

# Kitakyushu City's International Cooperation for Organic Waste Management in Surabaya City, Indonesia and Its Replication in Asian Cities\*

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## 1. Introduction

During the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992, Surabaya City – the second largest city of Indonesia located in Eastern Java – was awarded along with Kitakyushu City, Japan for its active dedication for achieving environmental improvements and sustainable development. However, Surabaya City failed to maintain this momentum and the positive environmental reputation of the city began to deteriorate. In the mid nineties, Surabaya City faced a tremendous challenge in managing solid waste in an environmentally sustainable manner. In order to help this situation Kitakyushu City, in partnership with a variety of private entities and research institutions including the Japan International Cooperation Agency (JICA) - Kyushu International Centre, the Kitakyushu International Techno-Cooperative Association (KITA), the Institute for Global Environmental Strategies (IGES), and the J-Power Group, JPec Co., Ltd., have been working to once again improve Surabaya's environmental standing. This began with a re-design of the urban waste disposal system. The following case study therefore aims to document the key achievements of Surabaya City in Indonesia and the replication of these measures in other cities in Asia<sup>1</sup>.

## 2. Situation of Solid Waste Management before Kitakyushu Involvement

The Surabaya City has a population of three million people, and half of this figure consists of people in the low-income group. In 2011, in an area of 330 sq km 2,400 metric tonnes of waste was generated a day, from the following sectors: residential (68%), markets (16%), commercial/ industrial (11%), and streets and open spaces (5%).<sup>2</sup> According to the composition of municipal waste generated in Surabaya City, more than 50% is organic and easy to compost. Since the introduction of the community primary collection (*Copricol*) law in 1980, the city's waste collection and disposal activities are managed by a two-tiered system. Collection of domestic waste and transportation to transfer depots is a household responsibility. The city government is in principle only responsible for waste at transfer depots, which is then transported to final disposal areas.

Surabaya, like other cities in Indonesia, is divided into neighbourhood units called *Kampongs*. Each *Kampung* is responsible for collecting waste generated within its area. In all *Kampongs*, a *Rukun Warga* (RW), a neighbourhood association, organises the waste collection scheme in the area; collecting fees from households, hiring waste collectors, providing pushcarts, and paying salaries to waste collectors for their services in collecting and transporting waste from household units to transfer stations. The Cleansing and Landscaping Department of the municipality is in-charge of transporting the waste accumulated at transfer depots to the final disposal site. In addition, they are responsible for collecting waste from commercial and institutional

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\* This paper is prepared by D.G.J.Premakumara, Policy Researcher of Kitakyushu Urban Centre, IGES in March, 2012

establishments. However, large waste generators such as industries arrange collection separately, often contracting out to the private sector.<sup>3</sup>

However, Surabaya City has managed to collect only half of the waste generated in the city, while the remaining was left in the more than 150 temporary disposal sites located on the streets, ditches, and open spaces, blocking the drainage system, contaminating water resources and resulting in increased insect and rodent populations<sup>4</sup>. This situation was at its worst during the rainy season, particularly in low-lying areas where most of the urban poor reside. Furthermore, the city has faced difficulties in finding a new site for final disposal since the closing down of one of its final disposal sites in Keputih area in 2001. It was also calculated that the final disposal site at Benowo only has a remaining lifespan of a few more years. The waste problem in the city deteriorated to such a state that it leads to, in combination with other political issues, the eventual dismissal of the Mayor and the appointment of the then Vice Mayor<sup>5</sup>.

### **3. Introduce a New Solid Waste Management System based on the Community-based Composting**

In 2002, Kitakyushu City extended its support to Surabaya City to transform the waste management system into one which is environmentally sound and economically affordable. After obtaining the approval from the House of Representatives of Surabaya Municipality in November 2002, Kitakyushu City dispatched a special team of experts to assess the existing situation before introducing a new system for solid waste management. This team, in cooperation with the staff of Surabaya City and the laboratory for Housing and Human Settlements of the Institute Teknologi Sepuluh (ITS) in Surabaya, has carried out a detailed study on waste management and citizen's perception to the problem in two selected districts out of total 31 districts in the city.

The findings of the study provided important insights for the team in designing the new solid waste management system for Surabaya City. It was identified that waste collection in middle-income and high-income areas was satisfactory, but not so in low-income areas, as in the *Kampongs*. More than 80% of *Kampongs* have established a RW that was involved in waste collection activities. Among these RW, some regularly organised neighbourhood cleaning campaigns with the residents to keep their neighbourhood clean. In addition, it was identified that waste pickers were also visiting these communities periodically to collecting recyclable materials. In response to the question of whether people would support the introduction of an alternative waste management system, over half of the respondents stated their willingness to participate, especially women in the *Kampongs*<sup>6</sup>.

Considering the above findings Kitakyushu City, in consultation with the staff of Surabaya City, developed a new waste management system. The new system was based on the concept of the 3Rs and introduced a waste separation at the source into wet (organic) and dry (inorganic). The organic waste is then processed into compost using a household composter or a community level composting centre. Inorganic waste is given to waste pickers or managed domestically to be recycled. Information activities were organised to make residents aware of the new waste management system and the importance of maintaining good hygiene conditions.

#### **4. Piloted the New Solid Waste Management System in Kampong Rungkut Lor**

The new waste management system was first piloted in *Kampong Rungkut Lor*, a low-income neighbourhood located adjacent to the largest industrial area in the city. It was a typical low-income neighbourhood, with about 200 families living in small rented rooms and the issue of solid waste was often a cause of friction within the community. Since its establishment in 2000 Puskota, a local non-governmental organisation (NGO) at the University of Surabaya has been involved in improving the environmental conditions in the area. In 2004 KITA, under the financial assistance of the Japan Fund for Global Environment of the Environmental Restoration and Conservation Agency, started to work together with Puskota in improving the solid waste management system in the community<sup>7</sup>.

In the new system, people were educated to separate organic and non-organic household waste at the source, before putting the waste out for collection. The organic waste is then collected by Puskota twice a week. The collected waste is transported to the nearby composting centre, where it is processed using the open windrow method.<sup>8</sup> However, the programme faced typical constraints, such as a lack of community participation and the community's willingness to separate waste at the source, and the length of time (more than three months) required for this particular composting method to decompose the waste, which also produced a strong foul odour. The residents in the surrounding areas raised complaints and demanded that the composting programme cease immediately.

KITA provided technical assistance to Puskota to improve the situation by developing a composting technology called the Takakura Method, a simple composting method introduced by Koji Takakura of J-Power Group, JPec. Co, Ltd, after six months of trial and error, based on the traditional windrow composting method adopted at Puskota's composting centre. The Takakura Method introduces fermentative microorganisms as seed compost, which were originally cultured from local fermented foods, such as soy sauce, yoghurt, fruits and vegetable peels, rice bran and rice husks.<sup>9</sup>

Using the Takakura Method, Puskota's composting centre gradually started to produce good quality compost in large quantities within one or two weeks, rather than the three months required for the open windrow method. Puskota further worked with the team of experts from Kitakyushu City to modify the technology so that it could be applied at the household level. The new household composting method, later popularly known as the Takakura Home Method (THM), was designed in a simple way to treat organic waste at the household level. Each household is provided a THM kit, which includes a composting basket, rice chaff to be used as a filter, and fermentative microorganisms as seed composting. People were educated about the way to cut their kitchen waste into small pieces, and put them into the compost basket. In two to three weeks, the organic waste is converted into compost that is commonly used for fertilising household gardens. As a result of regular education and public campaigns, as well as the actual visible benefits observed on the ground, the mindset of community members was also changed, which led to increased participation in the programme, discouraged outside dumping, and resulted in greener and cleaner neighbourhoods<sup>10</sup>.

The Kitakyushu City provided further training opportunities to the officials of Surabaya City and Puskota to learn more about the benefits of waste separation, recycling at the source, and the management of recycling stations. After these trainings Puskota also started to establish a Waste Bank by collecting inorganic waste, and recyclables separately, thus encouraging further waste segregation at the source and linking an informal recycling business into the municipal waste management system.

## **5. Linking Pilot Experiences to Municipal Waste Management Policies and Practices in Surabaya City**

Surabaya City realised the benefits of the pilot project and scaled-up the new waste management system in partnership with other local NGOs and the members of the family welfare improvement association, Pendidikan Kesejahteraan Keluarga (PKK). Along with these local partners, a series of awareness raising seminars were conducted covering all 31 districts in the city targeting different sectors, students, communities, businessmen and institutions. Further, Surabaya City has established a system of environmental facilitators; selecting citizens who are interested and committed to participate in environmental protection and neighbourhood improvement. The facilitators are tasked with accelerating the awareness raising and community mobilisation activities and identifying and training the environmental carders. With one carder for every ten houses, they are trained to assist residents in their neighbourhoods to understand the new waste management system, the purpose of waste segregation, use of household composting, the importance of maintaining hygiene, and also the follow-up monitoring of household composting and troubleshooting.

In addition, Surabaya City has established the supportive mechanism for assisting RW, which have taken the initiatives to start their own community-based programmes, based on the new solid waste management system. The households with a general knowledge of the functions of using the THM compost bins were selected to receive free bins from the city. Further, Surabaya City allocated a budget for building composting centres, the provision of relevant tools such as trash cart, waste shredder etc., and the necessary training for establishing the community-based composting centres.

Since 2005, Surabaya city has organised a number of neighbourhoods competitions, including Cleanest District Award, Green and Clean Competition, and the Free from Waste Competition in partnership with private sector and civil society, such as Unilever *Peduli* Foundation (UPF), an NGO affiliated with Unilever Indonesia and several media partners (Jawa Pos, JTV (local TV), Suara Surabaya (local radio), Radar Surabaya (local newspaper) to motivate and strengthen community participation in the city's new waste management system, and encourage them to improve the neighbourhood environment. Further, Surabaya City gives an award to the best environmental carder at the national day awarding ceremony, recognising their volunteer efforts to improve the local neighbourhoods.

## **6. Key Achievements**

The results achieved by Surabaya city in the last five years since introducing the new solid waste management system are encouraging:

- The city has seen a significant reduction of waste to be transported to the final disposal site, as much as 30% (1,241 tons a day in 2010, compared with 1,819 tons a day in 2005)<sup>11</sup>.

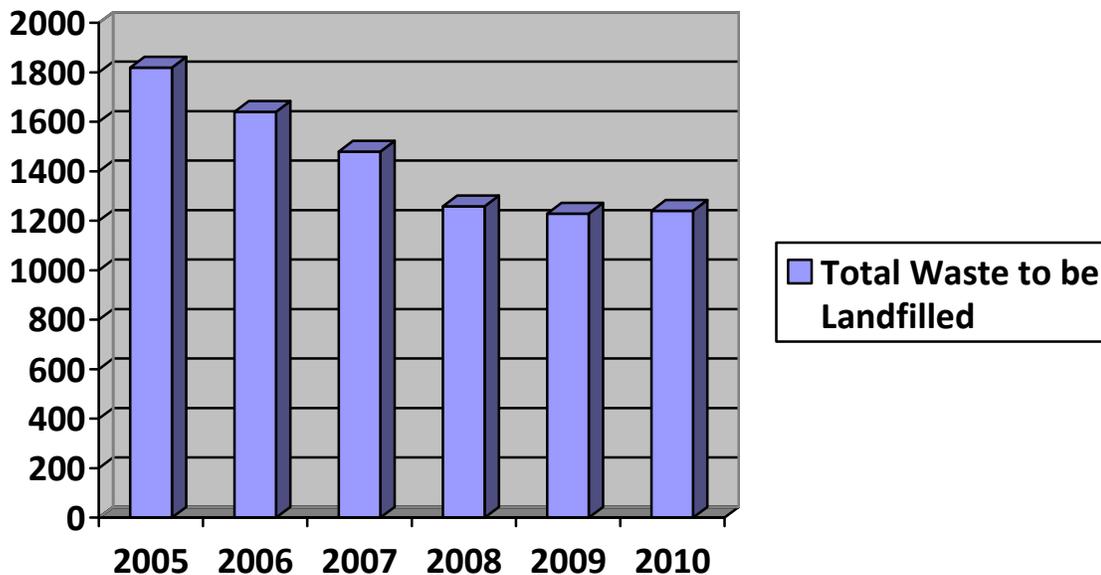


Figure 1: Reduction of Municipal Solid Waste to be Land filled. Source: Surabaya City, 2011

- 17,000 households in the city are actively involved in using the composting basket at household level, promoting home composting activities<sup>12</sup>. This has resulted in a higher community awareness of the environment and hygiene, improvement of the sanitary conditions in the household, and provided additional income earning opportunities for low-income families as they are able to sell their own compost (average price for composting is US\$ 0.07 per kg) as well as grow agricultural products to supplement their income.



Figure 2: Improvement of waste storage within the households. Photo: IGES

- At present, there are 16 composting centres in Surabaya City. According to the city staff, these composting centres have provided jobs for about 75 people, who is mostly coming from low-income families. Further, these composting centres produce about 7,000 tons of composting annually, which is used for parks and roadside trees. As a result, the extent of green spaces in housing areas and other urban spaces has increased by 10% during the last

five years. Further, some neighbourhoods have become renowned for their efforts in growing popular plants (Orchid Kampong, Adenium Kampong, Aloe Vera Kampong, etc.).

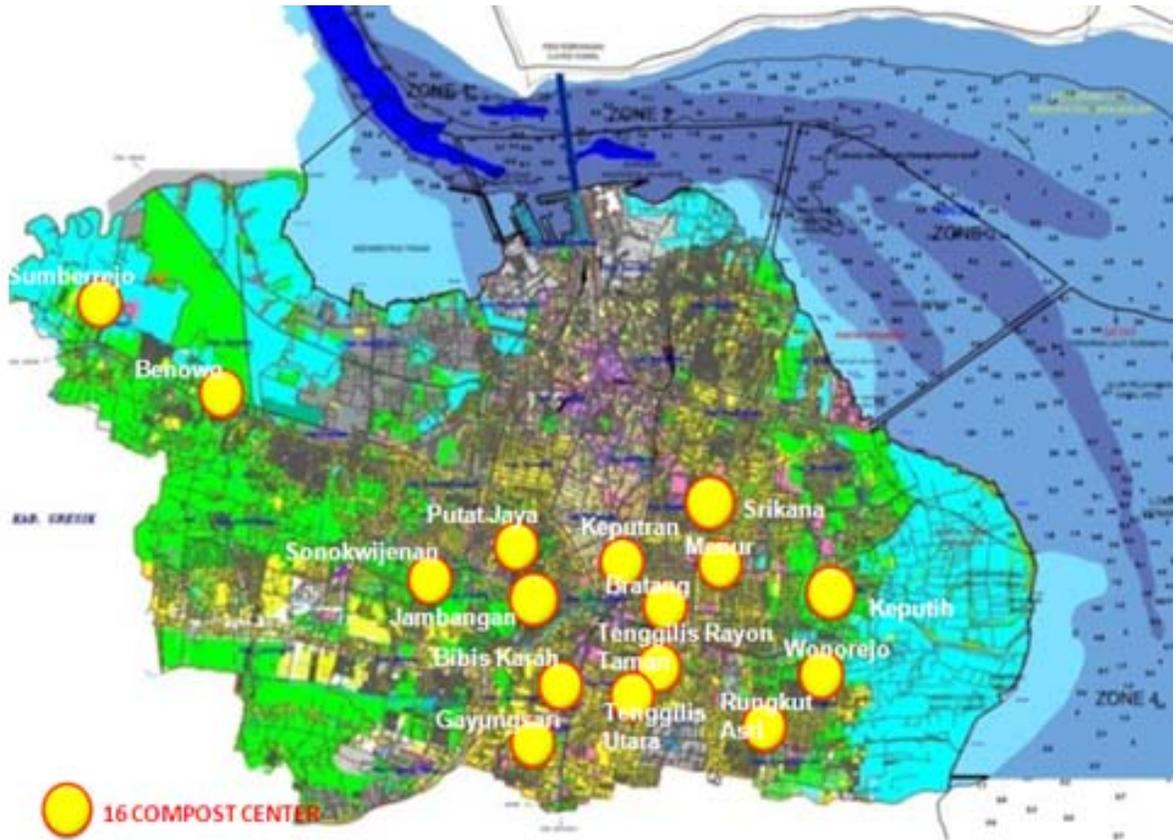
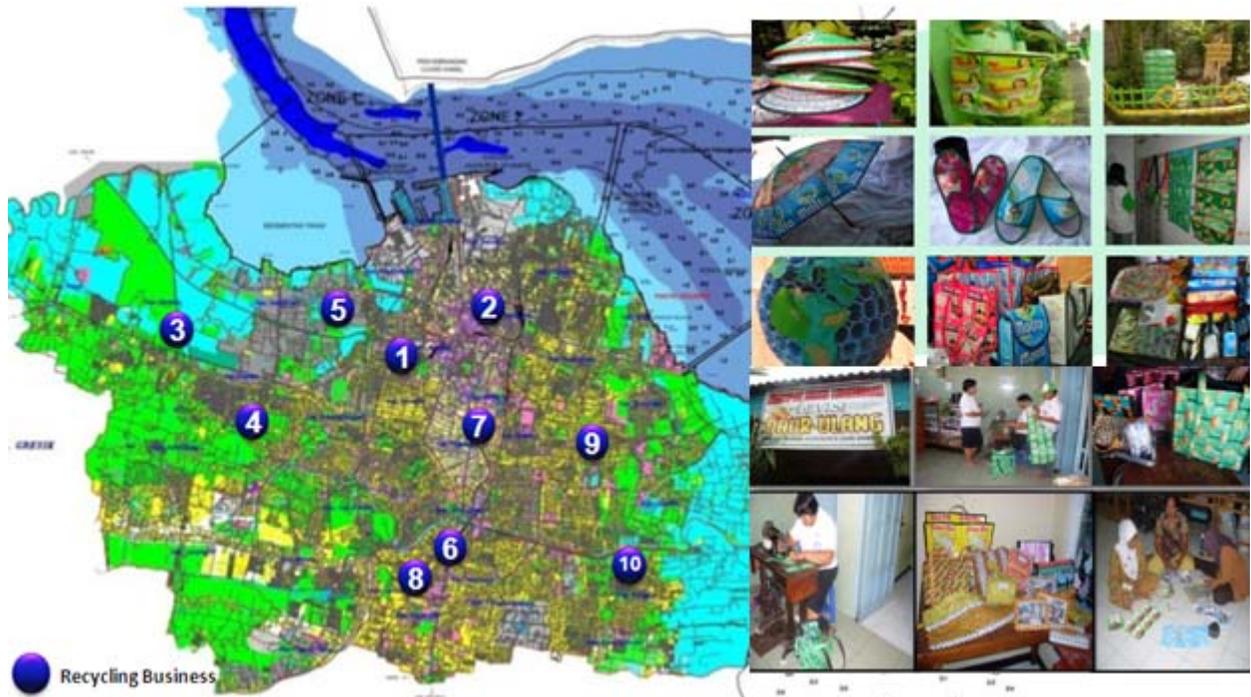


Figure 3: Location of composting centers in Surabaya City. Source: Surabaya City, 2011



Figure 4: Production of composting (upper). Neighborhoods became clean and green (below). Photo: IGES

- About 10 small-and-medium scale recycling businesses, a production of hand-made items, such as umbrellas, bags, purses, and lampshades etc., have been promoted by the UPF, creating new job opportunities for low-income people, motivating them to separate waste at the source and gain some extra income by selling recyclable waste.



**Figure 5: Location of recycling businesses and its activities. Surabaya City, 2011**

- Increased public awareness of segregation and reduction of waste at the source due to extensive socialisation programmes implemented by Surabaya City. At present, there are 400 environmental facilitators and 27,000 environmental carders actively involved in organising an education programme at neighbourhood level<sup>13</sup>. These community activities have resulted in building the social capital within communities and strengthening the active involvement of community members to keep neighbourhoods clean and green. It was identified that a number of neighbourhoods that would like to apply for the Green and Clean Surabaya award has increased from 300 in 2005 to 2,000 in 2010.



**Figure 6: Training and awareness rising at neighborhoods, Photo: IGES**



Figure 7: Award winning communities of the Green and Clean Surabaya. Photo: IGES

- In addition to the above benefits at the local level, this activity has also resulted in a number of global benefits, such as the reduction of greenhouse gases in landfills. According to UNFCC (2003), the baseline emissions in the absence of these composting activities in Surabaya City can be estimated as at 28,000 tCO<sub>2</sub>e for a ten year crediting period from 2010-2020. However, these composting centres are supposed to have project emissions, which should be calculated in understanding the net emission reductions.<sup>14</sup>
- The success of Surabaya’s community-based composting model has been brought to the attention of the national policy. Community-based composting was positioned as one of the key strategies in the National Solid Waste Management Law prepared by the Indonesian Government in 2008.
- Most of all, Surabaya City has regained its pride as an environmentally sustainable city. The city has become noticeably cleaner and greener, as acknowledged by many residents. Its achievements have been honoured through national and international awards, including the Adipura Award (Clean City Award) from the government of Indonesia for five consecutive years since 2005, the 2005 Energy Global Award (EGA) Austria, , 2007 Green Apple & Green Organization, London, urban environmental improvement from the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in 2007, 2008 UN-Habitat award for Best Practices in improving the living environment, and 2011 ASEAN Environmental sustainable City<sup>15</sup>.
- The success of the cooperation between the Kitakyushu City and Surabaya City in improving the solid waste management system resulted in the further strengthening of the international relationship between these two cities. As a result, Kitakyushu City and Surabaya City came to an understanding and signed the MOU in March 2011 at the 2<sup>nd</sup> High Level Seminar of the ASEAN ESC programme in Kitakyushu to expand further support for establishing low carbon and environmentally sustainable cities in Surabaya. Since signing, both cities have

worked together with their local partners to implement a number of other programmes to achieve the above set objectives.

- Waste water treatment was found to be the next major environmental challenge in the city of Surabaya, especially in *Kampongs*. Kitakyushu City started a new project in 2011 in partnership with KITA and IGES to establish a community-based wastewater treatment system under the Grassroots Fund of the JICA Kyushu International Centre. This project is will develop two model pilot systems, at community-level and market areas and examine the possibility for replication in other problem areas in the city.
- Kitakyushu City, KITA, and two other local companies TORAY and SKK (Suido Kiko Kaisha Ltd), started another project in Surabaya under the BOP Fund of the JICA, Kyushu International Centre in 2011. This project aims to study the applicability of the new technology developed by local companies in Kitakyushu to convert sea water into drinking water using solar power energy to run the machines. The pilot testing will be carried out in Surabaya City and will later be expanded to other isolated islands in Indonesia.
- Since April 2011, IGES and Kitakyushu City along with the private company NTT, provided their expertise to Surabaya City for the establishment of an institutional system to monitor greenhouse gas emissions in the city. The project is funded by the Ministry of Environment of Japan (MOEJ) and aims to build capacity in the relevant departments of Surabaya in the following key sectors: transport, energy, organic waste, water supply, waste water treatment, and green area management.
- Under the ASEAN ESC model cities programme of the Japan-ASEAN Integration Fund (JAIF), IGES has supported Surabaya City in the establishment of a pilot model waste bank project, with plans to disseminate its experience for further replication within the city.

## **7. Expansion the Surabaya's Experiences to other Cities in Asia**

The success of Surabaya City was documented by IGES in cooperation with KITA and Kitakyushu City. A series of seminars and workshops were organised in 2008-2009 under the Kitakyushu Initiative for a Clean Environment of the UNESCAP, sharing Surabaya's experiences with other cities in Asia<sup>16</sup>.

A workshop was organised in Surabaya City in August 2008 inviting more than 65 representatives from within Indonesia and some other cities of Asia and the Pacific Region. It presented the experience of Surabaya City and discussed its applicability in other cities in Indonesia. The participants noted that the replication of Surabaya's success within the country has already started through NGO networks, but an effective approach is still required to transfer relevant knowledge within Indonesia and outside the country. As a result, a proposal was submitted to JICA to start capacity building project on

community-based composting in five other cities, including Central Jakarta, Palembang, Makassar, Balikpapan, and Tarakan. Although this project has not yet materialised, proposed cities have taken voluntary efforts to improve the solid waste management system based on the Surabaya's experience.



Figure 8: Expansion of Surabaya's experience in other Asian Cities. Source: JICA/Kitakyushu City/KITA/IGES, 2011

- Another workshop was organised in March 2009 in Bangkok, Thailand including representatives from 22 cities of Thailand and several participants from Nepal. As a follow-up to this seminar, Bangkok, San Kamphaeng and Sriracha have started to apply the composting at household and community levels.
- A workshop that was organised in Bago, Philippines 28-29 May 2009, and was attended by 62 representatives from 25 cities in the Philippines. Attending cities such as Bago, Cebu, Talisay, and Puerto Princesa have started to apply composting to municipal solid waste management. To support these local initiatives, a community-based composting project was started in Cebu City in 2010 under the financial assistance of the Japan Fund for Global Environment Promotional Activity. This project aims to achieve the 10% waste reduction during a three year period.
- Two consecutive seminars were organised in Sibuyan and Kuala Lumpur, Malaysia in December 2009 attending 65 participants from 26 cities in Malaysia. As a follow-up, Kampar and Sibuyan cities started to apply composting at community level. In 2010,

Kitakyushu City has supported to Sibu city by dispatching experts to improve the solid waste management system, utilising the organic waste for making composting in households and markets.

- While many cities are now involved in adapting Surabaya's experiences to their local situations, Kitakyushu City has organised several networking seminars to provide an opportunity for these cities to meet each other, share best practices and lessons learned, discuss and find solutions to common challenges. A first workshop was organised in 2010 with the assistance of UNESCAP, aiming to facilitate dialogue between national and local governments in Indonesia to identify key challenges and opportunities in promoting composting in municipal solid waste management. A further workshop was organised in 2011 with the assistance of the JICA Kyushu International Centre inviting cities that are already involved in implementing the composting programme in Indonesia, Thailand, Malaysia and Philippines. The aims of this workshop were to discuss best practices and challenges, to develop networks between related sites and to identify the necessary materials for capacity development. As a result of this seminar, Kitakyushu City is now in the process of establishing a KitaQ System Composting Network in Asia.

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<sup>1</sup> This case study was compiled by the IGES, Kitakyushu Urban Centre based on the general information available in Kitakyushu City, KITA, IGES and Surabaya City. More information about this initiative can be obtained from the following reports, IGES (2010): *Composting for Waste Reduction: Information Kit*, Japan; Maeda, T et.al (2010): *Kitakyushu Initiative for a Clean Environment (Final Report)*, IGES, Japan; Maeda, T (2009): *Reducing Waste Through The Promotion of Composting and Active Involvement of Various Stakeholders: Replicating Surabaya's Solid Waste Management Model*, Policy Brief 9, IGES, Japan

<sup>2</sup> Silaban, T.A., *Solid Waste Management in Surabaya*, Paper presented at the Solid Waste Management Seminar, Kitakyushu, 19-20 September 2002.

<sup>3</sup> Premakumara, D.G.J, Abe, M and Maeda, T (2011): *Reducing Municipal Waste through promoting Integrated Sustainable Waste Management (ISWM) Practices in Surabaya City, Indonesia, Ecosystem and sustainable Development VIII, Ecology and the Environment*, Vol 144, WIT Press, UK, pp.457-468

<sup>4</sup> UN-Habitat (2008): *Best Practices: Green and Clean Initiative in Surabaya, Indonesia*. Accessed on 5 November 2011

<sup>5</sup> Silas J, *Waste Management Policies in Surabaya: An Integrated Sustainable Approach*, Accessed on 27 April 2010, [http://www.kitakyushu.iges.or.jp/successful\\_practices/solid\\_waste\\_management.html](http://www.kitakyushu.iges.or.jp/successful_practices/solid_waste_management.html)

<sup>6</sup> Silas J, *Waste Management Policies in Surabaya: An Integrated Sustainable Approach*, Accessed on 27 April 2010, [http://www.kitakyushu.iges.or.jp/successful\\_practices/solid\\_waste\\_management.html](http://www.kitakyushu.iges.or.jp/successful_practices/solid_waste_management.html)

<sup>7</sup> KITA (2007): *Separation at Source, Collection and Composting of Waste in Surabaya, Indonesia: Promoting the Reduction and Recycling of Waste*, Kitakyushu, Japan

<sup>8</sup> The windrow method is a traditional composting method used in many countries in which organic waste is placed in a pile of about one meter in height, sometimes after shredding and mixing with soils or other materials, and is left to decay naturally for a few months. It is simple, requires less capital, uses less energy, and generally relies more on land and labour and less on machinery.

<sup>9</sup> For more information about the Takakura Compost Method, please refer to "Waste Reduction Programme through the Promotion of Organic Waste Composting by KitaQ System: Information Kit," [http://www.kitakyushu.iges.or.jp/publication/Takakura/Takakura\\_Method\\_Full.pdf](http://www.kitakyushu.iges.or.jp/publication/Takakura/Takakura_Method_Full.pdf).

<sup>10</sup> Premakumara, D.G.J and Maeda, T (2011): *Linking Community-based Composting into Municipal Waste Management Policies in Surabaya: Lessons Learned*, HELP-O Newsletter, Vol1, Galle, pp.7-12

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<sup>11</sup> Surabaya City (2011): Community-Based Solid Waste Management as Best Practice in Surabaya City, a presentation made at the 2<sup>nd</sup> High Level Seminar on Environmentally Sustainable Cities, 15-16 March 2011, Kitakyushu, Japan

<sup>12</sup> Surabaya City (2011): Community-Based Solid Waste Management as Best Practice in Surabaya City, a presentation made at the a Networking Seminar on KitaQ System Composting in Asia, 29-01 July 2011, Kitakyushu

<sup>13</sup> Surabaya City (2011): Community-Based Solid Waste Management as Best Practice in Surabaya City, a presentation made at the 2<sup>nd</sup> High Level Seminar on Environmentally Sustainable Cities, 15-16 March 2011, Kitakyushu, Japan

<sup>14</sup> Yenneti, K (2011): Potential of Carbon Finance as an Opportunity for Decentralised Composting in Developing Cities in Asia and Premakumara, D.G.J (2011): Decentralised Composting in Municipal Solid Waste Management: Lessons Learned from Surabaya City, Indonesia, a presentation made at the Workshop on Capacity Building on Accounting and Utilising GHG Emission Reduction Measures for Local Waste Management Actors in Developing Asian Countries, 29-31 August 2011, Battambang, Cambodia

<sup>15</sup> Surabaya City (2011): Community-Based Solid Waste Management as Best Practice in Surabaya City, a presentation made at the a Networking Seminar on KitaQ System Composting in Asia, 29-01 July 2011, Kitakyushu

<sup>16</sup> More information can be found from the website of the Kitakyushu Initiative for a Clean Environment: <http://kitakyushu.iges.or.jp>