protests organised by people and civil society.

Table 2: Role of Protest/ Agitation on Waste Processing Plant

Sl. No.	Plant Location	Capacity (T/PD)	Current Situation
1	Chikkanagamangala	500	Destroyed in the fire; takes no waste
2	Doddabidarakallu	200	Overloaded with RDF and Compost; Takes no waste
3	Kannenahalli	500	Closed after protests
4	Seegehalli	200	Closed after protests
5	Subbarayanapalya	200	Closed after protests
6	Lingadheeranahalli	200	Takes 60 TPD, only functional plant
7	MSGP Plant, Chigarenahalli	600	500 TPD
8	Mavallipura	500	500 TPD
9	KCDC, HSR Layout	70	200 TPD
10	Quarry Landfills- Bellahalli, Bagalur, and Mittaganahalli	-	Over 2000 TPD

Source: The Hindu, April 8, 2017

Review of Literature

According to UNEP and WHO's Health and Environment Linkages Initiative Report (HELI, 2009), rapid, unplanned and unsustainable patterns of urban development are making developing cities focal points for many emerging environmental and health hazards. As urban populations grow, the quality of the urban environment will play an increasingly important role in public health concerning issues ranging from solid waste disposal, provision of safe water and sanitation, and injury prevention to the interface between urban poverty, environment and health. Unsustainable patterns of transport and urban land use are a driver or the root cause of several significant and interrelated environments and health hazards faced by urban dwellers in developing countries. David Satterth waite (2007) discussed the environmental health burden of the urban population in low and middle-income countries. This paper used comparative methods for explaining the environmental problems, different types of hazards, and supply of basic amenities between low and middle-income countries. This paper argued that there is a negative relationship between income groups and environmental health burdens. Amitabh Kundu's (2012) paper talks about the process of demographic growth, economic growth and the quality of the micro-environment in and around the city of Delhi. After the 1990s, when India adopted globalization and opened a trade policy, Delhi's population rapidly increased. Due to this reason, the city faces many issues like residential problems, lack of basic services in urban areas, waste management problems, environmental degradation and so on. To solve these problems, the Delhi government took policy measures regarding the peripheralization (spatial configuration) of the city. Under this programme, the city government created a new residential zone in other core areas for reducing the overcrowded

population in core areas. But this programme has had negative impacts on the regional economy, standard of living, and urban environment. He argued that transferring of environmental burdens in space and the process of degenerated peripheralization has a serious long-term cost implication for the regional economy.

R E Jones; J M Fly and H K Cordel's (1999) paper tries to find out whether urban residents are more concerned about environmental issues than rural residents or not. They found that urban people are more concerned about environmental issues. Also, they argued that local issues are more significant than national issues because people are closely related to local issues. They found that literate people, political awareness and high-income groups are more conscious of environmental issues and also demographic variables (religion, ethnicity, age, gender) have a higher impact on environmental issues. Xie and Ho's (2008) paper examined the role of the formal and non-formal organizations on urban environmentalism in two major cities in China, one in Xiangfan (now renamed Xiangyang) and another in Shanghai. In China, political conditions and cultural context have played a significant role in these movements. At the lower level (grassroots level) individual activity was more significant rather than organizational activity. The environmental activity in the central city, Xiangfan, is different from the eastern city of Shanghai. Shanghai is one of the more economically developed cities in China and also it is well connected globally. Thus, western tradition plays a major role in this city. Moreover, environmental NGOs have played a significant role in involving people in these movements. Brand, P. (2004) talks about the general theoretical perspective and the methodological approach of urban environmentalism and discusses the political economy and neo-liberalization for sustainable development of an urban area. This paper argued that neo-liberalization has promoted an open trade market and globalization. In this open trade market, the world's developed countries invest their money in an underdeveloped country and control the city's economy. This process has increased the conflict between the international organization and the local governing body. This trend also increases geographical spatial segregation, poverty, and environmental burden. Yangpi Tong (2005) discussed the role of political ideology and local institutions on environmental movements in Taiwan and China. These two countries are closely related to a socialist ideology and that's why decentralization politics has played a significant role in any social movement. At the grassroots level, there are different groups due to different ideologies. In socialist countries, every social movement is controlled by the local governmental organisation. Under the decentralization policy, the local institution plays a major role in protecting the environment because people are closely related to this institution.

Another study by Enqvist *et al* (2014) shows that the citizen networks in Bengaluru function as a platform that enables interaction between diverse interest groups and acts as a watchdog that monitors urban ecosystems. A paper by Bob Hendriks (2009) focusing on governance networks and democracy shows a shift from a normative focus on participation and voice to political rights and influencing the rules of the game. Based on Nairobi's experience, the paper emphasises that international donors and support organizations should increasingly build community structures and innovative post-liberal citizen engagement mechanisms for influencing political rights independent of changes in governance network approach, support simultaneous conflict and cooperation strategies

beyond the emergence and formation stages and increasingly offer real space and support to local solutions and innovations regarding co-governance rather than blueprint solutions.

Manasi and Deepa (2020) talk about arsenic contamination and environmental degradation of Hootgalli village in Mysore. This village is affected by water contamination (arsenic) due to industrial effluents. The major source of industrial effluent here is potassium nitrate which comes from the manufacturing sector. Potassium nitrate has increased the Biological Oxygen Demand (BOD) in the lake, water-borne diseases, and arsenic contamination in groundwater. A political leader identified those problems first and after that local people protested against the industrialists. The local people want two things- they want adequate drinking water and the shutting down of the industry. Vote bank politics and political ideology has played a major role in this movement. Another paper by Manasi has tried to focus on urban flooding and its causes; and urban conflict in Bengaluru. Before 1990, Bengaluru had 370 tanks and this number has rapidly decreased due to urbanization, industrialization, and encroachment of open space. Also, urbanization has decreased groundwater storage and infiltration rate. In the monsoon season of Koramangala, the lakes are reserved for rainwater and after that new grasses come up in that lowland. These new grasses are good for cattle as well as the environment. But, when the new policy and new construction came, this procedure was interrupted. The new policy and the construction organization hurt the system of water bodies in the Koramangala area. The local people and NGOs have protested against the Bengaluru Development Authority (BDA) and new construction. The Karnataka High Court said that BDA should involve local residential representatives in the Koramangala area development. After this protest Rs. 400 crore has been spent from 2006 to 2011 for re-modelling of the drain, rejuvenation of lakes, and there was also a Rs. 640 crore grant under the JNNURM programme.

According to Erin L Gordon (2012), the modern environmental movement was started in 1960 and 1970. The modern environmental movement covers broad and different areas of institutional oppression. Such oppression may include the consumption of ecosystems and natural resources into waste. It also includes pollution of air and water, weak infrastructure, exposure of organic life to toxic chemicals and several other focuses. Due to the rapid increase of urbanization and industrialization in the 20th century, the largest cities like Tokyo, São Paulo, Mexico City, Mumbai, and Kolkata faced many problems because of unplanned growth, lack of transport and infrastructure planning, lack of proper sanitation and sewerage facility and waste problem. All the above-discussed problems that highlight the intensity and dimensions of the problems on certain occasions led to agitations and environmental movements. The environmental movement can simply be defined as a social and political movement mainly concerning the conservation of the environment as well as improving the state of the environment (P P Karan, 1994). Generally, environmentalists favour the sustainable management of natural resources as well as the protection of the environment via changes in public policy and individual behaviour.

Research Gap

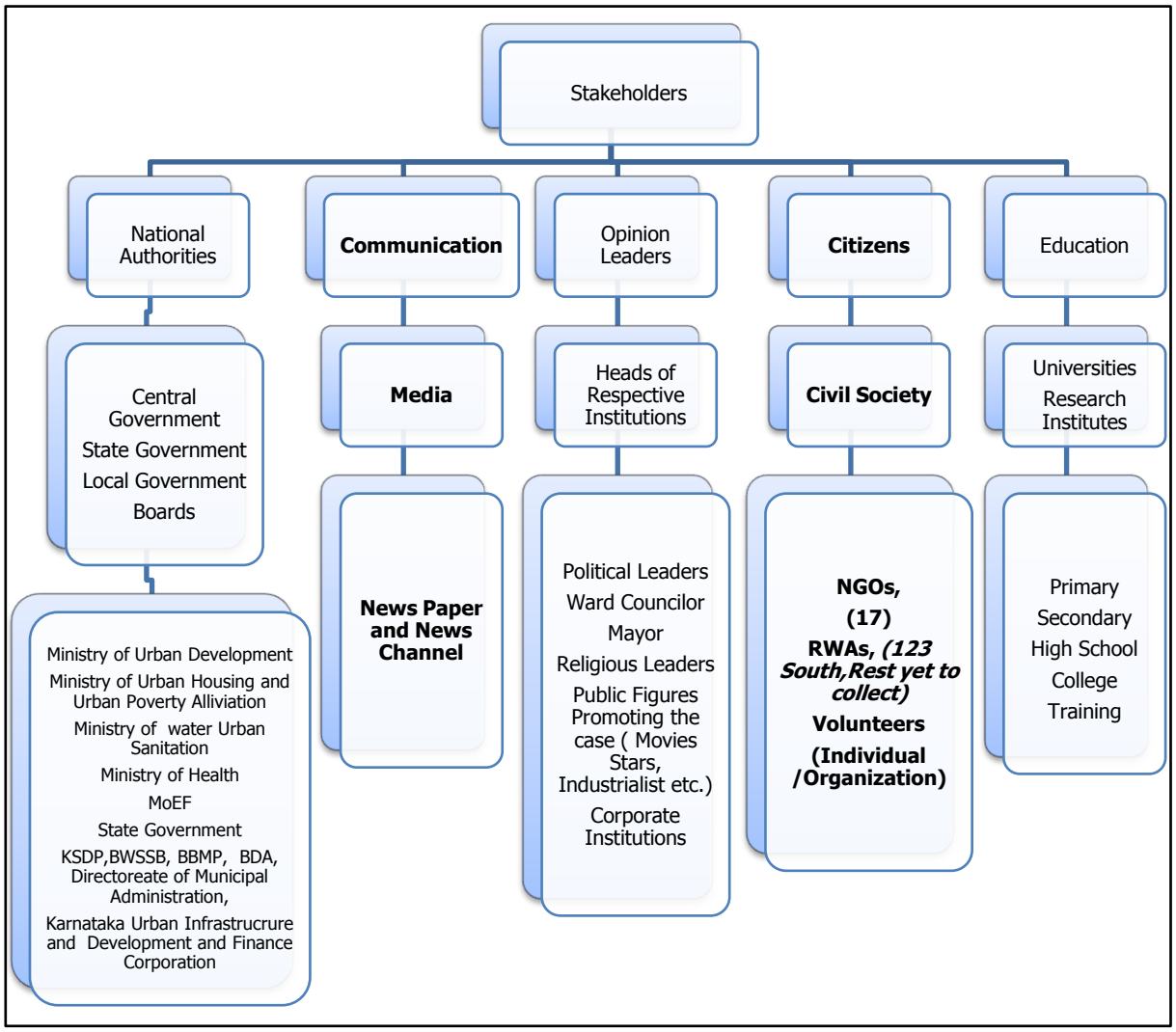
From the review of literature, it is quite clear that there are various MSW management related problems in terms of environmental challenges and governance. To solve the waste related problems, local governments promote a decentralised waste management system where the various stakeholders play an important role to solve the issues as well as bring changes in sustainable waste management. Sometimes they work together and other times as individuals to improve the waste management practices in the city. There are some studies that have discussed waste management, the negative impact on environment and health but there is rarely a study that has discussed the role of citizen group engagement in waste management in the city. The current study has filled this gap and discusses civic activism in urban waste management in Bengaluru City.

Data and Methodology

The study has used both primary and secondary data to find out the waste management status as well as to examine the role of activity and mobilisation strategy of civic groups in urban environmental movements in the city. The collected data from the field survey have helped to identify the activity of civic groups, ward committees, policymakers and the BBMP for improving the city environment as well as solving the waste-related issues. For the collection of primary data, field visits, face-to-face in-depth interviews and group discussions with the Non-Governmental Organisations (NGOs), voluntary groups, and individuals who are engaged with urban waste management in the city were carried out.

***Actors Involved in Urban Environmental Movements*:** Several factors trigger urban environmental movements. It is observed that citizens, civil society, media, NGOs and Resident Welfare Associations (RWAs), and individual organizations are various institutional organizations that have been involved in collective action in demanding change, the more so when the threshold level is reached, affecting the quality of life. For instance, the agitation against the landfill protest in Mandur and Mavallipura waste processing plant in Bengaluru view is a perfect example, where people were agitated by a foul smell from a nearby agricultural field that was polluted with leachate. It is important to have a processing plant but the technology has to be in place to ensure there is no pollution as well.

Figure 1: Stakeholder Engagement in MSW Management in Bengaluru



Source: Prepared by Authors

The various stakeholders play an important role in MSW Management in Bengaluru. Additionally, increasing environmental awareness among the various stakeholders about the waste related issues have played a vital role in the formation of these civic groups. They focus primarily on their local problems which later spread locally to regional as well as global levels. Their functional areas range from participation in demonstration projects to monitoring and research, advocacy, environmental management, public discussion as well as cooperation and building networks among the other groups and governmental agencies towards sustainable MSW management in the city. However, in recent times, the range of their activities have broadened as rapid urbanisation, migration from rural areas and concentration of economic activities in cities have added various new challenges to waste related issues. Thereby, their activities now include public interest lobbying, participatory pressure groups, urban waste management related politics, environmental justice, ecological modernization, promoting environmental education, and capacity building programmes.

The paper has discussed three case studies to identify the role of various stakeholders and their impact on the city's waste management. The paper describes the location of the conflict, reasons, impact and people's views regarding the issue. Additionally, it discusses how these major protests have evolved into a movement to resolve the urban waste issues with the help of several initiatives taken by various stakeholders in this regard.

Mandur Village Protest against Waste Dumping

The waste processing plant of Mandur is located 1.6 km from Mandur village. The surrounding area of this plant is occupied by agricultural fields, forests and plantation forests. Two Karnataka State reserve forests are located near this site; one is opposite to the plant while the other is located on the northern side of the plant. Eucalyptus and other mid-height trees densely dominate these two forests. This garbage dumping site has created several problems for the villagers. They are facing many health-related problems like skin diseases, respiratory problems, and water-borne diseases. Janardhan (resident of Mandur village) said: "During the night, the foul smell gets unbearable as the loaded trucks dump their garbage into the site". Also, he mentioned that "when we wake up in the morning, we see medium and lightweight garbage materials in front of our doorstep which is very disturbing". Another resident mentioned that "we get a foul smell 24 hours a day and our family members are not able to have food". Brush (resident of Mandur village) argued that "our agricultural land is affected due to this plant, scavenger birds, floating light particles of garbage; the stench is destroying our crops".

The Conflict: Bengaluru city generates around 4,000 tonnes of garbage per day and Mandur was getting nearly half of the total city garbage (Business Standard, June 3, 2014). On an average, more than 200 trucks dump unsegregated garbage every day. Due to the dumping of garbage, villagers faced several problems related to health and the environment. The garbage crisis threatened to go out of control and Mandur villagers started staging protests (DNA Bengaluru, December 10, 2012). A group of about 100 villagers staged a protest near Avalahalli police station where garbage lorries were parked on the roadside. When the villagers visited the BBMP officials on a Wednesday, the authority asked them to wait till Saturday evening for a letter. At their request, the villagers submitted letters to BBMP regarding their problems and requested them to close the landfill. Health minister Aravind Limbavali, BBMP commissioner Rajneesh Goel and Mayor Venkatesh Murthy promised the villagers that garbage would not be dumped in the landfill after January 29, 2013. Also, the officials promised to give it in a written format, which would be considered an agreement between the authorities and the villagers. But they did not get the letter from the authority by Sunday and they decided to protest again against the BBMP. On Monday, the communities living in and around Mandur observed a bandh, shop keepers downed shutters voluntarily, and the agitators forcibly locked the Mandur Gram Panchayat. However, the dumping of garbage continued and they used police protection for controlling the villagers. Gopal Rao, a social activist and resident of Mandur, said that "the communities were not ready to trust the BBMP's assurance this time. We believed them twice, but only got cheated. We are suffering every day. We will no longer put up with it, he said and added that they were ready to keep a vigil round the clock to prevent the entry of any garbage truck." (The Hindu, June 2, 2014).

Another villager, Murthy, said that "the government and the BBMP are giving more value to the garbage than to the lives of the villagers." He added, "Empty assurances over the years have only compounded our problems and villagers are affected by several diseases because of the air, water and soil pollution caused by the mounting of garbage in our backyard. Our field has been affected and crops have become emaciated. Why should we give the BBMP more time to get its act together?" (The Hindu, June 2014). Manjunath Rao, another resident of Mandur, said that "we will withdraw the protest only when the dumping of garbage ceases". On June 2, 2014, twenty-one protesting villagers of Mandur were arrested for allegedly throwing stones at police vehicles and garbage trucks. Additionally, a police officer said that, if the situation goes out of control, Section 144 under Cr PC may be imposed on the village to ensure garbage dumping (June 4, 2014, The Times of India). The villagers organised a stronger protest against the dumping of garbage in Mandur on Tuesday (5th June 2014) and raised various questions about the city's garbage disposal system. There were un-cleared garbage heaps in many areas due to a lack of proper management of city garbage. Angered by the arrest around 300 villagers, mostly women, staged a dharna in the landfill area on Tuesday and were determined not to allow garbage trucks inside.

The strength of this movement and current status: In 2005, BBMP took Mandur village as a garbage dumping site. Due to this landfill, villagers were getting a negative impact on their health, environment and socioeconomic status. Mandur villagers have been protesting to clean up their villages and stop garbage dumping since June 2012. Following this massive protest, BBMP Executive Engineer Nagaraj arrived at the spot and assured the protesters that the problem would be solved in a week. He also promised that steps would be taken to ensure that only a limited number of trucks carry the garbage to the unit daily (May 13, 2014, Deccan Herald). Chief Minister Siddaramaiah assured that garbage dumping would be stopped after November 2014 and regular health check-up camps would be held for the villagers. Also, he assured the residents that, "we will also take up odour control and spraying of repellents to tackle mosquitoes". At present, BBMP has stopped the dumping of garbage at this site.

Diverse views: Due to a hill of garbage dumping in this landfill, people are facing several problems. The villagers said that the Mandur's water is unfit for consumption and most of them bought drinking water even though they cannot afford it. The villagers were getting dengue, malaria, skin problems, and chronic diseases due to the garbage. Mandur resident Manjunath Rao said villagers had health problems due to the garbage and stray dogs attacked their cattle and children. Anand, one of the villagers of Mandur, said that in one week, six people died in the surrounding area due to this landfill. Students were not able to attend school because of the stench and had to move to another place. In the past, Mandur was famous for blue grapes and mangoes and 80 per cent of farmers were engaged in this field. But now, it has almost vanished because of the stench and insects coming from the plant. Another problem faced by farmers is the lightweight garbage from the landfill such as plastic, paper, and other lightweight particles get blown by the wind and pile up in their agricultural fields. Additionally, the garbage dumps have increased social isolation. One of the villagers said that "nobody wants to come

here and even if they come, they do not want to stay. For the young men of Mandur it is not easy to get brides; besides, there is no celebration of any kind". Keeping these issues in mind and solving these problems, the local people led by Doreswamy protested against BBMP in June 2014.

Scope for Dialogue: Regular and permanent solutions are necessary for the treatment and management of the city's garbage. It requires proper management and segregation at the source which will help to generate economic value from the waste. Additionally, it can be a good opportunity for job creation, and generating resources from waste by following a systematic way of waste management (reuse, recycle, reproduce, recreate and revalue) which will help to bring a healthy and clean environment.

Protest Against Mavallipura Landfills

Mavallipura is a medium village around 25-30 kilometres from the Central Business District of Bengaluru and its area is 303.17 acres. Mavallipura has good environmental assets; from the side, it is covered by natural forests (eucalyptus, babul, and other long and medium trees), ponds and agricultural fields. Avalahalli state forest and Karnataka Forest Research Centre are located near Mavallipura village. This waste processing unit has 46 acres of land which is located in a sensitive environmental zone. BBMP has an agreement with the Ramky Infrastructure Limited to manage this plant and around 700 tonnes of garbage is dumped into the plant daily.

The Conflict: The suffering of the people of Mavallipura began in 2003 when a local landowner H. Bailappa agreed to lease his land to dump solid waste. Due to the absence of safeguards, this area faced stench, air, water, and soil pollution. Residents started a systematic protest against the landfill under the leadership of the Dalit Sangharsh Samithi. In 2007, the government set up another agreement with Ramky Infrastructure Limited (RIL) for a waste processing plant for an operational period of 30 years. The area of this waste processing plant was 100 acres and it was surrounded by an agricultural field, natural forests and common grazing pastures. There are many more alarming factors for the location of these landfills. The Mavallipura landfills are located 2.5 kilometres away from the river Arkavathi and comprehensively violate an order of the Karnataka Department of Forest, Ecology, and Environment that protects the 1453 square kilometres watershed of Thippagondanahalli Reservoir across Arkavathi from polluting facilities. Another shocking feature of these landfills is that they are located 5.6 kilometres from the critical defence facility – Yelahanka Air Force Base. A study by KSPCB tells us that the leachate released from Bailappa's and Ramky's dumps has contaminated surface and groundwater significantly, particularly the Mavallipura tank which is part of a chain of lakes that ultimately discharge into the Thippagondanahalli Reservoir. Most of the villagers in Mavallipura are farmers or raise cattle to earn a living and if landfills converted their grazing land into waste dump sites, they will lose their daily earnings. Through it got permission from KSPCB to handle up to five hundred tonnes every day, the plant got almost 1000 tonnes of waste per day (July 13, 2012, Times of India). Nearly eighteen lakh tonnes of garbage were dumped at Mavallipura from 2007 to 2012. As per the agreement, the managing body should use a scientific strategy for waste segregation and recycling, but

there is no safeguard boundary and scientific technology in the plant (Leo Saldanha, Environmental Support Group). On July 12, 2012, villagers, resident groups and Leo Saldanha protested against the Ramky Infrastructure Limited and BBMP and they also filed a Public Interest Litigation (PIL) in the High Court.

Current Status: When the case opened, the court gave a one-week deadline to the company for covering the dump yard and provide financial assistance to families affected by health problems and those who lost their family members due to the plant. The landfill was shut down in July 2014 following the direction of the Karnataka State Pollution Control Board. However, in practice, the plant is still functioning and during field visits, the study found that around twelve loaded trucks were entering the plant per hour around 11 am (on Sunday). Santosh, one of the residents of the village of Mavallipura, said that "on any other normal day, the number of trucks entering is much more in comparison to the weekend as most of the offices and workplaces are closed in the weekend".

High Point of Protest: Due to illegal waste dumping, villagers face several health-related issues and many of them suffer from gastrointestinal problems, dengue, malaria, and skin disorders. Women and kids were badly impacted due to waterborne diseases due to this plant. In 2011, 15-year-old Akshay died due to dengue and Muniraju and Rajanna due to kidney failure. In these families, there is no previous family history of the prevalence of such chronic diseases and the villagers have accused the plant run by Ramky Infrastructure Limited (Leo Saldanha, Bhargavi S. Rao and K R Mallesh; June 30, 2012). Narayanappa (aged 55 years), a well-known farmer, used to cultivate various types of horticultural products but he was facing problems as his land was getting untreated leachate and light particles from the plant. Additionally, being so close to the site, his family suffered heavily from the plumes of smoke that arose from the massive mountains of waste that burnt to reduce waste volumes. He suffered a serious asthmatic attack and died (ESG Report, 2012). In the middle of 2012, residents and community groups plied pressure on Ramky Infrastructure Limited to stop waste dumping and they formed a volunteer group to prevent the entry of garbage loaded trucks into a dumpsite. On August 23, 2012, the BBMP deployed 600 policemen to force open the landfill for allowing the entry of the garbage trucks. At that time 36-year-old Srinivas, one of the protesters, collapsed in shock and died. Following this, on August 24, 2012, several hundred protesters from 12 villages in the vicinity of the landfill staged a protest at the Yelahanka General Hospital where the body of Srinivas had been taken and declared that the body would not be cremated till the BBMP paid compensation to the relatives of the deceased. However, police personnel, without permission from Srinivas's family, brought the body to his village and tried to cremate it. When people protested against this move, several leaders were arrested. The protesters did not give up, and finally, at 5 pm, L Srinivas, deputy mayor of Bengaluru, arrived at the scene and promised Rs 1 lakh compensation to the bereaved family. He also promised a meeting with the community leaders on the question of the landfill on August 29, 2012.

Residents' Demand

1. A resident of Mavallipura and twelve other villages in the north of Bengaluru are demanding a CBI inquiry into the city's garbage contract system.
2. They want to fully stop garbage dumping near their village because it's reducing the quality of the environment and health.
3. They want a medical facility and drinking water supply from BBMP.

Protest Against Lingadheeranahalli Waste Processing Plant

This waste processing plant is located two kilometres from Turahalli forest and 0.7 km from Somapura Lake. The south and south-west area of this plant are occupied by forest and agricultural land and horticulture crops are grown and livestock reared for their livelihood. "The rest of the land is sold for settlements and the land price depends on the distance from the waste processing plant; if the distance is small, then the land price is also low and if the distance increases, then the land price also increases." (Avinash, one of the villagers of Mattekalpalya).

In 2010-11, BBMP bought the land from the local landlord for the homeless population. In 2013-14, BBMP modified their decision and converted the land into a waste processing site. One of the local villagers Manoj said that the BBMP used a fake address of this plant to keep their activity secret. The actual location of this plant is Banashankari sixth stage, fifth block, Mattekalpalya. Due to this plant, people are facing breathing problems, as the plant emits a very strong stench. Avinash (a resident) said that five to six years back, this area was rich with flora and fauna. Local discussions revealed that it was common to see peacocks, Eurasian eagle-owls, varieties of butterflies, and even leopards. However, they had all disappeared after the plant was established. One of the villagers mentioned that before the setting up on this plant, they supplied vegetables and fruits to different parts of Bengaluru city, and currently, they are struggling to earn any money from agricultural fields. This waste processing plant dumps their un-segregated debris near their agricultural fields, affecting soil properties and reducing soil fertility, besides increasing insect attacks on crops.

The Conflict: Bengaluru is known as one of the highest growing city in India and it produces four thousand tonnes of waste every day across 198 wards in the city. This situation has created huge pressure on the city development authority for proper management and disposal of waste. In early 2014, BDA considered Lingadheeranahalli as a waste-processing plant site and this unit has a fixed capacity to process two hundred tonnes of wet waste per day. The BDA has taken this plan without consulting residents and other civic groups (May 11, 2016, Deccan Herald). That's why the residents and those in Banashankari Sixth Stage protested outside the Lingadheeranahalli garbage processing plant. They argued that this plant will harm groundwater, forest, and the environment. People were demanding their "right to breathe"; they don't want to see another Mandur and Mavallipura. Every day about twenty-five trucks, (each truck carrying eight tonnes of garbage) from the south zone, enter the plant (May 11, 2016, Deccan Herald).Hundreds of residents took part in a protest. Ramaswamy, a local villager led the protest on May 10, 2016, from 10 a.m. to 5.30 p.m., and said that the problems of bad odour, mosquitoes, and contamination of underground water table were not addressed despite several

promises from the BBMP (11 May 2016, The Hindu). They demanded that the BBMP shut down the plant as it is affecting their health and posing a threat to the flora and fauna of BM Kaval reserve forest and Turahalli forest. There are chances of diseases caused by insects and that the leachate reduces groundwater quality. Three persons from the surrounding villages had died due to air and water pollution (May 11, 2016, The News Minute). Devaraj, a resident of Mattekalpalya near the plant, said that he and his children were unable to eat peacefully due to the stench and mosquitoes if the problem continued; he plans to shift to another locality.

Under the Municipal Solid Waste Rule 2000, solid waste management cannot be taken up near lakes and forests. The BBMP does not have a No Objection Certificate (NOC) from the forest department nor has it applied for clearance from the State Environment Impact Assessment Authority. "If our land is affected and the groundwater contaminated, our lives will be destroyed," says Devaraj, a farmer of Mattekalpalya (Jan10, 2016, Deccan Chronicle). Also, there are no uses for proper technology and buffer zone maintenance between the plant and the residents or forests. Srinivas, a member of the resident welfare association (RWA) said that the existing plant has very outdated equipment, which is why disposal is not occurring properly and toxic water is released into the Somapura Lake. Ramprasad, a convener of 'Friends of Lakes' explains that if the right technology is used, the proximity of waste treatment plants is an issue that can be tackled (Jan 10, 2016, Deccan Chronicle). He also said that "look at the sewage treatment plant in Cubbon Park. It is in the heart of the city, but the areas around don't face problems".

Current Status: T S Mahesh, president of the Banashankari 6th Stage Resident Welfare Association, said that they filed PIL in the National Green Tribunal Court with the local group, against the BBMP and it was moved to the Karnataka High Court. Also, they submitted a petition to the BBMP last year and held a protest in June 2015. But to date, they had not got any response. He said, "We will continue to fight as the plant is affecting 25,000 houses and eight villages." After this protest, Sarfaraz Khan, BBMP Joint Commissioner for Health and Solid Waste Management, visited the spot and assured the residents that he would discuss the problems with the higher authorities. Still, this plant was active and daily 20-50 fully loaded trucks dumped city garbage into the waste processing plant (Manoj, resident of Banashankari 6th stage, 5th block).

The opposing stands: They argued that if the landfill and garbage processing unit are continuing in this area, then they will face the following problems:

- ✓ Groundwater will be contaminated in the layout.
- ✓ Exposure to hazardous waste can affect human health.
- ✓ Environmental pollution around the layout; children and the ageing population is more vulnerable to these environmental pollutants.
- ✓ Biodiversity will be affected. This area has forests and a lake, that's why there are many special animals and birds there. They will be affected by this plant.
- ✓ The cleanliness of the layout will be lost.

Lessons learned from these three incidents

- A proper and systematic way of disposal of waste is very important to protect human health as well as the environment.
- Site selection, collection and treatment of leachate, and the cover of the dump area need to be taken into consideration for the dumping of waste into landfills.
- Need to educate citizens, environmental activists, and engineers on the impact of hazardous waste on the environment and human health.
- Need to monitor and observe the environmental and professional ethics in industrial units to deal with and handle the waste.

The four cases discuss the implications and networks that were formed to oppose impacts. Several such instances are booming across the country, specifically in Bengaluru to fight for justice.

Role of Civic Groups in Waste Management

Most of the environmental non-governmental organisations (NGOs) in Bengaluru came after the economic reforms. The study found that there are two types of voluntary groups or NGOs existing in the city (see annex4). One group don't believe in any kind of protest and want to work with the government to improve the city's infrastructure, basic facilities, and environmental quality. Another group wants to work with people, identify their actual problems and want to bring some changes in society through a protest or agitation.

Table 5: Nature of Environmental NGOs in Bengaluru

Sl. No	Name of the NGO/ Voluntary group /Blog	Formation year	Focus area	Activist/ non-Activist
1	Bangalore Environmental Trust*	1987	Urban waste	Activist
2	SAAHAS Zero Waste*	2013	Urban waste	Non- Activist
3	Sensing Local*	2016	Urban waste	Non- Activist
4	Hasirudala*	2013	Urban waste	Non-Activist
5	The Ugly Indian**	2010	Urban Waste	Activist
6	Environmental Support Group*	1996	Urban Waste	activist
7	CIVIC	1992	Urban waste, lakes and Governance	Activist

Symbol index: * NGO, ** Voluntary Group,

Source: Prepared by the Author based on the nature of group activity

In the proper management of the city's municipal solid waste (MSW), various initiatives have been taken by civic groups as well as local government ranging from awareness creation, segregation at source, collection and transport and disposal of waste. The citizen groups and BBMP have organized various campaigns and training programmes to manage the MSW as well as improve the city

environment. Some of these programmes include Kasa Muktha Bengaluru';[6] 'Wake up Clean up Bengaluru',[7] 'My Waste my Responsibility',[8] and 'Not in my Backyard'.[9] For example, in the last few years, various civic groups have organized several campaigns and public discussions with the help of BBMP to ban single-use plastic. In this campaign and training programme, different types of people such as traders, street vendors, and restaurant owners have participated and shared their knowledge of waste management practices. Additionally, eco-clubs have been set up in schools and colleges where the students can be made aware of better management of waste. The group called Solid Waste Management Round Table (SWMRT) is one of the pioneer civic groups enabled to educate teachers, staff and students about Trashonomics and the best strategy for waste management. In the city, there are more than two hundred groups actively engaged with MSW management and also on social media where they discuss the current issues, transparency and accountability in BBMP's waste management system (Kalra and Manasi, 2020).

Segregation of waste is one of the most important tasks in MSW management and '2bin1bag' by SWMRT is one of the most successful initiative programmes. In this programme, the organic and rejected waste is put in green and red bins accordingly and recyclable waste is mainly collected in a bag. Due to unplanned urban expansion, waste management is the major issue in the city and due to this, various groups and individuals protested and filed Public Interest Litigations (PIL) against the government's waste management practices. The city generates a majority of the mixed waste and segregation of waste is the major concern in waste management (Kalra and Manasi, 2020).For the better management of waste, in 2015, the Karnataka High Court passed an order for the citizens to adopt the idea of '2bin1bag'[10] to segregate the waste at the source (November 30, 2018,Business Line). As per the SWMRT report, more than two lakh households adopted this initiative and many civic groups have taken a positive initiative to implement it within the city. Also, there are various stakeholders engaged in MSW management such as RWAs, itinerant buyers, rag pickers, and NGOs like Hasirudala, Sahaas, BPAC, and Swachha. Sahaas has its recycling unit and also they have a dry waste collection centre (DWCC) across the city where people can put their dry waste and e-waste. Another NGO called Hasirudala plays an important role to manage the waste from bulk generators such as apartment complexes, hotels, marriage halls, and hospitals. One of the other major functional areas of Hasirudala is to secure and improve the social status, providing identity cards, and looking at the health condition of waste pickers and the waste workers. According to them, more than ten thousand waste pickers received their occupational identity card in Karnataka.

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[6] 'Kasa Muktha Bengaluru' (garbage free Bengaluru) was launched by then Chief Minister Siddaramaiah, then Ramalinga Reddy (Bengaluru In- Charge Minister) and others in July 24, 2013 at Freedom Park. This programme offers training to the pourakarmikas and BBMP's contractors; creates volunteer groups for awareness campaign; audit and monitoring of BBMP's waste management practices.

[7] 'Wake Up Clean Up' seven days expo was organised by BBMP with the help of other government bodies and NGOs from February 3-10, 2013 to find the best solution for efficient SWM in the city

[8] 'My Waste My Responsibility' promotes complete waste segregation and uses of eco-friendly products

[9] 'Not in my Backyard' refers to waste disposal in a safe and responsible manner

[10] '2bins1bag' facilitates waste segregation at home where organic waste keep in green colour bin, blue colour bin is for dry waste and rejected waste for red colour bin

The processing of MSW is another major responsibility of BBMP and the city has eight waste processing units (The Hindu, July 5, 2017) as well as some biomethanisation units. For the proper management of MSW, many civic groups are favouring a decentralized waste processing system at the ward level as well as organic waste composting at the household level. The group called CIVIC has filed PIL many times in the court to implement the rule of ward committee formation in all 198 wards to solve the ward level garbage related issues. In the concern of the 'Zero Waste Initiative',[11] 'Green Wedding',[12] roof gardening and home composting are gaining attention in citizens' perception. 'Compost Santhe'[13] is one kind of decentralized waste processing initiative where it encourages the citizens to manage their household garbage. The compost from organic garbage helps for roof gardening as well as biogas generation (Kalra and Manasi, 2020). The BBMP has agreed and planned to install Compost Santhe units in all 198 wards. These units will facilitate the farmer to collect compost for their agricultural production. In the city, many municipal councillors and MLAs have come forward with the residents to implement this programme in their locality. Furthermore, this initiative has drawn attention in social media and newspapers where the people started a campaign called "Our Waste, Our Responsibility" to promote the Compost Santhe initiative. Another group called Daily Dump is well known for home composting and is the manufacturer of eco-friendly products. They organized various programmes about how to create wealth from waste, job creation in the field of the waste management system, and research on waste composting. They provide facilities like leaf composting, flower composting in the temple and religious festivals, and home organic composting units. They are playing a significant role to create awareness about vermin-compost, segregation of waste according to their nature and how to reduce the burden on the city's waste management system.

It would not be true to say that civic groups are always protesting against the local government. The city has seen various success stories regarding waste management where civic groups and the government work hand to hand to achieve goals such as the plastic ban campaign, '2bins1bag', 'Compost Santhe' and 'Zero Waste'. Although their activities have brought significant positive changes in waste management in the city, they are facing various challenges. The study observed that most of the NGOs raised questions about the waste collection strategy of the urban local bodies. BBMP has taken several policies for the collection of waste and segregation, but they mentioned that the ground reality shows the impact of these policies is negligible. The door-to-door collection did not happen properly as it mainly applies to those people who are staying on the ground and first floor, but for those who are staying on the above floors; this strategy has very little impact. It was observed that they dump their waste on the roadside when they go to their workplace. Segregation of waste is another major problem with the waste management system in Bengaluru. Pourakarmikas are collecting waste from different sources and contractors are simply dumping it into the waste processing plant or the landfill. Most of the respondents agreed strongly that the political nexus and corruption are playing a significant role in the city's waste management practices. Also, they mentioned that there is no issue in the government

[11] 'Zero Waste' focus on minimum waste generation and encourage people to reuse and recycle waste

[12] 'Green Wedding' to promote zero waste wedding where it includes items made from eco-friendly products, such as cutlery made from sugarcane fibers, invitation card made from recycled paper.

[13] 'Compost Santhe' promote for organic waste composting and build a network between compost producers and buyers to use the compost for farming

waste management policies but, because of the corruption and the political nexus, there is no proper impact of these policies on the ground. Lastly, human behaviour and people's mindset play a key role in the waste management system in every city. In the city, many citizens think that since they are paying their taxes to the government, it is their responsibility to manage the waste. On the other side, lack of knowledge, the rapidly growing population, and consumption habits increase the waste management problems in the city. In addition, the composting method needs some space as it attracts mosquitoes, rats and dogs by the stench and in urban areas most people do not have sufficient space to manage their waste. Also, cultural belief has a significant impact on the city's waste management process. One respondent mentioned that people had beliefs that if they keep garbage in their house then Laxmi (goddesses of wealth) would not come and 'Rahu and Ketu' (shadow planets considered inauspicious) would come at night time. Hence, they threw their garbage wherever they found space which had increased the black spots in the city.

Conclusion

Environmental awareness and activism in Bengaluru are moving at a fast pace, implying a growth in responsible behaviour. However, Johan Enqvist *et al*, 2014 in their paper on Bengaluru, indicates that the networks' activities are influenced by internal tensions between inclusiveness and efficiency and between internal and external legitimacy. Hence, they suggest the development of a comprehensive framework for urban environmental stewardship to better describe the potential roles of citizens in governance across diverse social, political and ecological conditions and during different periods of urban change. Thus, there is a long way to go in upscaling the efforts to see significant impacts, but the efforts are commendable.

Civic activism plays an important role in the area of policy formation, and government activities, as they increase people's participation and environmental awareness. The engagement of various stakeholders in the decision-making process can enhance the strength of the goals and objectives of the decision. Many times, civic groups and the government work together to solve the problems. For example, single-use plastic is one of the major problems in urban waste management and to ban single-use plastic, the civic groups and government bodies worked together and earned huge attention from the citizens. Many times, individual stakeholders take the initiative to solve the problems by campaigning, discussing and filling PIL in court. To recognize the formal role of waste pickers and scrap dealers in waste management practices in the city, SWMRT filed an affidavit in Lok Adalat in 2012. Afterwards, BBMP issued an official letter to recognize their formal role and also provided ID cards to two thousand waste pickers.

Similarly, CIVIC (an NGO) has filed many PILs in court to implement the ward committee and decentralized the waste management system at the ward level. Afterwards, BBMP incorporated many of the suggestions and recommendations provided by CIVIC. Another organisation Saahas has influenced much of the government's decision-making process related to dry waste collection and composting of organic waste. Similarly, Hasiru Dala is working with BBMP for the social security and financial stability of pourakarmikas. In early 2020, BBMP incorporated inputs from Hasiru Dala in its SWM bye-laws. In December 2017, Karnataka High Court passed an order and directed the citizens to adopt the '2bin1bag'

initiative to segregate the waste at the source. Finally, to prepare the draft of the Master Plan for Bengaluru, the individual experts, civic groups, and NGOs play a very crucial role to improve and modify the required changes which will, directly and indirectly, help to improve the waste management practices, city environment as well as improving the city governance.

Amidst all this, it should not be forgotten that solid waste management is not a short-term process; it is a continuous long-term process. It requires a comprehensive system, a decentralised waste management and a strict monitoring mechanism for implementing the rules and regulations. Additionally, people's awareness, motivation and participation are further required to strengthen the waste management practices in the city. To secure environmental sustainability, people should adopt the five ways (refuse, reduce, reuse, repurpose, and recycle) of effective waste management to properly manage the waste. Additionally, BBMP needs to further motivate and encourage eco-friendly approaches for the management.

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Appendix

Annexe 1: Details of Pourakarmikas in Bengaluru

Sl. No.	Description	Number
1	Pourakarmikas listed on the rolls	32,000
2	Pourakarmikas as per first audit by BBMP	15,000*
3	Garbage vehicle drivers and helper	11,000
4	Supervisor	1,000
5	Compactor driver	500
6	Unaccounted workers	5000

*Approximate figure;

Source: The Hindu, August 27, 2017

Annexe 2: Waste Processing Plants and Their Capacity

Sl. No.	Name of the Waste Processing Plant	Capacity (Tonnes per day)	Garbage intake now (Tonnes per day)
1	Kannahalli	500	150
2	Seegahalli	200	50
3	Lingadheeranahalli	200	70
4	Doddabidarakallu	200	70
5	Subbarayanapalya	200	0
6	Chikkanagamangala	500	0
7	Karnataka Compost Development Corporation (KCDC)	300	200
8	Mavallipura	70	70

Source: The Hindu, Wednesday, July 5, 2017

Annexe 3: Waste to Energy from Waste Processing Plant

Waste to Energy from Waste Processing Plant			
Sl. No.	**Name of the Waste Processing Plant**	**Capacity (Tonnes per day)**	**Power Output (MW/Hour)**
1	Giddenahalli	500	9.66
2	Gorur	1000	13
3	Bellahalli	600	7
4	Bellahalli	1000	8
5	Kannahalli	500	-

**Giddenahalli project is being shifted to Mavallipura

Source: The Hindu, March 22, 2017

Annex4: Classification of Activism

Sl. No.	Name of the specific model	Based on	Remarks
1	Participatory Activism	Membership organisation	Few events and many participants
2	Transactional Activism	Small advocacy organisation	Many events and few participants
3	Radical Activism	Usually on the loose organisational platform and individual activist	Few participants and militant strategies
4	Civic self-organisation	Individual, organisational effect	Many events, no organisation, and few participants
5	Episodic mass mobilisation	Short term events	Many participants, no organisation and very few events

Source: Cisar, 2013

Annexure 5: List of Environmental NGOs and Civic Group Working on Urban Waste in the City of Bengaluru

Sl No	NGO Name	Environmental Issues										
		Urban Waste	Sanitation	Water Supply	Forest conservation	Lake conservation	Energy	Green Initiative	Recycling of waste	Rag Picker Issues	Awareness creation Capacity Building	Good Governance
1	Centre for sustainable development (CSD)	✔	✔		✔	✔	✔	✔	✔		✔	✔
2	Eco-Watch	✔				✔	✔	✔	✔		✔	
3	Bangalore Environmental Trust	✔		✔		✔					✔	✔
4	Bangalore Political Action Committee (BPAC)	✔				✔		✔	✔		✔	✔
5	Solid Waste Management Round Table	✔						✔	✔	✔	✔	✔
6	Saahas	✔						✔	✔		✔	✔
7	Youth for Parivarthan	✔			✔						✔	
8	Environmental Support Group (ESG)	✔	✔	✔	✔	✔			✔	✔	✔	✔
9	Ugly Indian	✔			✔						✔	
10	Hasirudala	✔						✔	✔	✔	✔	✔
11	Yelahanka Eco Group	✔									✔	
12	Jannagraha	✔	✔					✔			✔	✔
13	ENDLESSLY GREEN (Blog)	✔									✔	
14	Sensing Local	✔				✔					✔	
15	Swachha	✔									✔	

Source: Compiled from the different sources

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