Development of Work Plan for Reducing SLCPs from MSWM in Surabaya, Indonesia

January 2017

1. Introduction

The Climate and Clean Air Coalition (CCAC) is one of the global efforts that unites governments, civil society and private sector, committed to improving air quality and protecting the climate by reducing the Short Lived Climate Pollutants (SLCPs) across different sectors. It was launched on 14 June 2011 by the governments of Bangladesh, Canada, Ghana, Mexico, Sweden and the United States, along with the United Nations Environment Programme (UNEP) and currently have 51 national governments, 16 International and Bilateral Agencies and 45 Non-Governmental Organizations (NGOs) are working together to address short-lived climate pollutants (SLCP) by raising awareness of short-lived climate pollutant impacts and mitigation strategies, enhancing and developing new national and regional actions, including by identifying and overcoming barriers, increasing capacity, and mobilizing support, promoting best practices and showcasing successful efforts, and improving scientific understanding of short-lived climate pollutant impacts and mitigation strategies[1].

Under the coalition, 11 initiatives have commenced work thus far. One of these initiatives is the Municipal Solid Waste Initiative (MSWI), aimed at reducing SLCPs created by municipal solid waste. The CCAC-MSWI has completed its Phase 1 (establishment of infrastructure and initial assessment of the MSW initiative) activities and currently underway in Phase II (Implementing on the ground action with cities and informing the long-term framework of the initiative) and Phase III (implement on the ground action with cities towards long-term feasible solutions and scaling up beyond the initial targets).

Under this initiative Surabaya, Indonesia undertook a rapid city assessment in 2014. The outcomes of the assessment highlighted various issues in the city. In order to deepen understanding of Surabaya City's issues a study has been undertaken to develop a work plan towards improving Surabaya City's SWM system and, by extension, lowering SLCP emissions. The objectives of this study are:

1. Develop a work plan for implementation of community-based SWM and 3R activities
2. Develop work plan to improve temporary disposal sites into intermediate waste recycling facilities
3. Develop work plan for promotion of composting for organic waste recycling
4. Develop work plan for improving the final waste disposal site

[1] For more information about the CCAC and its initiatives see http://www.ccacoalition.org/en

2. Background

2.1. Location, Population, Governance

Surabaya, a second largest city is located on the east coast of Java Island and is the capital of Jawa Timur Province. It has a population of 2,853,661 (Statistics Indonesia 2014), and is a highly urbanized business center due to the many service industries located in the city[2]. Most of the city is lowland, around 3 – 6 m above sea level, the exception being the south region, 25 – 50 m above sea level. The boundaries of Surabaya City in the north and east are bounded by Madura Bay, the south by Sidoarjo Regency, and the west by Gresik Regency.

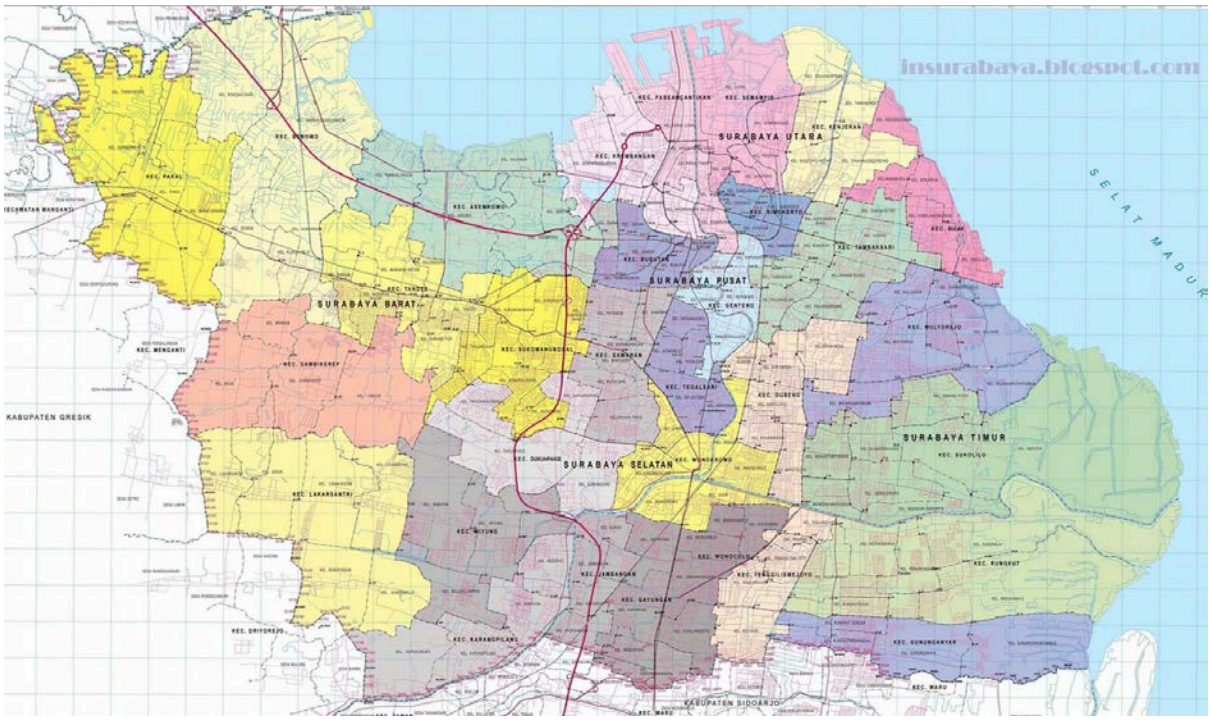

Figure 1: Districts and Sub-districts of Surabaya City. Source: Surabaya City, 2016

For administrative purposes, Indonesian cities are divided into districts (kemacatan), sub districts (kelurahan), community associations (rukun warga), neighbourhood associations (rukun tetangga), and households. Community and neighbourhood associations are created through registration by the residents and are variable in size. However, a neighbourhood association must have at least 40 households, and a community association must have at least four neighbourhood associations. Surabaya City consists of 31 districts and 154 sub-districts, 1,368 community associations and 9,118 neighbourhood associations[3].

[2] Government of the United Kingdom, "Indonesia: Surabaya and Bandung - opportunities in second cities" accessed at https://www.gov.uk/government/publications/indonesia-surabaya-and-bandung-opportunities-in-second-cities/indonesia-surabaya-and-bandung-opportunities-in-second-cities on 13th January 2017

[3] Statistics of Indonesia, 2014

Table 1 - Districts in Surabaya City by Population

District Name	Area's Region (km^2)	Population (Person)	Population Density (Person/km^2)
Tambaksari	8.99	217,100	24,149.05
Sawahan	6.93	201,721	29,108.37
Semampir	8.76	182,531	20,836.87
Wonokromo	8.47	159,964	18,885.95
Kenjeran	7.77	146,757	18,887.64
Gubeng	7.99	136,621	17,099.00
Krembangan	8.34	115,638	13,865.47
Sukolilo	23.68	104,893	4,429.60
Rungkut	21.08	104,046	4,935.77
Bubutan	3.86	101,812	26,376.17
Tegalsari	4.29	101,716	23,710.02
Sukomanunggal	9.23	97,909	10,607.69
Simokerto	2.59	97,713	37,727.03
Tandes	11.07	89,469	8,082.11
Mulyorejo	14.21	82,773	5,824.98
Pabean Cantikan	6.80	82,383	12,115.15
Wonocolo	6.77	78,337	11,571.20
Karangpilang	9.23	70,322	7,618.85
Wiyung	12.46	65,742	5,276.24
Genteng	4.05	59,273	14,635.31
Sambikerep	23.68	58,566	2,473.23
Dukuh Pakis	9.94	58,429	5,878.17
Benowo	23.73	55,754	2,349.52
Tenggilis Mejoyo	5.52	54,861	9,938.59
Pakal	22.07	53,472	2,422.84
Gunung Anyar	9.71	52,120	5,367.66
Lakarsantri	18.99	48,484	2,553.13
Jambangan	4.19	47,548	11,347.97
Gayungan	6.07	44,092	7,263.92
Asemrowo	15.44	42,973	2,783.23
Bulak	6.72	40,642	6,047.92
TOTAL	333	2,853,661	8,579.08

Source: Registry of Inhabitants and Civil Registration Service of Surabaya City, 2016

3. Waste Management Overview

3.1. Waste Quantity and Composition

Surabaya generates approximately 1,512 tonnes of waste per day with approximately 1,281 being landfilled giving a waste diversion rate of 15.3%. Organic waste predominates with around 57% being organic. Non-organics mainly comprise paper (14%), plastic (16%) and others (11.6%). Metal and glass are less than 2% of the total. The main source of Surabaya's municipal waste is residential waste, being 68% of the total. The other categories are markets (16%), commercial/industrial (11%) and streets/open spaces (5%). Of the diverted waste, organics are 95.5 tonnes per day, less than non-organics, which are 135.5 tonnes per day. Waste banks divert approximately 1 tonne per day (calculated from data in Wijayanti & Suryani, 2015).

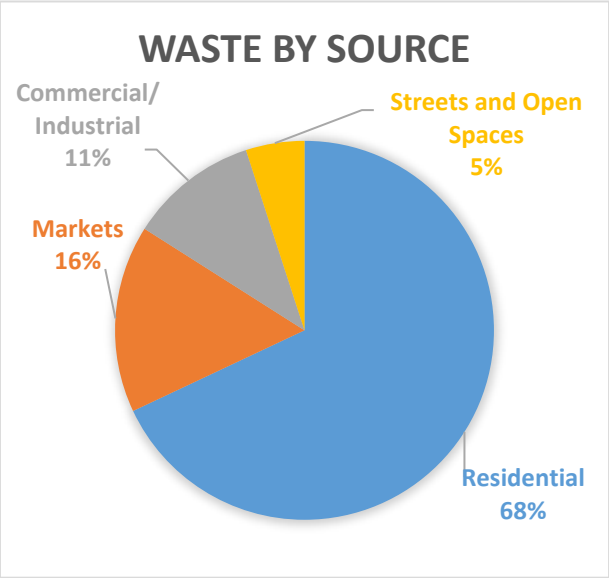

Figure 2: Waste by source. Source: Surabaya City, 2016

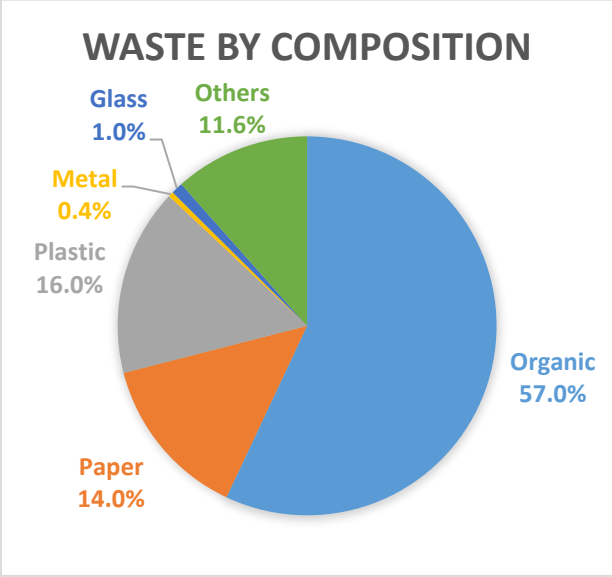

Figure 3: Waste by composition. Source: Surabaya City, 2016

3.2. Waste Collection, Treatment and Disposal

Surabaya City has based its waste collection on a 3R community approach. This has several components:

Awards

Surabaya City has been a multiple winner of the Adipura Award, a competition run by the national government to award top performing cities. Within the city, there have been two competitions established by which the city encourages environmentally-friendly behaviour at the community level – the Surabaya Green and Clean Programme and the Merdaka dari Sampah (Free from Waste) competition. The Surabaya Green and Clean Programme started in 2005 and grew rapidly to achieving a peak involvement of 2,774 neighbourhood associations (of 9,118, 30.4%). This programme was initiated by Agency of Cleansing and Gardening (DKP), the Java Post, and Unilever Indonesia. It is envisioned that from this programme, communities can learn socialization strategies, environmental education and appreciation of community thereby boosting community participation. The Merdaka dari Sampah is similar, but is focused on developing and expand community based waste management throughout the city.

Figure 4: Typical view of waste bank in Surabaya. Source: Authors, 2016

Waste Banks

Waste banks are a new innovation in Indonesia, established in 2008. The purpose is to encourage waste separation and recycling by establishing waste "banks". Customers sell recyclable waste at the banks with their contribution being marked in a bankbook. The customer either receives the money made by selling the waste or some other benefit, depending on the waste bank. This scheme is supported by the national government, who established waste bank guideline in 2012. Since inception in 2013, waste banks in

Surabaya have grown rapidly to 180 branches and over 10,000 accounts[4]. Assuming that waste banks have one account per household and with an average of 3.63 people per household[5], then 10,000 accounts would cover approximately 36,300 people, which is 1.27% of the total population of the city. With a diversion rate of 1.02 tonnes/day (based on the 7.14 tonnes/week figure above) being attributed to waste banks, and assuming that the amount of waste being diverted per waste bank remains the same as waste banks scale, there is a maximum potential for waste banks to reduce waste going to landfill by 80.3 tonnes/day, which would comprise 15.6% of the 1,281 tonnes total currently. Non-organics comprise a maximum of 43% of the waste (550 tonnes), with 80.3 tonnes therefore being 14.6% of the non-organic waste. Waste banks could have a theoretical upper limit of diverting 14.6% of non-organic waste from landfill.

Figure 5: Community waste collection. Source: Authors, 2016

Community Waste Collection

As previously detailed in the Surabaya City CCAC MSWI Action Plan, since the introduction of the community primary collection (Copricol) law in 1980, the collection of MSW from residential areas is managed by Rukan Warga (RW) (neighbourhood associations) who organise the waste collection scheme in the area collecting fees from households, hiring waste collectors, providing pushcarts, and paying salaries to waste collectors for collecting and transporting waste from household units to transfer stations. The households use different types of storage bins, such as plastic or metal bins and fixed brick boxes in front of the house for waste storage. Collection from commercial, institutional establishments and from street

[4] Wijayanti and Suryani, 2015
[5] Statistic of Surabaya, 2014

sweeping is carried out by the Cleansing and Landscaping Department of the city. In addition, the city has lead on the recruitment of volunteer environmental cadres (28,000) to educate the residents about the waste separation and recycling at source.

Temporary Disposal Sites

Primary collection and transportation from sources to temporary disposal sites (TPS) in Surabaya City is conducted by communities. However, secondary collection and transportation from TPS to final disposal (TPA) is conducted by both private and goverment. The number of TPS in Surabaya City are 221 and are all government-owned except for five. In recent years, the Kitakyushu, Japan-based waste management company Nishihara Corp. has established a temporary disposal facility. It is called a SuperDepo and handles 15 tonnes of waste per day. It is primarily a waste separation facility without on-site recycling faciliites. It was opened in March 2013 and employs 20 people, mainly former scavengers. The initial construction was undertaken under a JICA project with the facility being transferred to the city under agreement in 2015.

Figure 6: Super Depo in Surabaya. Source: Surabaya City, 2014

Composting

MSW generated in Surabaya is approximately 60% organic and ideal for composting. Since 2005, Surabaya City has been involved in promoting composting at the household and community levels. It was estimated that the city has already distributed about 19,000 composting bins to motivate residents to do household composting. In addition, 21 small-scale composting centers have been established and operated by the city to treat the green waste, market waste and some organic waste from households. Nishihara Corp. has also established a medium scale composting centre with a capacity of 20 tonnes per day. The facility was

established in September 2014 and employs 5 staff. Nishihara Corp. has a plan to upgrade to a larger scale waste sorting and composting facility of 150 tonnes per day employing 70 people. It would process 100 tonnes of organic waste per day and 50 tonnes of non-organic waste.

Table 2 – Composting Facilities managed by Surabaya City

Location	Capacity (m^3/day)	Production (m3/day)	Workers
Jl. Raya Manyar	12	8	7
Jl. Bibis Karah Depo Sampah	2	1	2
Jl. Keputran	4	4	3
Jl. Tenggilis Utara	6	2	3
Jl. Menur 31	12	8	5
Jl. Tenggilis Tengah	12	2	3
Jl. Rungkut Asri	12	4	3
Jl. Wonorejo	6	3	3
Jl. Gayungsari IV	3	1	2
Jl. Darmo Baru Barat	18	6	4
Jl. Putat Jaya	12	7	3
Jl. Sumber rejo I	3	2	2
Jl. Keputih Tegal 32 (di dalam Liponsos Keputih)	3	2	2
Jl. Srikana (dekat Kampus Ekonomi Unair Srikana)	6	2	2
Jl. Jambangan Kebonagung I	6	1	3
Jl. PDAM Balas Klumprik	6	2	2
Jl. Golf 4 Komplek Marinir Gunungsari	6	1	3
Dalam IPLT Keputih	12	4	3
Jl. Tubanan (dekat makam)	3	2	2
Rungkut Asri Tengah	12	4	3
Tambak Deres, Kenjeran	No Data	No Data	No Data

Source: Cleansing and Landscaping Department, Surabaya City

Final Disposal

The collected MSW is transported to the final landfill site in Benowo, about 22 miles west, an area of 40 acres (16 ha). The site is almost full. There is a small 2MW biogas generator and a non-functioning incinerator. The site is operated by a private company (Semper Organik) who have a 20-year concession,

which started in 2012. The Cleansing and Landscaping Department of the Municipality is in-charge of transporting the waste accumulated at transfer depots to the final disposal site using municipal containers and trucks. Due to heavy traffic, it takes a long time to reach them, which limits each truck to a maximum of two trips to the disposal site per day. There are occasional fires particularly in the dry season with the smoke disturbing the people and the environment. It was also estimated that the landfill site has a remaining lifespan of five years and is facing difficulties in finding a new site due to a scarcity of public lands in the city.

Figure 7: Sanitary landfill in Surabaya. Source: Authors, 2016

4. Gaps and Issues

4.1. Reported

Community Based SWM and 3R Activities

IGES conducted a survey on solid waste management within three sub-districts Gundih, Keputih, and Kertajaya. The results were shared at a workshop conducted in April 2016 where a SWOT analysis for waste bank development in Surabaya was undertaken. The survey identified a correlation between environmental awareness and the presence of a waste bank (albeit with a small sample size). Barriers to the implementation of waste banks were identified as financial (lack of access to start-up funds; lack of

knowledge of potential buyers of recyclables); awareness (low community awareness of the 3Rs or waste bank concept); capacity (lack of knowledge on how to establish and manage a waste bank); institutional support (lack of integration into local SWM system). A more detailed account of the workshop and survey can be found in the appendix.

In addition to the above activity, ITS, on behalf of IGES, further conducted interviews with Surabaya City waste management experts Bapak Satrijo Wiweko, Director of the local NGO Sahabat Lingkungan and Bapak Hermawan, a prominent local environmental advocate. Concerns raised were (i) a lack of clear collaboration between the local government, NGOs and communities; (ii) insufficient levels of awareness; (iii) lack of capacity; (iv) lack of clear market for recyclables. A centralised system adopted by the nearby City of Malang was cited as a possible model.

Temporary disposal sites into intermediate waste recycling facilities

As reported above, Surabaya has a large number of small waste recycling facilities. However, these facilities are not sufficiently large to conduct waste separation. This is a significant issue due to the lack of universal waste separation at source within the city. Even in cities with universal waste separation, it is necessary to have intermediate facilities with further waste separation being undertaken. Another issue is that some of the temporary disposal sites are poorly maintained and lack a roof covering creating additional issues for the storage and separation of waste. One possibility would be to upgrade the facilities so that they are two storeys tall creating additional space vertically. Another possibility would be to expand on the SuperDepo concept as piloted by Nishihara Corp. Both possibilities would require an in-depth investigation into the costs and benefits.

Promotion of composting for organic waste recycling

In December 2016, IGES and ITS held a workshop on organic waste recycling. The workshop discussed issues regarding household, community and centralised composting. Issues at all levels were broadly similar with low rates of waste separation at source; little administrative or financial support; low quality compost being produced at too high volume without a clear market. For the centralised composting schemes issues related to a lack of knowledge of such schemes and difficulties in sourcing sufficient waste; finding land and finding a final end customer for the product.

Many suggestions were put forward including the need for (i) policy making and implementation (including responsibility/incentive provision/penalties) and clear target setting as well as collaboration with and among related government ministries and agencies (particularly the Ministry of Agriculture); (ii) capacity building to improve the standard of compost as well as the implementation of quality standards and

monitoring; (iii) raising awareness on composting with particular emphasis on community benefits such as employment opportunities and income generation.

Improving the final waste disposal site

The final disposal site is about 37ha. It is almost full with the waste reaching a height of about 12 meters. Due to land requisition issues, the final disposal site is the sole site for now and the foreseeable future creating an immediate concern as to how to manage the waste.

In addition, as rain intensity in Surabaya is quite high (around 2000 mm/year) reduction of leachate from rainwater has become an important issue. The provision of proper drainage system for rainwater is required to manage the reduction of leachate.

Following the recent announcement by the national government of support for waste-to-energy projects, Surabaya is now actively waste-to-energy options for final disposal. Further research would be needed in this area with consideration of the impact of such technology on current practices.

4.2. Perceived

Community Based SWM and 3R Activities

In addition to the workshop undertaken by IGES, there was research conducted into the determinants of waste banks by IGES appears to indicate correlation between waste banks and environmental awareness or action (Premakumara et al. 2017) which is in line with other research conducted in Surabaya (Dhokhikah, Trihadiningrum, and Sunaryo 2015). However, the number of respondents in both research papers is insufficient to prove this and in addition, the chain of causality remains unproven – whether it is the presence of a waste bank that leads to greater environmental awareness/action or a greater level of environmental awareness/action leads to the establishment of waste banks.

Final Waste Disposal Site

Presidential Decree No.18 of 2016 in Indonesia declared the intention of the Government of Indonesia to support the investment costs for the establishment of waste to energy in 7 cities including Surabaya. This proposal is being carefully considered by the local government. It could lead to a move of focus from waste reduction activities towards disposal.

Other Observations

Gaps and issues reported for issues surrounding temporary disposal sites, promotion of composting for organic waste recycling and improving the final waste disposal site were in-line with that perceived by IGES.

4.3. Summary

Overall Surabaya is comparatively advanced within the ASEAN region regarding SWM practices. However, its system is currently not fully integrated due to the large number and variety of stakeholders. Community efforts such as waste banks, household and community composting and community competitions have clearly had some impact but they have yet to reach a city-wide scale. Further expansion is needed through (i) awareness raising; (ii) capacity building; (iii) financial support; and (iv) policy frameworks. It will be necessary to fully assess all of the different stakeholders in order to understand how to fully integrate Surabaya's solid waste management system. Efforts to expand activities will require additional resources and support over the long term to ensure sustainability.

5. Planned Scope of Activities

The following activities are recommended for Surabaya City to assist with improvements to their MSW

5.1. Community-based SWM and 3R activities

Surabaya City is recommended to improve and expand its nationally and internationally acknowledged impressive efforts to implement community based waste management and 3R activities. Waste banks are an excellent opportunity to do so – investigations should be made into their further support and integration into the MSW system; capacity building for operators; and improving commitment to the establishment and operation of waste banks.

Activity	Deliverables
(1) MSW Integration Strategy for Waste Banks	• Currently, waste bank is an isolate activity outside of the city waste management strategy due to its introduction by the national government. Considering its huge potential in encouraging waste separation at source and reduction of waste to be landfilled, development of integration strategy including mapping of waste banks against intermediate facilities
(2) Improvement of Commitment to Waste Banks	• Research into the financial costs of establishment of waste banks and the potential for either private sector or government financial support

	• Development of strategy to further promote waste banks through existing environmental promotion policies (such as Surabaya Clean and Green; environmental cadres and so on)
(3) Capacity Building for Waste Bank Operators	• Development of How to Guide on Waste Bank Establishment, building on the nationally released guidelines • Development of regular workshops where advice is given on the establishment of waste banks. • Creation of networks/ federation/ cooperatives of waste banks to strengthen their power to negotiate with private buyers

5.2. Improve temporary disposal sites (TPS) into intermediate waste recycling facilities

Temporary disposal sites are currently rudimentary and lack the space for waste separation. Investigations should be undertaken into the expansion of the intermediate waste facilities.

Activity	Deliverables
(1) Improve temporary disposal sites (TPS) into the intermediate waste treatment facilities	• Assessment of all TPS of (i) current status ii) funding requirements for proper operation; (iii) potential new sites if current site is considered impractical • Categorise into self-operated, city assistance required and cannot operate due to lack of land • Where TPS is too small to accommodate waste recycling, it should be enlarged where possible. • As the number of TPS is about 180, then every kelurahan in Surabaya must have at least one TPS. Collaboration between TPS and nearest waste bank may introduce

	further waste reduction and it can be managed either by the communities or DKP.

5.3. Promote composting for organic waste recycling

Composting efforts at both the community level and through centralised composting houses are on-going. Research should be undertaken regarding the integration of community and centralised efforts as well as improvements in the quality of compost produced and investigations into the potential market.

Activity	Deliverables
(1) Assessment of potential market for organic waste	• Study and apply the potential market for organic waste composting both from the government and private sector; • Description of quality of compost required for different uses • Study the potential of integrating compost products with the compost promotion activities of the PT PUPUK Indonesia, a State Owned Enterprise in Indonesia
(2) Capacity Building within Composting Houses/Communities	• Training on composting to be given and the development of regular monitoring and evaluation to ensure composting quality.
(3) Integration of Composting Houses with Community Composting efforts	• Study and apply the possibility of integration of composting houses and community efforts
(4) City support for private composting	• Assessment and improvement of current mechanisms to compost the organic waste collected from shopping malls and public markets towards the establishment of a medium sized composting facility based on the experience of the Japanese-based company called Nishihara, which has already an experience of operating 10-20 tonnes/day organic waste from the commercial premises and city's market.

	• Surabaya City should establish a supportive environment such as provision of land (rent or leasing), guarantee a long-term contract and efficient tipping fees to motivate private companies to introduce new technologies for composting • Develop and implement awareness raising and education programmes to build citizen support for establishing such medium and large composting facilities near residences.
(5) Establish a new legislation to reduce food waste	• Establish new legislation to reduce food waste generation in the city. In order to promote reduction of the food waste, introduce the new laws for promotion of recycling and related activities for the treatment of cyclical food resources. Currently, some of the OECD countries including Japan, USA, EU, South Korea, etc have enacted similar laws to reduce the food waste and lessons that be learned. • This can be started from the public markets and commercial enterprises.

5.4. Improvement of the final waste disposal site

The final disposal waste site is coming to the end of its life and is facing issues concerning the amount of waste being deposited. Surabaya City is actively considering the implementation of incineration technology. The recent move by the Indonesian government to financially support the implementation of incineration technology has also given a further motivation. Nevertheless, Surabaya City should consider whether the introduction of such technology would prevent the establishment of a resource circulation society.

Activity	Deliverables
(1) Assessment of technology for final treatment	• Study and identify the potential WtE technologies (gasification, incinerator, biomass), considering cost; technical feasibility; capacity building issues; and

	potential effects on 3R waste management approaches.
(2) Assessment of leachate issue	• Report on leachate following an assessment by landfill site experts

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Appendix

Initial Mission to Indonesia, 21 – 23 October 2015

Meeting at the Ministry of Environment and Forestry, Indonesia. 21 October 2015

In order to support further the expansion of CCAC MSWI in Indonesia as well as ensure national government support for on-going work in Surabaya, a delegation from Kitakyushu City and IGES headed by Dr. D.G. J. Premakumara, Senior Policy Researcher, IGES and Mr. Naoki Motoshima, Director, Kitakyushu Asian Center for Low Carbon Society, Kitakyushu City met with representatives from the Ministry of Environment and Forestry, Indonesia headed by Mr. Sudirman, Director of Solid Waste Management.

Following presentations from IGES on CCAC MSWI and their work undertaken in support and from Kitakyushu City on their environmental work including international collaboration and support for CCAC MSWI, there was a general discussion.

The Government of Indonesia reiterated that it has no concerns regarding CCAC MSWI work within Surabaya City as it is part of the collaboration between Surabaya and Kitakyushu cities under their sister city agreement.

Regarding CCAC membership, the Climate Change Office does not advise Indonesia to join CCAC due to concerns regarding potential pressure on their HFC levels (one of the CCAC initiatives focuses on HFCs). In response, it was stressed that CCAC is non-binding and that Indonesia could join activities within the MSWI without any obligation. Indonesia then stated would be willing to support CCAC MSWI activities and discuss expansion to other Indonesian cities on an unofficial basis.

Regarding specific solid waste management issues, it was noted that the Ministry is currently in partnership with the Plastic Recycling Association and is actively working to improve partnerships with associations relating to paper and metal. The Ministry also looking into how to link the waste banks with the larger scale recyclers.

The Ministry reminded IGES that permission would be needed to expand to further cities due to internal rules. In principle, they have no objection to this and are keen to support city to city cooperation. The Ministry requests IGES keep them updated regarding progress on the Surabaya City project. (Please note that such permission was received for forthcoming work in Medan. Mr. Sudirman subsequently met Mr. Kazunobu Onogawa on the sidelines of the Regional 3R Forum for Asia and the Pacific in November 2016

and expressed his interest in accompanying IGES to Medan once activities commence). The meeting then wrapped up with both sides agreeing to keep each other informed of developments.

Meeting with Surabaya City, 22 October 2015

An initial meeting for the commencement of the work plan activities was held on 22 October 2015. Attendees included Dr. D.G. J. Premakumara, Senior Policy Researcher and Mr. Simon Gilby, Policy Researcher, IGES; Prof. Eddy Soejono, Sepuluh Nopember Institute of Technology; Ir. Chalid Buhari, Head of Department, Landscaping and Cleansing Department (DPK), Surabaya City; Ir. Aditya Wasita, Deputy Head of Department, Landscaping and Cleansing Department (DPK), Surabaya City; and Mr. Yusuf Kurniawan, CEO, YOLO (IT company).

The meeting started with an overview of CCAC MSWI and an in-depth explanation of the current iteration of the CCAC MSWI tool. The tool was explained in a comprehensive manner with Surabaya City officials expressing interest in receiving further training once the tool was officially finalised. Due to the busy schedules of city officials it was not advisable to give training until the tool is officially complete to avoid the risk of having to give multiple training sessions.

Surabaya City is currently exploring the use of IT to improve its solid waste management. This is being explored through two potential means. The first is the RomBank app. The idea is to create an app like Go-Jek (similar to Uber but for motorcycles) for waste. The motivation for this is twofold (i) currently waste banks are able to gather waste but are unsure how to sell it and (ii) waste banks in other cities are unable to sell their waste in their own cities and are sending it to Surabaya. This is becoming an increasing problem. Using IT, a fixed rate can be introduced for garbage and advertised locally. Recycling businesses require both quantity and quality of waste. IT should enable the three stakeholders - waste bank; recycling buyers; suppliers – to be more effectively integrated. Suppliers would be able set prices and communicate them effectively and widely. The city is confident this would not cause a problem for the waste banks – the purpose is not to make the waste banks redundant. It was noted by IGES that Phitsanulok, Thailand has introduced IT in a similar way but due to the differences between the cities, the differences will need to be carefully checked.

The second is the SWAT system which is a computerised system set-up this year in order to track waste trucks in real time and has enabled greater confidence in the data. The data is currently only privately used by Surabaya City whilst the technology is being verified as functioning correctly. The city is planning to give

headline data to the public once the system is shown to be working reliably. System cost Rp50m to construct (approx. USD3,600 at October 2015 exchange rates). The city would like to make this freely available to other cities.

Other matters discussed included the markets, landfill and promotion of 3Rs and waste separation. There are current efforts underway to bring the markets and waste banks together. It was agreed that waste management must be managed holistically and that environmental education is key. It was observed that there needs to be a balance between punishment and education in order to achieve buy-in with local citizenry.


Site Visits, 23 October 2015

In order to understand further the solid management of the city, site visits were undertaken to the Nishihara Composting Depo; Paing Market Waste Depo; and Bratang Composting Centre.

The Nishihara Composting Depo was established by the Kitakyushu-based Japanese company Nishihara. It has a capacity of 20 tonnes a day with 5 staff. Compost created is used as a base for fertiliser through windrow composting. The composting centre is next to a former dumpsite. It is planned to convert the area to a public park as well as establish a composting centre (capacity 100 tonnes/day; 10 people) and a SuperDepo (capacity 50 tonnes/day; 60 people). The financial viability of the site is coming into question due to the lack of fees that Nishihara can leverage.

Paing Market Waste Depo was shown to IGES as a typical example of a market waste site. Waste is sorted then sold, but it is not done in an organised manner. There appeared to be people living at the site.

Bratang Composting Centre was visited as it is widely considered to be one of the best composting sites in Surabaya City due to the efforts of the staff in meticulously sorting the waste to ensure the quality of the compost.

Photos above left to right – Nishihara Composting Depo; Paing Market Waste Depo; Bratang Composting Centre)

Community Solid Waste Management Survey and Waste Bank Workshop, 14 April 2016

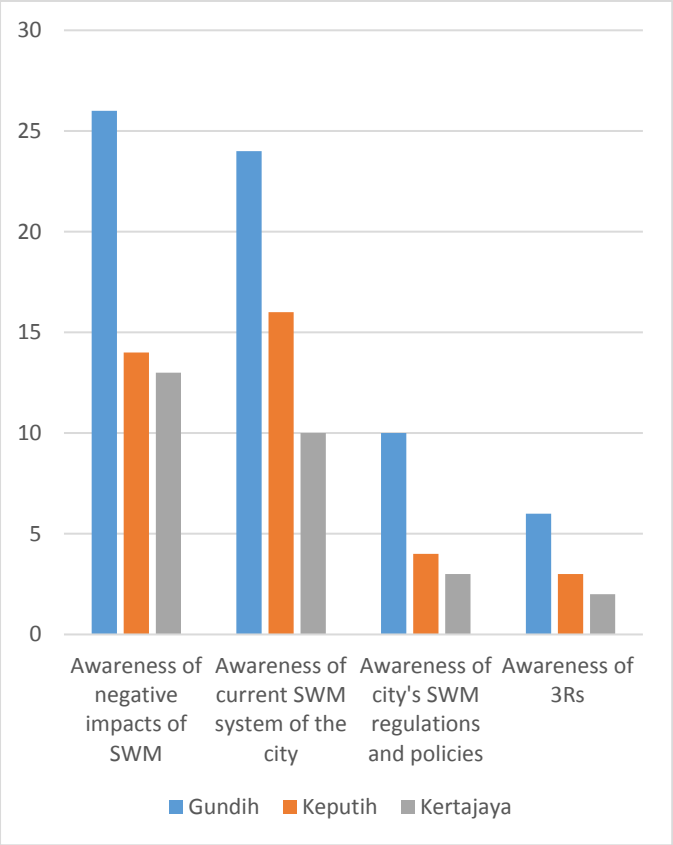
Introduction

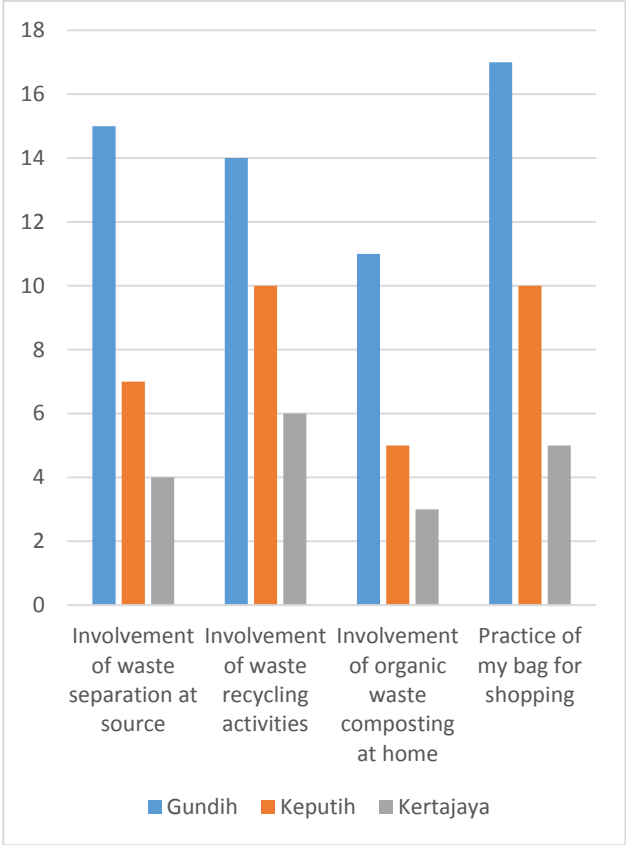
In order to further understand solid waste management within Surabaya, a sample survey was carried out in three selected communities or neighbourhoods (Rukun Tetangga or RT in Indonesia) in Surabaya City to understand the level of success of waste banks in achieving their original objectives of (i) increasing the awareness of 3Rs and MSWM system and (ii) behavioural changes towards waste separation at source and promotion of waste reduction and recycling activities among residents at the community level. Further to this, a multi-stakeholder workshop was organized on 14 April 2016 at the Institut Teknologi Sepuluh Nopember (ITS) in Surabaya inviting representatives from Waste Banks (both managers and customers), leaders of CBOs, non-governmental organizations (NGOs), academic and city staff to discuss and identify the key opportunities and challenges in implementing the Waste Bank program and its expansion within the local MSWM system in Surabaya using the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.

Community Solid Waste Management Survey

Three communities were selected: Gundih, Keputih, and Kertajaya, after consulting the city staff for the field survey considering their level of participation in the Waste Bank Program, assurance of the CBOs to support the data collection activities, similarities with other communities in the city, time limitations and financial constraints. Gundhi was the community defined as having the most active waste bank with 90% of respondents to the survey being members. Keputi was less active with 50% of respondents being members and Kertajaya the least with 25% of respondents being members. A sample of 28 households was selected from each community (covering approximately 50% of households considering the average size of the community that is about 40-60 households) using the simple random sample method for the interview. The interviewees are the representatives of the households (both male and female who are over 18 years old) available when the researchers have visited the selected houses to conduct the survey during the period of January to March 2016. Each household was asked total eight questions including four on the awareness of 3R and MSWM system and another four questions related to behavioural change on waste separation at source, waste reduction and recycling activities, using a structured interview with exactly the same questions in the same order. As can be seen below, there appeared to be a correlation between waste bank involvement and awareness of and involvement in environmental activities. However further research would be needed due to the small sample size.

Results of the Survey:





Waste Bank Workshop

As noted above, a workshop to identify the key opportunities and challenges in implementing Waste Bank program and its expansion within the local MSWM system in the city was held on 14 April 2016. After a wide-ranging discussion, the workshop participants produced the following SWOT analysis.

SWOT Analysis

Strengths

- Low investment costs
- No need of costly waste separation equipment
- Simple in operation and management
- Easy to market
- There is no limit to growth

Weaknesses

- Lack of personal commitment and skills within CBOs
- Difficulty in finding initial investment
- Persuading residents to be waste bank members
- Finding information of recycle buyers and their market prices

Opportunities

- Global awareness on resource management, 3Rs and circular-economy
- Availability of enabling policies and programmes at national and local level
- The presence of private sector cooperation through its Corporate Social Responsibility (CSR) programmes

Threats

- Waste Bank is not yet fully integrating with local MSWM system
- Low public awareness on waste separation, 3Rs and recycling

Training Workshop on SLCP Tool in Surabaya City, 26 July 2016

A half a day training workshop on SLCP tool was organised at the Institute of Technology (ITS) in Surabaya City. It was aimed to introduce the SLCP tool and its appliaction for the invited participants (total 15) from the Landscaping and Cleansing Department (DPK) of Surabaya City, the resaerch staff of the ITS and the Non-Governmental Organisations (NGOs) that involved in promoting 3R activities in the city.

The workshop included presenattions, practical group work and discussion sessions. First, Dr. D.G. J. Premakumara, Senior Policy Researcher introduced the SLCP tool and the importance of its use as a management tool to understand the different waste management scenarios and their impacts. Prof. Eddy Soejono, Sepuluh Nopember, ITS explained the waste management and climate change impacts specially from open dumping and in-effective landfill operation.

After the above two presentations, participants were asked to make 3 groups and practically apply the tool into a given situation where they would like to achieve in waste reduction targets through promoting composting and waste banks at community level. Then, group findings were presented and discussions were conducted to understand their feedback for using the tools. The participants agreed that the SLCP tool is very interesting and helpful as a management tool to identify the better scenario of waste management system in the city. It is also good to choose the technology such as compost and recycling. This type of scenario making is important to influence the policy makers. However, for effective application of the tool to day-to-day operation, further training and capacity building are required. In addition, Surabaya City needs to establish proper data collection and management system.

Composting Workshop, 6 December 2016

Introduction

Due to the large amount of organic waste produced by the city and the continual strains upon final disposal capacity, composting has become a clear means by which waste can be diverted from landfill and SLCP reductions be realised. In order to further understand the opportunities for composting, a workshop was held with participants from the City of Surabaya, City of Kitakyushu, NGOs, private companies and academia.

The meeting was led by Prof. Eddy Soejono, Sepuluh Nopember Institute of Technology; Dr. Chen Liu, Policy Researcher, IGES and Mr. Naoki Motoshima, Director, Kitakyushu Asian Centre for Low Carbon Society, Kitakyushu City.

The workshop opened with an overview of CCAC MSWI by Prof. Eddy Soejono followed by an introduction to the workshop and overview of food waste management issues by Dr. Chen Liu. Further presentations were delivered on Surabaya's waste management system and the two different composting methods currently being used by the city – household and community and centralised/business facility. Finally, Mr. Naoki Motoshima presented on Kitakyushu City's experiences with both household and business composting.

Discussion

Following lunch, the participants were split into groups and asked to discussion the various issues. Regarding motivational issues, it was felt that consideration should be given to developing a more convenient way of composting. Capacity building should be undertaken and a publicity campaign be held to demonstrate the benefits of composting such as employment opportunities and other 'feel-good' factors. Mechanisms for regular information sharing should be established. Capacity issues highlighted included a lack of citywide awareness of waste separation at source, which should be further promoted and developed. The quality of compost should be improved through integrating household and community composting schemes with centralised ones. In addition, a monitoring and evaluation system should be developed and implemented to ensure quality. Regarding structural issues, it is recommended that policies be created to incentivise composting and set clear targets. For implementation, it is recommended that collaboration among the related government ministries and agencies (particularly the collaboration with the Ministry of Agriculture) be pursued. A review of the market for end products should be undertaken.

A summary table of the aspects of composting – household, community, centralised against the issues (motivational, capacity, structural) is given below.

	Household	Community	Centralised
Motivational Issues	Low level of awareness/separation at source	Low level of awareness/separation at source	Low level of awareness/separation at source

	Voluntary cooperation without policy support		
	No clear benefit		
Capacity Issues	Low quality compost		
	Troublesome/no space at home/no time		
Structural Issues	Overproduction/limited market for end product	Overproduction/limited market for end product	Limited market for end product
		low administrative/finance support	
		Community leaders lack a sense of environmental responsibility	
			Land Availability