



case study

September 2017

Community-based Solid Waste Management in Galle City A Pilot Project in China Garden

Introduction

Municipal Solid Waste Management (MSWM) is one of the serious environmental pollution and public health issues in developing countries. The World Bank estimates that current global Municipal Solid Waste (MSW) generation is about 1.3 billion tons and it is expected to increase to 2.2 billion tons per year by 2025¹.

In general, MSWM is a responsibility of the Local Governments (LGs). It is one of the largest single budget allocation, estimated at about 40% of the city's operating budget in low and middle-income countries². However, it was also evident that most of cities are struggling to provide at least the most basic level of MSWM service to its citizens. Typically, one to two-third of the

MSW generated in low and middle-income countries are not adequately collected³. The uncollected waste is disposed indiscriminately in the streets and in drains, so contributing to flooding, breeding of insects and rodent vectors and the spread of diseases. Further, the collected waste is also disposed on open lands in an uncontrolled manner.

Figure 1: Landfill site of Galle City





Figure 2: Waste collectors at work

Such inadequate waste disposal is leading to the emission of methane gas, which not only add to global warming and associated climate change, but also leads to increase environmental pollution and public health risks. The global estimations show that MSW landfill is the third largest source of global methane emissions⁴. In this regards, improvement of MSWM in developing countries is getting global attention as one of the key drivers that contribute to achieve sustainable environmental agendas and commitments of the United Nations (UN) such as Pollution Free Plant, Paris Climate Agreement and the 2030 Sustainable Development Agenda/ Sustainable Development Goals (SDGs).

This is not exceptional in Sri-Lanka, one of the fastest growing countries in South Asia. Improving MSWM is now getting a higher national priority after two tragic situations taken-place in 2017 such as dengue epidemic

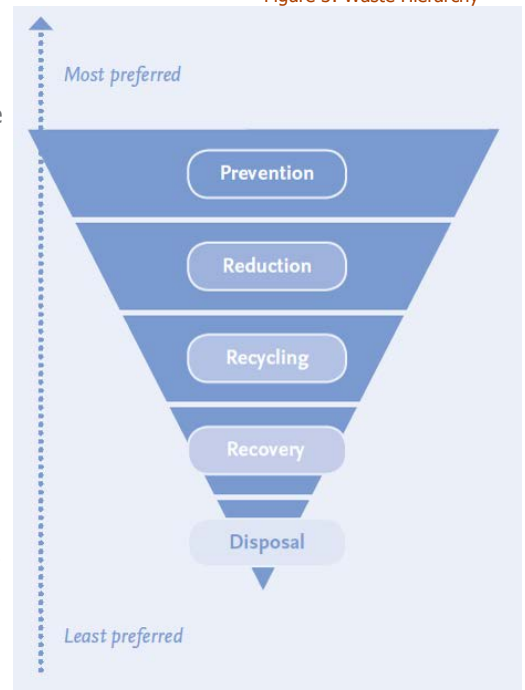
outbreak and landfill collapse in Colombo City.

According to the Epidemiology Unit of the Ministry of Health (MoH) Sri Lanka, approximately 80,732 dengue fever cases, including 215 deaths were reported in the first-half of 2017, which is a 4.3 fold higher than the average number of cases in the same period between 2010 and 2016. It was also identified that a failure to collect MSW is one of the main reasons for standing water pools and other potential breeding grounds for mosquito larvae attribute to the higher number of cases⁵.

Further, the Meethotamulla landfill, only a single landfill site owned and operated by the city of Colombo since 1989 was partly collapsed on 14 April 2017 causing a death toll of 32 with another 1,700 families lost their housing⁶. In this background, the Government of Sri Lanka has taken an immediate steps to sign new contracts with the private sector to establish two Waste to Energy (W2E) plants with 10 Megawatts each to incinerate MSW in Western

Province aiming to reduce the waste to be landfilled at the end of the pipe. However, according to the Waste Hierarchy, the sustainable waste management system is depended more on following attempts to reduce, reuse and recycle waste at the source before promotion of final treatment and disposal. In this regards, strengthening the participation of citizens and the community-based organizations for MSWM is an important step.

Figure 3: Waste Hierarchy



City to City Cooperation for Improving MSWM in Galle City

Galle, a coastal city with a total population of 101,159 is situated on the southwestern belt of Sri Lanka⁷. The city was one of the major ports and a commercial center during 16th and 17th centuries. Galle is also famous as one of the UNESCO World Heritage Sites in the country for the existence of Galle Fort that was built by the Portuguese. However, like many other fast growing cities in the country, Galle City faces a great challenge in managing its MSW. According to the City Commissioner, a daily waste generation and collection is amounted up to 40 to 50 tons. The city also faces a challenge in finding land for waste disposal in future due to high-rate of urban growth and the current landfill site is also not ideal for dealing with the waste, which results in polluted urban water bodies and increased environmental pollutions. At the same time, the city has taken some efforts to introduce the waste separation at source (bio waste and non-bio waste) since November 2016, increase the waste collection coverage throughout the city, public awareness and reduction of waste to be landfilled by material recycling and composting.

In this background, CITYNET Yokohama Project Office in Japan partnered with the HELP-O, a local Non-Governmental Organization (NGO), to assist in improving the MSWM in Galle City based on the successful experience of Yokohama City, one of environmental model cities in Japan, in achieving a 40% waste reduction target within 5-7 years by making commitments from; citizens to separate waste, business to collect and recycle, and city government to create more sustainable 3R (reduce, reuse and recycle) system with public education.



Figure 4: Informal meeting with the community leaders in China Garden

Meeting with the community leaders in China Garden, Galle City

China Garden is one of the highly populated areas in Galle City. The name is believed to refer to Chinese migrant labourers who were brought to the area for agricultural work in the early 19th century by then the colonial Governor of the country. Currently 270 families are living in the area. Considering the challenges with the existing waste collection system in China Garden, it was selected as a pilot project to implement the community-based solid waste management system. A sample survey carried out by HELP-O identified that there is no regular waste collection service in this area. The majority (66%) put their household waste into the plastic (shopping) bags and bring them to the communal collection points in the main roads. Then, the city's vehicle will collect them from these points and

transport to the landfill site. The rest (34%) is practiced throwing their waste into the nearby open spaces, burn or buried. Though, Galle City has been promoting waste separation, a majority (62%) is still not practiced the waste separation at source. However, some households (20%) separate recyclable materials (newspapers and bottles) and sell them to the buyers called Botal Pattare who have visited their houses. A very few families (11%) are doing backyard composting and use the product compost for gardening. Due to lack of space, the majority (66%) are not willing to do the composting at home. It was also observed that few families are doing paper bag making business using the used paper. According to these families, this is the only income in their family.

Figure 5: A member who makes the paper bags





Figure 6: Meeting with the City Commissioner

Project Activities

With the experience of Yokohama City, CITYNET-Yokohama Project Office and the Institute for Global Environmental Strategies (IGES), Galle City and the HELP-O have been implementing a community-based solid waste management project to achieve waste free city in Galle. The main objectives of the project are: (i) to organise an awareness programme, (ii) to strengthen the partnership among stakeholders, (iii) to mobilise the community, and (iv) to establish monitoring system.

Awareness programme

Like many other cities, one of the key challenges faced by the Galle City in improving its waste management system is changing attitudes of the citizens, business, city officials and workers. Citizens need to be changed

their current attitudes from throw-away mind to waste reduction and separation at their households. Businesses need to change their production, collection and recycling activities. The political leaders, city officials and workers are also needed to change their attitude about the waste and need to take actions in applying positive changes in the planning and implementation of waste management programmes. Hence, a series of awareness and education programmes are designed and conducted targeting all the important stakeholders (citizens, businesses and city officials).

Partnership among key stakeholders

Building partnership among key stakeholders is necessary for the sustainable operation of the waste management in the city. The project

has introduced some measures to strengthen the partnership with civil society groups (Women Groups and local political leaders in China Garden) to get their cooperation for awareness raising, planning and implementation of project activities at community level. The project also started new activities with the schools in the city, involving the environmental student societies, to train and mobilise them to get involve in awareness raising activities as Green Leaders. Further, the project strengthened the partnership with businesses in creating new recycling opportunities. For example, one recycling company called Random Global Private Company signed a new agreement with the city and purchased the separated glass waste (13 tons/month) that is originally dumped in landfill. In addition, the Light House hotel and Lions Club provided their support for awareness raising and environmental education activities under the company's Corporate Social Responsibility (CSR) programmes.

Mobilise the community

Galle City is divided into 15 wards for administrative purposes. HELP-O and Galle City have selected China Garden, one of the ward among them, as a pilot project area for mobilising the residents to get their support for establishing a new waste management system considering the challenges in providing regular waste



Figure 7: Public awareness programme

COMMUNITY-BASED SOLID WASTE MANAGEMENT IN GALLE CITY

collection service by the city in the area. Currently, the city's waste collection service is not available in this area due to the issue of access for waste collection vehicles. Residents are asked to bring their waste to the communal collection points located on the main roads. Due to the long distance to the communal collection points and the irregular collection pattern, most of residents are preferred in throwing their waste to nearby open areas. The pilot project therefore aimed to design a new waste collection system in consultation with the city's waste collection department and the community-based organisations. The new system is suggested to apply a community waste collection system with a bicycle which can come inside the community. The community would advise to separate their waste into wet and dry. Wet waste will be collected three times a week while dry waste will be collected once a



Figure 8: Awareness programme in China Garden

week. Further, a project aimed to encourage residents to reduce the waste generation and promote more reuse and recycling activities for improving livelihood generation.

Project monitoring

It was evident that most of the

externally supported programmes are failing due to lack of sustainable mechanisms to continue that project activities after the completion of support. Thus, this project aimed to establish the green leaders & sub-committees within the city to continue the programme activities.

Figure 9: Glass waste collection center at landfill site





Figure 10: Composting and bio-gas in Galle City

Lessons Learned and Future Considerations

Formulate a MSWM plan for the city considering the local needs and resources

Galle City has taken some innovative steps in partnership with HELP-O and other interested parties for improving the waste management system. Since November 2016, the city has been promoting the separated waste collection in all 15 wards. The city also set up a waste collection schedule and disposal plan. However, it was evident that these efforts are still in an ad-hoc manner without an integrated waste management plan. This has caused for lack of consistent collection and disposal, low cooperation from citizens, and caused illegal disposal of waste and unnecessary costs of daily operation.

Based on the experience of China Garden, city can develop an integrated waste management plan for the city involving all key stakeholders. The plan should consider all the aspects of waste

management starting from waste separation, collection, recycling, treatment and disposal. The plan also needs to consider the relevant policy and financial requirements that are required for the effective implementation of the plan.

The bulk of Gale City's waste shows the potential of composting and bio-gas

According to the city office, the contribution of biodegradable waste is high in the total waste stream. It was estimated that biodegradable materials constituted about 77% of the total waste collected. Of this figure, 59% was made up of food, mostly fruits and vegetable waste, while yard waste contributed the remaining 18%. The recyclable materials such as glass bottles, plastics and aluminum cans were conspicuously low in the waste samples and this figure accounted only 12% in the entire sample. Other residual waste, made up mostly of clothing, broken pots, toys and non-recyclable packaging, constituted about the rest of other 11%.

Because of this large amount of organic waste, the most practical and effective strategy is promotion of composting (aerobic) or/and bio-gas (anaerobic) methods to recycle the organic waste before final dispose.

There is some evidence in practicing both composting and bio-gas methods in the city. A centralised composting facility has been operating by the Southern Provincial Council in Monrovia, 20 KM away from the city. This composting facility accepts the separated biodegradable waste from Galle and other neighbouring cities. Its capacity is 40 tonnes per day and used a windrow composting method. The facility uses back-loaders to make and turn the composting piles. All other operations, including screening and packaging are doing by manually. The observations show that the facility is at full capacity and to be scaled up it needs to introduce some mechanical improvements such as screening, in addition to physical construction. Further, city can promote the household composting, educating residents who have enough space.

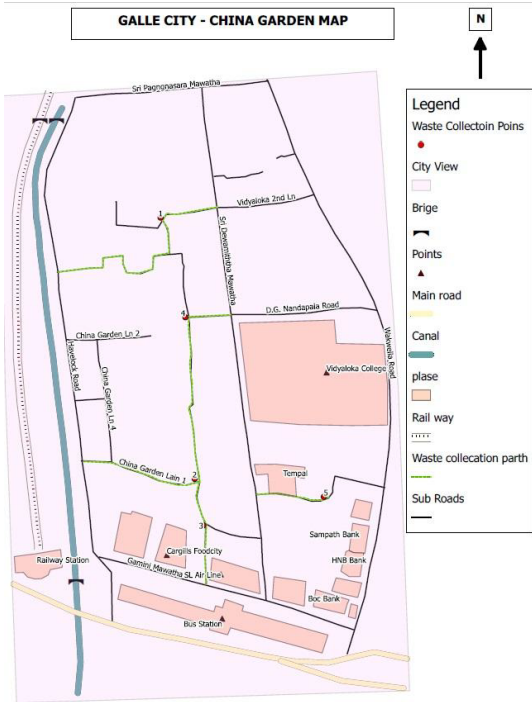


Figure 11: A map of the China Garden

for doing backyard gardening. In addition, HELP-O has been involved in promoting bio-gas at individual and community levels. The results show that bio-gas can also help to reduce the biodegradable waste to be collected and disposed. Also, the generated methane gas can be collected and used for household cooking purposes, saving about 20% - 30% of family's monthly costs need for LP gases. The observation also identified that these backyard composting or bio-gas activities need a proper monitoring and follow-up advise to sustain the operation.

It can also be recommended to carry out the feasibility study jointly between the experts of CITYNET Yokohama Project Office, IGES, HELP-O and Galle City to identify the potential of a centralised bio-gas facility for Galle City using about 10 - 15 tons of organic waste, targeting the biodegradable waste from city markets. The experience of bio-gas in other Asian and European cities can be shared, but need to consider the capacity and appropriateness to the local conditions.

Engage Citizens and Others

This is a key step, since the sorting of waste is done at the individual household level. A public education program to educate residents about the economic, environmental and social benefits of the 3Rs is essential. Residents can also organise and mobilise to do backyard composting or bio-gas. To address the potential participatory barriers, the assistance of HELP-O and other NGOs, Civil Society Organisations (CSOs) and Community-Based Organisations (CBOs) can be secured through effective partnership building.

The experience of Yokohama City shows that comprehensive awareness and education programmes are important to educate the community about waste management system of the city. To build the partnership among other stakeholders such as businesses (formal and informal), schools and academic institutions.

Figure 12: Environmental education programme at school



Key steps for Community-Based Solid Waste Management

- 1 Preliminary Meetings
A series of preliminary meetings need to be organized to consult and create awareness among city officials and citizens.
- 2 Development of Waste Profile
A sample survey is conducted to understand the waste characteristic and awareness.
- 3 Building partnership
Assign supportive sub-committees at the city and community level to strengthen the public, private and community partnership
- 4 Organizing community
Recruit Green Youth Leaders and community cluster leaders, conduct awareness programmes.
- 5 Develop a new MSWM system
Design a new system with citizen.
- 6 Introduce a new MSWM
Introduce the new waste separation and collection system.
- 7 Experience sharing
Experience of pilot project will be documented and shared with other neighbouring communities.



Figure 13: Community leaders meeting in China Garden

REFERENCES

- (1) World Bank (2012): What a Waste: A global review of solid waste management, <http://www.worldbank.org/en/news/feature/2012/06/06/report-shows-alarming-rise-in-amount-costs-of-garbage>
- (2) Global Methane Initiative(2011): Landfill Methane: Reducing Emissions, Advancing Recovery and Use Opportunities, https://www.globalmethane.org/documents/landfill_fs_eng.pdf
- (3) World Resources Institute, 1997. The urban environment
- (4) UNEP-IETC, 1996. International Source Book on Environmentally Sound Technologies for Municipal Solid Waste Management. s.l.:United Nations Environment Programme (UNEP), International Environmental Technology Centre (IETC).
- (5) Dengue fever – Sri Lanka (2017) 19 July 2017 WHO <http://www.who.int/csr/don/19-july-2017-dengue-sri-lanka/en/>
- (6) <http://citiscopes.org/story/2017/what-can-cities-learn-sri-lankas-landfill-tragedy>
- (7) http://www.statistics.gov.lk/PopHouSat/PopulationAtla_2012/04_DSLevelMaps/Map%20P3.31.1.1%20%20Galle%20-%20Population%20%20%20by%20DS.pdf

CITYNET
YOKOHAMA



IGES
Institute for Global
Environmental Strategies

This brief note is prepared by Dickella Gamaralalage Jagath Premakumara, a Senior Researcher/ Programme Manager of the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET), Institute for Global Environmental Strategies (IGES), Japan in cooperation with Chatura Welivitiya, Nadeesha Godakanda, Nadeeka S Amarasinghe, and Dineka S Surasinghe, HELP-O, Sri Lanka and Masaaki Taniguchi, CITYNET Yokohama Project Office, Japan.