

**DESIGNS FOR SUCCESS:
BEST PRACTICES
IN LOCAL WASTE
MANAGEMENT**

EDITED BY BENEDIKT SEEMANN,
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AND RONNA MAE VILLANUEVA



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Konrad
Adenauer
Stiftung

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MESSAGE FROM THE KAS COUNTRY REPRESENTATIVE

In the fields of economic and political integration in Southeast Asia local governance is often neglected. That is one of the reasons why Konrad-Adenauer-Stiftung (KAS) and UCLG ASPAC have partnered to start DELGOSEA in 2010. The underlying philosophy is a bottom-up approach. We believe that subsidiarity in all processes is crucial to effective governance and successful participation in public and political affairs.

The level on which civic participation can be observed best is the local level. Even though the political systems of the ASEAN member states vary, there is one thing all states have in common: People experience government and governance almost exclusively on their municipal level. It's in their cities, provinces and municipalities where they can see if governance works for them – or if it fails. One thing that is crucial for the well-being of local governments is the issue of waste management. Although the topic might seem less appealing for some political analysts, efficiency in waste management actually decides whether people suffocate under the load of their own waste or whether it can be dealt with.

This publication is meant to provide an exchange of waste management practices in a Southeast Asian context. It brings together different experiences from different places of the world to show how important issues of waste management can be dealt with. "Designs for Success: Best Practices in Local Waste Management" is not only for local government officials but also for civil society, experts and analysts who care about lasting solutions in this field. It is our hope that successful waste management can make our cities and municipalities more attractive, greener and sustainable.


Benedikt Seemann

Country Director

Konrad-Adenauer-Stiftung Philippines Office

FOREWORD

The inevitability of climate change calls for collective action to ensure preservation of a healthy environment for future generations. The partnership for Democratic Local Governance in Southeast Asia (DELGOSEA) contributes to various global initiatives towards this common goal.

DELGOSEA was created in March of 2010. This was a project co-funded by the European Commission and the Konrad-Adenauer  Stiftung of Germany through the German Ministry for Development Cooperation. The objective was to create a network that would encourage exchange of success stories. The vision was to encourage replication of good practices throughout the Southeast Asian Region. This was met with eagerness from representatives of member organizations such as local government officials, non-government organizations and members of the academe. The informal gatherings provided a venue for organizations closest to the people to gather and discuss various concerns. Through years of constant communication and strengthening relationships came a realization that similar challenges were faced. Many in the region have encountered them and were ready to share the solutions that they applied in order to resolve their problems.

More than 6 years have passed and the network continuous to grow with the support of Konrad Adenauer Stiftung. The partnerships forged through the years have continued to prove its relevance to date. It is the intention of the DELGOSEA network to create a knowledge bank that member organizations can draw from to help provide solutions to communities in neighboring countries. The network filled a gap that some local government units felt in their search for assistance to provide adequate services to their constituencies. Good citizenship was manifested by concerned NGOs and academicians as they contributed to matters being discussed during workshops.

Last August 02-03, 2016, the DELGOSEA came together once again in Siem Reap, Cambodia to discuss successful practices in waste management. This is our network's share to global initiatives to address the growing concerns of protecting the environment amidst an uncontrollable growth in population in the region.

This brochure is a compilation of the various presentations made during the recently concluded Waste Management Conference in Cambodia and additional researches on Solid Waste Management in Southeast Asia. The program provided a venue for the West to share with the East and vice versa.

The Association of Southeast Asian Nations (ASEAN) held its 28th and 29th Summit at the National Convention Centre (NCC) in Vientiane, Lao PDR last 06-08 September 2016 with a theme of "Turning Vision into Reality for a Dynamic ASEAN Community". The Summit was attended by heads of State from Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Viet Nam.

The different Heads of States of the ASEAN member nations have reiterated their firm commitment to support a common vision that we share. It is DELGOSEA's intention to reinforce this vision by propagating good governance actively through people's participation, consultation, transparency and constant sharing of good governance practices among the local communities in the ASEAN region. Let these stories be part of the valuable stock of resources that continue to enrich the DELGOSEA Bank of Knowledge and Good Practices.

Marisa Lerias

DELGOSEA Network Coordinator

ABOUT DELGOSEA

"Life in the DELGOSEA family means reflection, adaptation and development, reaching beyond individual cultures and backgrounds. We are diverse, but united in our aims and visions". - Susanne Stephan

The basic idea of DELGOSEA is to create a network for the replication of success stories in local governance between cities and municipalities within Southeast Asia. The network is composed of Local Government Associations (LGAs), local authorities, non-government organizations and academic institutions from Philippines, Indonesia, Vietnam, Thailand, Cambodia, Myanmar and Laos.

The network concentrated on the following four thematic areas while selecting best practice examples from the 7 countries:

- people's participation in planning and decision-making;
- institutional governance;
- urban environment;
- fiscal management and investment promotion strategies.

At the heart of this original project – or 'first phase' of the DELGOSEA network – was the exchange of best practices on good local governance across five Southeast Asian countries: 16 best practices of good governance were selected and offered for replication in 16 pilot cities in the five partner countries. Both the best practices and the experiences of the pilot cities during the replication have been extensively documented. These documentations, together with a variety of training materials are available from the website: <http://delgosea.eu/cms/Downloads>.

At that time, DELGOSEA was a network of cities from five countries – Cambodia, Indonesia, the Philippines, Thailand and Vietnam – supported by local government associations (LGAs) and various other stakeholders from government, civil society, academia and media.

Since 2013, in its 'second phase' the network has started to expand to more ASEAN countries, aiming to have members from all 10 countries. The DELGOSEA remit has also expanded: the network is working on gaining accreditation to ASEAN and in that way influence ASEAN decision-making on local governance. The DELGOSEA Network Council has been set up as a steering instrument for the network, representing it in negotiations with ASEAN and other bodies.

On the national level, DELGOSEA members organize themselves through the National Steering Councils. Each National Steering Council consists of representatives from Local Government Associations (representing municipalities/cities), Civil Society, Academia/Media and national governments. These Steering Councils develop national workplans, focusing on capacity building, advocacy and good practice exchange; they also choose the representatives for the Network Council.

Of course, the exchange of good practices, of information and knowledge remains a strong feature of DELGOSEA and all members are encouraged to make good practices from their countries available via the network's website and social media.

A PRIMER ON THE CHALLENGES OF SOLID WASTE MANAGEMENT IN SOUTHEAST ASIA

Ronna Mae A. Villanueva

"We have a responsibility to look after our planet. It is our only home." - The Dalai Lama

Waste Management is a growing concern each local government unit in Southeast Asia has to address. The continuing industrialization and rise in the population in Asia and the Pacific region has contributed to a waste crisis caused by rising quantities of waste and aggravated by poor government regulation and waste management practices. According to the United Nations Environment Programme (UNEP), a 1999 World Bank report predicted that the total volume of municipal solid waste alone that is generated in Asia and the Pacific will more than double by year 2025, greatly surpassing capacities of existing waste treatment facilities. The complexities and enormity of the challenges become evident when we consider other waste types to be managed. These include municipal solid waste, industrial solid waste, hazardous waste, municipal wastewater, industrial wastewater, and storm water.



The core of the problems of solid waste management is the absence of adequate policies, enabling legislation, and environmentally concerned citizens. This waste crisis overwhelms the resources and capacity of local governments and communities; however, it is also a significant and largely untapped opportunity for transformative change. As we envision the future, a sustainable waste management program with a viable system for collection and waste prevention approach should be the primary goal of the Southeast Asian nations.

This primer offers an overview of the existing condition in Southeast Asian nations in terms of waste generation, processing, policies and management challenges.

Defining Solid Waste Management

Solid-waste management may be defined as the discipline associated with controlling the generation, storage, collection, transfer and transport, processing, and disposal of solid waste in a manner that is in accordance with the best principles of health, economics, engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes. In its scope, solid-waste management includes all administrative, financial, legal, planning, and engineering functions involved in the solutions to all problems of solid waste. The solutions may involve complex interdisciplinary fields such as political science, city and regional planning, geography, economics, public health, sociology, demography, communications, and conservation, as well engineering and materials science. (Asian Productivity Organization, 2007).

Categorizing Waste Generation

The rate of waste generation in the Southeast Asian Nations is alarming, imposing a challenge to each government concerning environmental threat and pollution in the recent years. Based on a study conducted by UNEP, the most fundamental step in waste management is quantifying and qualifying the different types of waste being generated. It is important to have a system for the collection and analysis of basic information about wastes.

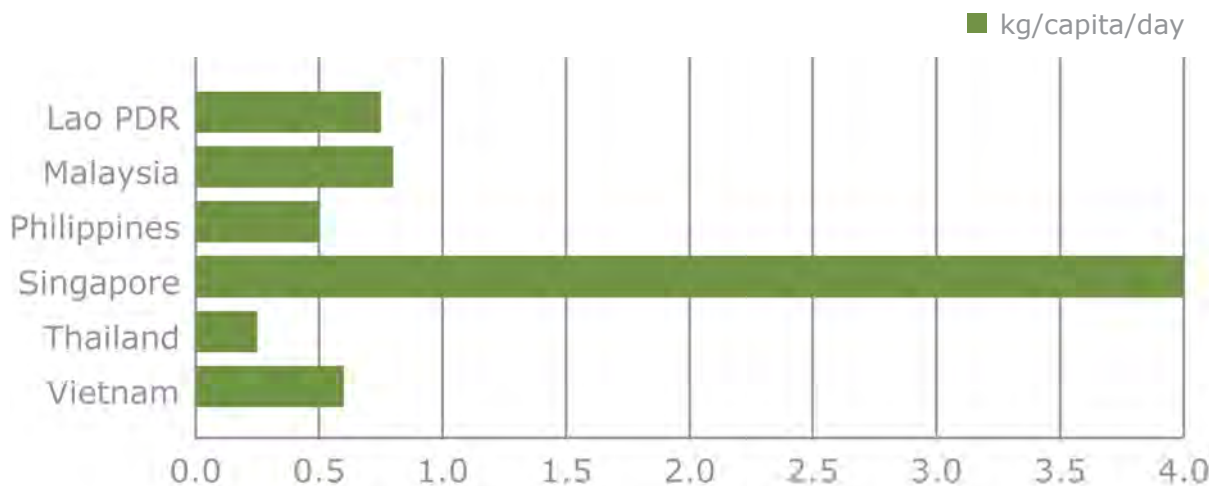
What should we consider important to achieve this stage? UNEP cites the following: sources of wastes, the quantities of waste generated, their composition and characteristics, the seasonal variations and future trends of

generation. All these aspects form the basic composition of suitable waste management strategies. In fact, data collection and management should be an on-going exercise for monitoring purposes and to enable future and long-term planning and decision-making.

There is a marked range of waste generation per capita among the ASEAN countries. Malaysia (population of 22 million) generated an estimated 5,475,000 tons of solid waste. This is about 0.68 kg per capita/day in 2001. This was comparable to Singapore's 5,035,415 tons of waste in the same year. However, Singapore's per capita waste generation is much bigger because it has a population of only 4,452,700. Vietnam generates about 49,134,000 tons per year (about 0.61 kg/capita/day). In the Philippines, waste generation is an average of 36,172.50 tons per year, i.e. 0.50 kg/capita/day (in urban areas) and 0.30 kg/capita/day (in rural areas). In Lao PDR average urban waste production is 0.75 kg per capita per day. The quantity of waste produced by Thailand in 2001 was 14.1 million tons or 38,640 tons per day (about 0.23 kg/capita/day), an increase of about 470 tons per day compared to year 2000 (Tan, 2001).

Figure 1 gives the rates of waste generation for these ASEAN countries in 2001.

Figure 1: Waste Generation in Selected ASEAN Countries (2001)



Source: United Nations Environment Programme, *State of Waste Management in Southeast Asia* (2001)

A. *Municipal Solid Waste*

Municipal Solid Waste (MSW) can be defined using Chapter 21.3 of Agenda 21 (United Nations Conference on Environment and Development, Rio de Janeiro, June 14, 1992 Chapter 21 "Environmentally Sound Management of Solid Wastes and Sewage-related Issues": "Solid wastes...include all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris. In some countries the solid wastes management system also handles human wastes such as night-soil, ashes from incinerators, septic tank sludge and sludge from sewage treatment plants. If these wastes manifest hazardous characteristics they should be treated as hazardous wastes."

MSW is thus seen as primarily coming from households but also includes wastes from offices, hotels, shopping complexes/shops, schools, institutions, and from municipal services such as street cleaning and maintenance of recreational areas. The major types of MSW are food wastes, paper, plastic, rags, metal and glass, with some hazardous household wastes such as electric light bulbs, batteries, discarded medicines and automotive parts.

B. *Industrial Solid Waste*

Industrial solid waste is the non-toxic or non-hazardous waste generated by various industries. In many ASEAN countries, it has been included as part of municipal solid waste. As a result, there is an absence of a systematic database on industrial solid waste and the exact rates of industrial waste generation are not known. The lack of information on industrial solid waste is lamentable because it can actually include a wide range of materials that may have different levels of impact on the environment.



The types of industrial solid waste would include packaging materials, paper, housekeeping wastes, food wastes, scrap materials such as glass and ceramics, resins, plastics, metal and plastic scraps, stones, cloth, rubber, straw, wood waste, products which are off-specification and a variety of materials not officially specified as or are known to be hazardous/toxic.

C. *Hazardous Waste*

There is no precise definition for hazardous waste due to the differences in its classification in the Southeast Asian countries. Nonetheless, most hazardous wastes are recognized as coming from industrial, agricultural and manufacturing processes, as well as from hospital and health-care facilities. The high volume generators are the chemical, petrochemical, petroleum, metals, wood treatment, pulp & paper, leather, textiles and energy production industries.

D. *Municipal Wastewater*

Municipal wastewater depends on the supply and demand for water generated. The required volume produced in developing countries is about 160 to 200 liters/person/day, while for developed countries it can be as high as 250 to 300 liters/person/day. It is estimated that 60 percent of the total population of developing countries have access to water supply, 90 percent of which is in urban areas.

E. *Industrial Wastewater*

Industrial wastewater originate mostly from agro-based industries, including animal farms, and the manufacturing industries. In many of the ASEAN countries, this industrial wastewater may include domestic sewage.

F. *Storm Water*

Storm water quantities are generally estimated from the precipitation-evaporation rates of each country. ASEAN countries lie in the tropics and generally experience high rainfall compared with other regions in the world. However, there can be wide variations depending on location.

Contemporary Waste Processing

The collection and transportation of waste are the main factors that contribute to the high cost for solid waste management. This is usually under the responsibilities of the public sector, however, there is a current trend for contracting or privatization as practiced in Singapore, Malaysia, Thailand, Philippines and Indonesia. Collection and transport are labor intensive as well as capital intensive. All medium and large cities would have administrative structures for providing collection services, usually by using containers and communal bins or door to door services. According to UNEP, Singapore has a collection rate of more than 90 percent while in Bangkok, Jakarta and Kuala Lumpur the rate is more than 80 percent. In Indonesia, collection rates have been improved through a pre-collection system at villages, which deposit their MSW at transfer or temporary storage facilities. Unfortunately, collection services are not extended to the poor and informal settlements which do not pay or are inaccessible.

Now, let us take a look on the types of waste treatment for the six categorized waste generation:

First, municipal solid waste management practices in the ASEAN region include recycling, composting, incineration and landfilling. An overview of the disposal methods applied by selected ASEAN countries for municipal solid waste is given in Figure 2. The most dominant method is open dumping.

Figure 2: Disposal Methods for Municipal Solid Waste in Selected ASEAN Countries

Country	Disposal Methods (%)				
	Composting	Open dumping	Landfilling	Incineration	Others
Indonesia	15	60	10	2	13
Malaysia	10	50	30	5	5
Myanmar	5	80	10	-	5
Philippines	10	75	10	-	5
Singapore	-	-	30 *(10 in 2002)	70 *(90 in 2002)	-
Thailand	10 **(0 in 2001)	65 **(67 in 2001)	5 **(32 in 2001)	5 **(1 in 2001)	15 **(0 in 2001)
Vietnam	10	70	-	-	20

Source: ENV 1997

*Communication with National Environment Agency officials

**Draft Annual Report, The State of Pollution, Thailand B. E.2544 (2001), Pollution Control Department 2002

Second, most of the ASEAN countries handle and treat industrial solid waste together with municipal solid waste. This means that the same methods are used, which would comprise of open dumping, landfilling, and incineration. However, in those countries where there are few waste management facilities, the industrial solid wastes are often dumped on private land, or buried within or close to the premises of the industrial facility where they have been generated.

Third, the most acceptable method of disposal for hazardous wastes is through the use of sanitary landfills as practiced in Malaysia. Although hazardous waste incinerators have been developed in Singapore, Malaysia and Thailand. In the case of the Philippines, one facility for treatment of metal finishing wastewater available on Cebu Island and an incineration plant for medical wastes is found in Laguna. In the rest of the countries in the ASEAN region there is usually co-disposal of hazardous waste with municipal solid waste in open dumps, including, perhaps, storage of toxic wastes in sealed containers.

Fourth, municipal wastewater is processed by a sewer and a drainage system in more developed cities. Wastewater from homes run through lateral pipes that are connected to the main sewer, which leads to the trunk sewer. From the trunk sewer, wastewater is channeled into treatment facilities before final discharge. However, more often than not, the existing systems are in poor condition due to lack of maintenance, poor design and construction, as well as insufficient capacity.

Fifth, industrial wastewater in ASEAN countries include oil interceptors, balancing/equalization tanks and other biological and chemical filtration systems.

Sixth, storm water in most Southeast Asian countries is discharged into the nearest water course and not into the sanitation systems that are usually designed to receive runoff generated by tropical thunderstorms. In the less urbanized areas, storm water is allowed to seep into the ground and also discharged into the nearest watercourse.

Policies and Strategies

In the ASEAN countries, various regulations and standards have been introduced for waste management. Many have sewer-related laws, which cover wastewater quality regulations for sewerage systems. Town or City planning Acts and water pollution control laws are normally related to such sewerage acts. Examples of acts/laws relating to waste management include those stated in Figure 3:

Figure 3: A Summary of Waste Management Policies and Strategies in the ASEAN Countries

Country	Waste Management Policies and Strategies
Brunei Darussalam	<ul style="list-style-type: none"> ▪ National Development Plans and National Environment Strategy for broad policy statements on waste management ▪ Administrative procedure manuals and guidelines for waste handling and disposal ▪ Sectoral legislation - Penal Code, Minor Offences Act, Land Code, Water Supply Act, Petroleum Mining Act, Forestry Act, Fisheries Act, Miscellaneous Licensing Act and Municipal Boards Act
Cambodia	<ul style="list-style-type: none"> ▪ Law on Environmental Protection and Natural resources management ▪ Sub-Decree on Solid Waste Management ▪ Sub-Decree on Water Pollution Control
Indonesia	<ul style="list-style-type: none"> ▪ Environment Management Act Number 23, 1997 ▪ Government Regulation Number 82, 2001 (Water Quality Management and Wastewater Controlling ▪ Local Government Regulation – each district ▪ Government Regulation Number 18, 1999 juncto Government Regulation Number 85, 1999 about Hazardous Waste Management ▪ Presidential Decree Number 61, 1993 about Basel Convention Ratification on the Control of Trans-Boundary Movement of Hazardous Waste and Their Disposal ▪ Number Kep-01 to Kep-05/BAPEDAL/09/1995 Various procedures and requirements for hazardous and toxic wastes ▪ Number Kep-68/BAPEDAL/05/1994 on procedures for license for hazardous waste storage, collection, operations of treatment equipment, treatment and final disposal
Lao PDR	<ul style="list-style-type: none"> ▪ Ministry of Industry and Handicraft Decree on Industry Management, 1992 ▪ Ministry of Industry and Handicraft Decree on Discharges and Emissions, 1994 ▪ Environmental Action Plan 1993, revised 1995 ▪ Environmental Protection Law
Malaysia	<ul style="list-style-type: none"> ▪ Environmental Quality Act 1974, and its subsidiary legislation thereunder ▪ Local Government Act 1976 ▪ Street, Drainage and Building Act 1974 ▪ Drainage Works Ordinance 1954 (Revised 1988) ▪ Urban Storm water Management Manual for Malaysia 2000
Myanmar	<ul style="list-style-type: none"> ▪ Pollution Control and Cleansing Rule ▪ The Protection of Environment Directive ▪ The Municipal Act ▪ The City of Yangon Municipal Act ▪ The Union of Myanmar Public Health Act ▪ Mandalay City Development Committee regulation
Philippines	<ul style="list-style-type: none"> ▪ Integrated Environmental Protection and Natural Resources Management Policy 25 ▪ Presidential Decree 1586 The Environmental Impact Statement (EIS) System ▪ Presidential Decree 984 Pollution Control Law, 1978: Water Quality Management Program ▪ Clean Air Act 1999 (RA 8749) ▪ Solid Waste Management Act (RA 9003), Ecological Solid Waste Management Act of 2000 ▪ Toxic Chemicals and Hazardous Waste Management (RA 6969) ▪ The Philippine Agenda 21
Singapore	<ul style="list-style-type: none"> ▪ Environmental Public Health Act: Environmental Public Health (General Waste Collection) Regulations - under the National Environment Agency <ul style="list-style-type: none"> □ Environmental Public Health Toxic Industrial Waste) Regulations ▪ Sewerage and Drainage Act and associated subsidiary legislation - under the Public Utilities Board ▪ Environmental Pollution Control Act and its Regulations - under the National Environment Agency ▪ Hazardous Waste (Control of Export, Import and Transit) Act <ul style="list-style-type: none"> □ Hazardous Waste (Control of Export, Import and Transit) Regulations
Thailand	<ul style="list-style-type: none"> ▪ Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 <ul style="list-style-type: none"> □ Water Quality Standards □ Solid Waste, Night soil and Hazardous Waste Management □ Toxic Substance Legislation
Vietnam	<ul style="list-style-type: none"> ▪ National Conservation Strategy 1988 ▪ Law on Environmental Protection 1994 <ul style="list-style-type: none"> □ Directive on Urgent Measures on Solid Waste Management in Urban & Industrial Areas, 1997 □ Decision on Hazardous Waste Management 1999 ▪ National Plan for Environment & Sustainable Development 1999

Source: United Nations Environment Programme, State of Waste Management in Southeast Asia (2001)



While statements on sanitation are usually very positive in long-term plans and development strategies, generally, waste management as a priority is not as high as other development priorities. Budgets for waste management are generally low.

Facing the Challenges of Waste Management

There are three major challenges to be considered in the area of waste management: the political challenge, the technology challenge and the challenge of perception and education (Visvanathan and Trankler, 2003). First, the inefficiency of governments to address issues as such has been a common ground for most developing Asian countries. A good example for this is Malaysia, wherein solid waste management laws have been debated on but is barely on its way for implementation. Second, technological advances vary from one country to another. The incorporation of waste management policies and waste disposal technologies may not always be applicable. A certain country can only develop a sustainable waste management approach based on its economic situation and waste composition. Lastly, the success of waste management depends on the perception of the people and how they give value to it. Waste is part of life and should not be viewed as a problem that ceases to be once it has been removed. In Asia, lack of environmental ethics and awareness contribute to the failure of solid waste management plans. Education and instilling awareness on environmental issues will go a long way. Social media has a big impact to our young generation and with proper teaching and fostering of environmental-consciousness, we have a chance to improve the present day situation of waste management.

In summary, Figure 4 provides an overview of the general waste management status in the ASEAN countries, which is reflected in terms of availability of formal policies, institutional and regulatory frameworks, budget support, training programs, participation from the private sector and the communities, and information system for waste management.

Figure 4: A Summary of Waste Management Status in the ASEAN Countries


Waste Management Aspect	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam
1. Policy on Integrated Waste Management	NA	NA	NA	NA	NA	NA	NA	A	NA	NA
2. Policy on Solid Waste Management	NA	NA	NA	NA	NA	NA	A	A	A	NA
3. Institutional arrangement to handle/manage wastes	A	A	A	NA	A	A	A	A	A	A
4. Regulatory framework for waste management	NA	NA	A	NA	A	NA	A	A	A	A
5. Budget support for waste management	A	NA	NA	NA	A	NA	A	A	A	A
6. Training program for waste management	NA	NA	NA	NA	NA	NA	NA	A	NA	NA
7. Private sector participation	NA	NA	NA	NA	A	NA	A	A	A	NA
8. Community participation	NA	NA	A	NA	NA	NA	A	NA	A	A
9. Information System	NA	NA	NA	NA	NA	NA	NA	A	NA	NA

Note: A means Available; NA means Not Available

Source: United Nations Environment Programme, *State of Waste Management in Southeast Asia*, 2001

Conclusion

Waste management is a major challenge in Southeast Asian countries. Waste generation and management topped by a growing population in these nations have been an emerging concern. The quantity of waste generated have increased tremendously in the last decade, mainly due to the improvement of living standards, rapid economic growth, and industrialization in the cities. There is diversity in the types of waste and its generation in the different countries depending on their urbanization and development.

It is apparent that these countries have put in a great deal of effort toward handling the waste problems they encounter. Nevertheless, a lack of awareness, technical knowledge, legislation, policies, and strategies are major issues for waste management. The regional governments have to strengthen their efforts to control the rapid growth rate of waste generation and to allocate adequate resources for waste management. Measures to enhanced reduction, recycling, reuse, and recovery should immediately be taken into realization. Governments may also have to enhance the appropriate legislation to promote these measures with financial incentives. More  an improvement in precise data collection has to take place in order to achieve sustainable waste management.

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THE DELGOSEA EXCHANGE: IDEAS TOWARDS THE ROAD TO A SUSTAINABLE LOCAL WASTE MANAGEMENT IN THE SOUTHEAST ASIAN REGION

Ronna Mae A. Villanueva



On 03 August 2017, the Partnership of Democratic Local Governance in Southeast Asia (DELGOSEA) together with local and foreign experts convened in Siem Reap, Cambodia for a symposium on local waste management. The primary objective of the workshop entitled, "Designs for Success: Best Practices in Local Waste Management", was to take a closer look into the issue of waste management and be able to share the good practices with one another. The event reached a number of around 70 guests comprising of the DELGOSEA network members, partner organizations, international experts and high-ranking officials from the Cambodian local governments.

The workshop began with keynote speaker, Mr. Rowan Fraser, project consultant with the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). He provided an overview of waste crisis in the Asian and Pacific Region from the international perspective. The urban population in Asia is rising dramatically and is forecast to hit 250 million by 2030. In addition, incomes in Asia are rising rapidly, all this translates into higher consumption and more waste generation. Instead of letting the rubbish pile up in landfills or burn it, UNESCAP is encouraging local governments to view garbage as a resource and implement innovative ideas of recycling and reusing waste, both to generate income, but also to turn it into alternative energy and compost. Fraser outlined both the many advantages of such recycling schemes, but also reported on the challenges, such as the difficulties to making them financially viable and the need to encourage ownership by the local community, as well as suggesting ways of overcoming these difficulties.

The keynote was then followed by a presentation by Mr. Min Muny, an independent consultant working with the local government association NLC/S. He presented the results of a survey of municipalities in Cambodia where the responsibility for waste management has recently been decentralized to the local level. The results show clearly that there are fundamental, inadequate and inappropriate legal framework, and ineffective enforcement of legal instruments as well as inefficient human and financial resources. While some of the municipalities have tried to be pro-active in implementing the new regulation quickly, it became apparent that many provincial administrations were unsure on how to proceed.

Having had the background on the issue of waste management from the previous speakers, the symposium become more specific and practice-oriented. Three best practices for waste management models were described in more detail. The first was presented by Mr. Galih Adhi Pramono, Programme Associate of UCLG- ASPAC. He explained the strategies UCLG ASPAC had devised to assist Indonesian cities in their waste management efforts. Secondly, Ms. Gloria Buenaventura, Head of the City Environment Management Office of Marikina City, Philippines, outlined the successful recycling and waste segregation process in her city. Lastly, Mr. Michael Dahm, Regional Director of the German Rhein-Sieg-Abfallwirtschaftsgesellschaft, showcased the German approach on waste segregation.

The final session saw the participants split into three groups to discuss waste management models from their region, explore the question of public-private partnerships as part of the model and to showcase good practices from their own experience to the plenary.

A complete discussion of the individual speakers will further be discussed in this publication.



Opening Remarks by H.E. Leng Vy, the Undersecretary for Ministry, Cambodia



The members' discussion during the waste management workshop




The members' discussion during the waste management workshop

DELGOSEA NETWORK LEARNING: LAO PARTNERS' VISIT TO THAILAND

Fulvia Lie

Improperly managed household refuse will give rise to several problems resulting to negative pressures on people's life including health, safety, and economy. Local government has put some endeavors to design a simple waste management which was found working in several areas.

Currently, there are not many Lao municipalities have been working on waste management especially with community participation. Most of the waste management in Laos is responsible by national government and private companies. They come and collect the wastes and garbage from communities once a week and each household pay for their wastes. The wastes are dumped at the fields for drying and burning and it effected to the environment and people who live near to the dumping fields. The waste management is important, but through capacity process the waste management in Laos still limited on visible process of well management recycling etc. They just have done from experience and that's make them have less motivation sometime. 




Hazardous Waste Bin (light bulbs, batteries, electronic devices)

UCLG-ASPAC (United Cities and Local Governments Asia Pacific) realized the importance to provide eye opening opportunities for our Lao partners through a study tour for exchange experience with municipalities in Thailand where good practices and reputation on Solid Waste Management are namely; Nongsamrong Municipality in Udonthani province, Sakholnakhon municipality in Sakolnakhon province, and Khonkaen Municipality in Khonkaen Province, in order to learn on community-based solid waste management and exchanging culture among both neighbor. Therefore, all those municipalities are located on Northeastern region of Thailand and their local dialogues are similar with Lao PDR. Therefore, it will be the enormous good role models and lesson learnt for Lao partners to learn easily from their success on good governance as bottoms up. The study tour has been made possible last October 11-14, 2016 in collaboration of DELGOSEA (Partnership for Democratic Local Governance in Southeast-Asia) Network, Learning for Development Association (LDA) in Lao and National Municipal League of Thailand (NMLT). 



Plastic Bottle Trash Bin for Recycle

The main objectives and proposed methodologies of the study visit are: (1) to exchange experience with the different waste management groups and experts of Thailand in order for Lao partners to exchange and learn from them, (2) to provide the participants a more learning and understanding on integrated waste management with community participation and (3) to motivate Lao partners to adapt and apply the best practices on SWM in their own community. 

The study tour was well represented by 60% of government agencies (representatives from Vientiane Capital's Governors' office; Vientiane Province Governors' office; Prime Minister office; representative from local government or national government agency in charge of local governance issues) and 40% of civil society and Non-Profit Associations (Lao Learning for Development Association, Association for Rural Mobilisation and Improvement (ARMI) of Savannakhet Province, Equal Education For All (EEFA), Province Environment Conservations and Community Development Association (ECCDA) in Vientiane, Laos.)





Hazardous waste drop-off point





Review Session of the Study Visit

Nongsamrong Municipality, Udon Thani Province


Community participation is the strategic contributing factor in solid waste management. Their involvement in the process will utterly furnish a positive outcome notably in the waste reduction from the source. Having this notion, Local leader in Nongsamrong designed participatory waste management focusing on the organic waste. The practice aimed to transform the organic waste into compost using earthworm and to bring down the waste volume to final disposal site. An incentive in the form of recycling fund for community is available to encourage them to participate in the management process. 

The solid waste management practice requires everyone to apply for membership. The membership will be legally bonded in a Memorandum of Understanding (MoU) signed by the municipality and community mentioning the responsibility of each Parties. After application per household, members will be supplied with tanks and couple of earthworm whose urine will be used to compost waste. In addition to the organic waste, community is also encouraged to recycle hazardous waste. They shall drop the toxic in the collection center allocated for each community group. 

Building on the signed MoU, municipality will purchase the produced compost from community members. Playing role as a mediator, municipalities also seek market potentials to sell the compost as well as use it in public areas. This way, mutual partnership between governments and community members for sustainable environment achieved. Governments not only reduce budget for waste management but also gain compost with cheaper price compared to market price; while community is benefitted by the opportunity of turning waste into money, developing their economy. 

Every member also is entitled for a life insurance amounted THB1,000 covering the death. To get the benefit, member need to deposit an initial balance of minimum THB300 in their bank account. All transactional activities relating to the waste management program will benefit members and are recorded in the account. 

This practice hits a success. From what used to be 22 tons of waste per day, the Municipality managed to reduce up to 16 tons per day within 5 years span of time albeit the number of population kept increasing. Active community participation was the highlight leading to inspiring ambience to others. Their involvement was assured through a frequent dialogue and hearing. Additionally, local leader has a critical function in reaching and

persuading community to join the membership. As a result, this practice was put into National Agenda of Solid Waste Road Map, open door for other Municipal Mayors to go to community and approach them to get involved in the waste management effort. This is also supported by politicians (from either side) saying their agreement to focus on environment. 

Phangkon Municipality, Sakon Nakhon Province

Similarly, Phangkon Municipality also applied participatory solid waste management. They have a membership scheme which offers a life insurance at the amount of THB5,000 per death. Local authority of Phangkon applies the integrated solid waste management practice from upstream to downstream. Within this context, local leaders embrace community to do waste selection, from organic, recyclable to hazardous waste.



Review Session of the Study Visit

For the process at upstream, government supply community members with tank for waste collection in their house. Community can turn organic waste into compost and biogas and use it to fulfill their own needs; for example, biogas used by home economics such as noodle house. While for recyclable waste, members can just sell it to government, which at the same day will resell it to bigger market to avoid piling up, and get the money transferred to their account. Hazardous waste, the last type, will be put in the dropped off point collection.

At end point process, local authorities build 6 meter height wall in the landfill to avoid increasing crime rates. The landfill is open for registered scavengers whom are paid THB500/month. They may work on certain time between 8 am – 5 pm. While for scaling up, Phangkhon government receives waste from surrounding municipalities under condition that they separate their waste. Phangkhon authorities will keep an eye on the transferred waste every week and quickly notice an upsurge. When the increase keeps going, they will charge 4 times higher of fee than before. In exchange, they also provide trainings on how to do waste management and waste separation at source.


Phangkhon's local government also invites public to contribute to the efficient allocation of city budget. By disclosing amount of money used for solid waste management, community members will be able to calculate the amount of waste they produce; the less the better, as the budget can be allocated for more important posts such as education and schools. To inform communities about their waste, local government holds open house every year with music, culture and art festivals and/or combined with trainings.


Khon Kaen Municipality, Khon Kaen Province





Khon Khaen Municipality Sharing on Solid Waste Management Practices

Khonkaen province has vision "To be the coolest and happiest place to live in the world within 2020 & To be the model of low carbon city in Mekong Region". To achieve the target, Khon Kaen has been doing many activities to approach Low Carbon City concept set by the National Municipal League of Thailand, which includes Green City Strategy, Clean City Strategy, City of Energy Care, and Living Sustainable City. Khon Kaen also develops Green City Network that involves various stakeholders: people (temple and community leader), education institute (Khon Kaen university and school), private agencies and governmental agencies.

In setting the Green City Strategy, Khon Kaen municipality aims to expand green space while at the same time maintaining the existing green land. In implementing the strategy, government involves education institution and community by encouraging actions in forms of breeding trees in schools, creating environmental awareness of student, launching green campaign, supporting free tree given to the community, and involving community to recruit volunteers to help the city green. 

As for Clean City, Khon Kaen targets to become the land of zero waste. Efforts taken include waste management practices that involve private sectors: provide tank separation waste, educate waste separation for the officer, promote using clothing bag instead of plastic bag, etc.. As for waste management involving people, the efforts are differentiated into waste management at source (constructing compost pit at house/temple/school, composting leave and garden garbage), waste management at transport (separating waste composition), and waste management at end (converting waste to energy, converting plastic into oil). Included in the activities are reduce plastic use, declaration not to use foam, and calculate amount of CO2 per tree so people know the worth of each tree. 

Khon Kaen municipality translates City of Energy Care to becoming the social of green power by reducing the oil consumption and encouraging green energy consumption. Activities to support this strategy involve actions such as controlling air condition operation time and change all the light bulbs at government office into LED. Other activities  include turning off electricity equipment during lunchtime, providing the design of energy saving building.

Lastly, for Living Sustainable City, Khon Kaen municipality sets goal to make Khon Kaen become city of eco-friendly. To achieve the goal, government educate  low Carbon Society concept to the community and at the same time increase members of green network.

Lesson Learned


The three municipalities in Thailand have inspired Lao partners on the essential role of community in governance. Engaging them at the earliest level will ensure sustainability as well as inclusiveness in the development. They also found that delegating responsibility at the lowest level will contribute to the efficiency of governance including solid waste management.



Participants of Laos-Thailand Visit with Deputy Mayor of Khon Khaen and UCLG ASPAC

MUNICIPAL SOLID WASTE MANAGEMENT IN AN INDONESIAN CONTEXT


UCLG-ASPAC STRATEGIES FOR INDONESIAN CITIES

 h Pramono

Introduction

United Cities and Local Governments Asia-Pacific (UCLG ASPAC) has been a partner of Konrad Adenauer Stiftung Philippines Office since 2010 on the "Partnerships for Democratic Local Governance in Southeast Asia (DELGOSEA)" Network.

One of the most important aspects of protecting and preserving the natural environment is to reduce and regulate the waste and use it for an outcome, such as energy. One of UCLG-ASPAC's visions is to promote economic, social, cultural, vocational and environmental development in enhancing the services to the citizens based on good governance principles. In 2014, UCLG-ASPAC started to promote and develop solid waste management to local governments. UCLG-

ASPAC works towards building partnership with local government that have a commitment to  a joint strategy for solid waste management. UCLG ASPAC aims to encourage cities in Indonesia to concern more on waste management and take responsibility on the important roles on protecting the world green environment.



Summary Of Outcomes

Activities related to Waste Management gave the contribution for organizational outcomes:

- UCLG-ASPAC contributed to environment sustainability in local government level
- UCLG-ASPAC and UNESCAP doing effective cooperation for Solid Waste Management Pilot Project
- Networking with Malang City, Malang Regency, Jambi City and Probolinggo City for Solid Waste Management
- Working together with Wakatobi Regency in creating green shelter that consist of Biogas Plant and Plastic Recycling

Focus Area

UCLG-ASPAC worked with Wakatobi regency to develop a role model of Low Carbon Society, a joint effort from all stakeholders to reduce carbon emissions through various approaches such as utilizing renewable energy like Biogas Processing, composting and plastic recycling. The Cleansing Department of Wakatobi commits to build four biogas constructions from the organic waste with one model under construction near the center of the city in their cleansing agency office. Along with UCLG-ASPAC, both Malang Regency and Wakatobi have a cooperation for Biogas engineer of Malang Regency helped Wakatobi Regency to create master plan for biogas construction of 36m³ for the anaerobic digestion reactor. With Malang Regency support, Wakatobi builds their way to a sustainable livelihood.

In Bandung, UCLG-ASPAC worked with local government to support their approach on managing and recycling green waste from the city garden into biomass pellets to be converted into bio-fuel. By linking partners from the wood pellet industry, UCLG-ASPAC connected a cooperation between different industries to follow an interconnectivity within large communities for sustainability and Solid Waste Management.

UCLG-ASPAC also work together with Jambi City, Malang reGENCY, Malang City and Probolinggo City to host the Baseline Survey on Pro-poor and Sustainable Solid Waste Management. The baseline survey is the follow up action of workshop on the issues in November 2014. The workshop was to encourage the municipalities to be aware on environment especially solid waste management. At the workshop, the local governments, as participant, also shared their interest and strength to host pilot project on solid waste management funded by UNESCAP in cooperation with Waste Concern Bangladesh. The result was those cities that mentioned above shortlisted as candidate to host the pilot project on Solid Waste Management and the baseline survey will be the reference to choose what city as a host of the pilot project.

The BIG Picture



"...Anything can be made by recycled material.." (Suroso, Jambi)

Background


As part of the pro-poor and sustainable solid waste management approaches, UCLG-ASPAC and UNESCAP agreed to conduct Solid Waste Management Project in one selected city starting in February 2015. The project aims at converting the organic fraction of municipal solid waste into biogas through the process of anaerobic digestion. UCLG-ASPAC and UNESCAP have been implementing baseline survey and fact finding missions in four cities in 2015 to select one city to host solid waste management pilot project. Those cities are Malang City, Malang Regency, Jambi and Probolinggo. The purposes of the mission are to inspect proposed locations for Solid Waste Management Pilot Project and to decide a final shortlist of those locations based on technical analysis that was provided by the consultant.


Working towards a low-carbon solid waste management, an approach that is both long-term sustainable and effective for the community due to the deepening linked arms UCLG-ASPAC, organizations and local governance. An Integrated Resource Recovery Center (IRRC) is a facility where 80-90% of waste can be processed cost-effectively within proximity of source of generation and in a decentralized manner. The IRRC concept is based on three principles: Cost and Liability in terms of waste, Processing involving in the IRRC, and Resources with the converted energy and materials. This approach Part of the Baseline visit to the Waste Bank in the center of Jambi City, Mr. Suroso, organizer of the bank, stated wonderfully in the midst of the surrounding recycled artistic handicrafts, "If people asked me what things that can be made by plastic, paper and other waste, I will ask them back what things you want to make because anything can be made by recycled material". As this became one of the prime examples of the IRRC model when a recyclable material is transformed into a product, it follows the saying, "Trash into Cash".



Photo collage of UNESCAP Mission for Solid Waste Management Baseline Survey in Jambi City, Malang Regency, Malang City and Probolinggo City. 3-10 March 2015

Jambi City

Working with Sustainable Waste in Indonesia, the consultancy team collecting the technical data for each city, and UNESCAP has already been a spectacular experience learning the potentiality each city can propose for the future projects. As selected cities, Malang Regency and Jambi City will host the pilot project on solid waste management, 

In Jambi city, the team visited three potential sites that have been identified by the consultant. Those sites are Angso Duo Market, Slaughter House Area and Talang Banjar Market. The proposed site is located inside the area of upcoming Angso Duo Traditional Market. The Angso Duo market is still in the construction process and only 200 m² is provided for composting or waste processing site, although the Jambi City government commits to provide 1000 m² to complete the criteria of UNESCAP for biogas installation plan. Talang Banjar Market will be the most reasonable site, since the market have the good access and enough waste input. Fact-finding also team had very productive meeting on existing policy and strategy of local government in waste management with related agencies. The team and related agencies discussed about contribution that will be given by local government and stakeholders if Jambi City becomes the chosen location for the project model. According to the meeting with related agencies, Jambi City Government will be ready to provide the land for the biogas plant and co-finance for the implementation of Solid Waste Management. 




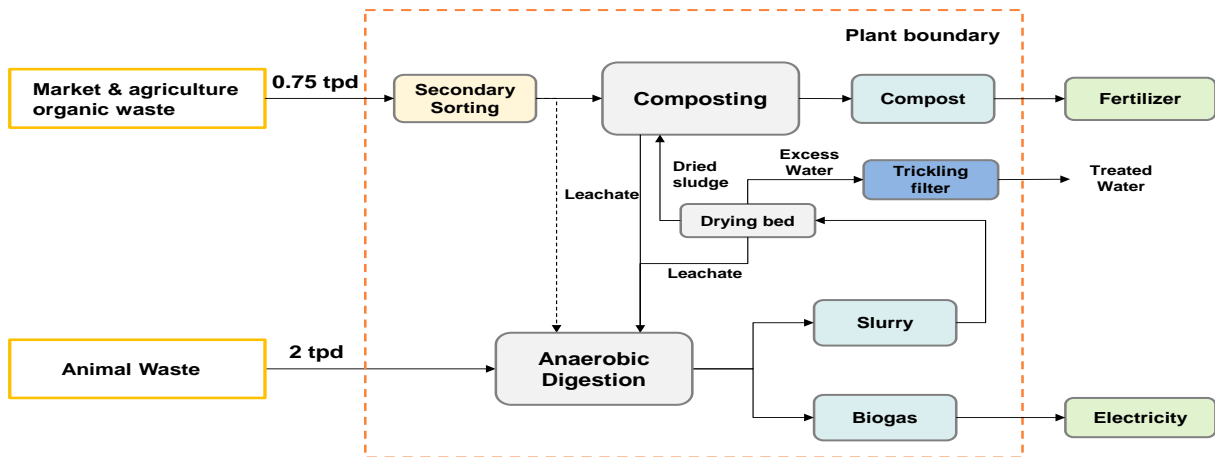
UCLG-ASPAC, UNESCAP and SWI were in Malang Regency to visit 3R Temporary Disposal Sites and "Pujon" Traditional Market as proposed sites for Biogas Plant. 9 March 2015

Malang Regency




UCLG-ASPAC, UNESCAP and SWI visited Jambi to assess proposed sites (Angso Duo Market & Jambi Traditional Market) for Biogas Plant. 4 March 2015

The SWM mission team had a very productive meeting and field visit with the related agencies and stakeholders that was prepared effectively by the Malang Regency. The local university in Malang regency also joined in the field visit and shared about the cooperation with the Malang Regency in regarding to the development of renewable energy. The head of Cleansing Agency who conducted the meeting stated that Malang Regency is a big regency with 23 temporary disposal sites following the "3 R" concept. From the baseline survey, consultant identified two potential sites for the biogas plant. The first site is located near the temporary disposal sites and the second is near the traditional market and livestock center namely Pujon Market with 2, 5 ton/day of waste input. The second location that was proposed by the consultant is beside TPST 3R Mulyo Agung. All of proposed sites in Malang Regency are appropriate with UNESCAP criteria. The local government will provide the legal letter for the land use in the case if Malang Regency is chosen as a location for the pilot project. 



Integrated Resource Recovery Center-Malang Regency. The graph is prepared by UNESCAP


Wakatobi Low Carbon Society

The Cleanliness Agency are in charge of providing services and projects in regarding to solid waste management. They have motorcycle-wagon system to pick up both nonorganic and organic waste throughout the whole Wangi-Wangi Island. They especially collect dry organic waste (which consists of branches, leaves, grass, etc) from both filtration site and specific locations and have it transported to their own compost facility in their office front yard. The compost facility, minimal and simplistic, produces compost soil that are used to grow vegetation and agriculture on their coral rock ground. One interesting development is their small-scale biogas installation, currently in construction, to create a model to demonstrate how it works and the possibility to create a large-scale one in the future. In collaboration with compost facility, the biogas can function for several hours to create gas. As a first step, this is an impressive achievement for no consultant was hired and the community are involved with the making of the installation. Another facility is a small scale Plastic Shredder facility which is also under construction. It is a small site where there is one allocated space for storage of plastic bottles, a machine that shreds the plastic and a set of concrete-block containers for storage of shredded plastic and water. The machine originally was in a landfill site however due to its lack of usage, it was then moved into the new facility. The community collects the plastic which then exchanged to the facility with a payment in return (1Kg = 1000 IDR). The shredded plastic, once washed and clean, will be transported by container to Jakarta then to Hong Kong to become into a synthetic material used for clothing. 



Biogas Plant and plastic recycling in Wakatobi Regency is still under construction


Solid Waste Management-Wakatobi Regency

UCLGASPAC provides network to Wakatobi Local Government in implementing solid waste management.  Through this network Wakatobi Local Government could connect with other cities like Malang Regency to adopt waste management system. UCLG-ASPAC connected Wakatobi Regency to Yokohama City University to conduct "Clean




The Beach Campaign” with children in Wakatobi on 2-3 September 2015. It was 14 students, 1 professor and 1 researcher of Yokohama City University came to Wakatobi to have a campaign to increase the awareness of children to save the environment through simple waste management. They worked together with children in Kapota Island, a part of Wakatobi Island, to draw posters on “Clean The Beach Campaign”.

Challenges

One of the most common challenges we faced was the coordination with multi-sector agency and time management, especially with the Baseline Survey. With such a strict timeline with limited amount of time, there is very little room to make mistakes which in fact is inevitable. In the other hand, local government as our partner also has a lot of activities. The most difficult challenge was in arranging the meeting with mayor and related agencies. In one field visit, the schedule could not implemented properly due to some activities need to be done by local government out of the schedule. Regarding to the lack of coordination. Intensive discussion and double check mechanism was the effective solution to overcome the challenges that the team faced. Every project will always have challenges however with each one overcome, it becomes a learning experience. 

Conclusion



It has been a wonderful experience for UCLG-ASPAC to become involved one of the most impacting activities, working towards a greener environment with the local governments. To see the amount of commitment and spirit from those working for a better and sustainable community inspires us to connect and support with more leaders around Indonesia and Asia-Pacific. We can vision in the next years to come a Biogas Plant functioning in the morning markets of Wakatobi Regency to a linked cooperation and support from all local governances and partners. It is exciting to work towards a better future for what is waiting, through 

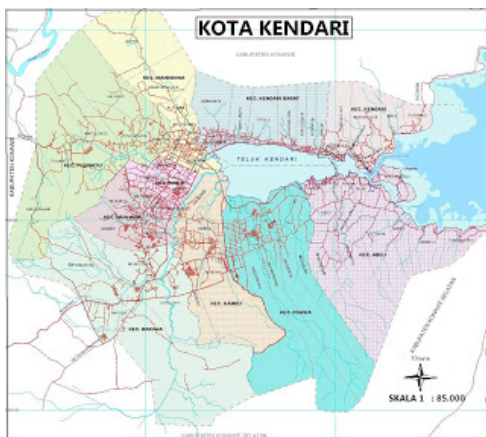
the bumps of the road, will be incredibly important for the local and global community.

Waste management will bring two benefits for the world including the local government. First is environment sustainability and renewable energy for public consumption. Awareness and willingness of local government are very important to encourage community to aware on environment and be involved in working together with local government to create alternative energy for green environment. Replication mechanism is the effective solution to spread any new technology in waste management. It is good to have cooperation with UNESCAP and “Waste Concern” Bangladesh who has the very effective and pro-poor approach on municipal solid waste management. It will help municipalities increase their capacity in waste management and replicate its technology. 


KENDARI CITY, INDONESIA

TURNING WASTE INTO ALTERNATIVE ENERGY

Andi Nur Fitri Balasong




Profile of City



Kendari City had been formed since the Bay of Kendari became an anchorage for merchants, especially those of Bajo and Bugis who came to trade and lived around the Bay of Kendari. Kendari City, with Kendari as its capital, which also functions as the capital city of Southeast Sulawesi Province. Kendari City is located in the southeast Sulawesi Island's peninsula. Its land is mostly located in Sulawesi Island, surrounding the Kendari Bay, with an island namely Bangkutoko Island. The land of Kendari City is 295, 89 KM² in width or 0, 70 percent of the land width of the Province of Southeast Sulawesi. The number of its citizens based on BPS date in 2012 was 304.862, with 153.922 males and 150.940 females. Its population growth rate is 3, 09 each year. 

Situation Prior to the Initiative

Like other capital cities, Kendari City has a high population growth rate. This condition is caused by the urbanization to Kendari. Known as the biggest city in the Province of Southeast Sulawesi, Kendari City is the main source of subsistence for the province.

At national level, Kendari City was categorized as the city with a low level of cleanliness compared with the other cities in Indonesia. This had lasted for several years. Therefore, Kendari City had never got Adipura as one of the cleanliness awards. In social aspect, the citizens of Kendari had a low level of awareness in keeping their environment clean, especially in disposing waste. Since the number of citizens in Kendari increased along with the larger amount of waste, how to dispose waste became one of the city's main problems. 

In general, the infrastructure of waste disposal in the city was as follows:

- The Final Waste Disposal in the city had an insufficient condition, while the amount of waste increased significantly. 
- The Final Waste Disposal still used open dumping system.
- The Final Waste Disposal had not had waste zone division.
- Waste management/sorting with 3R system (Reduce, Reuse and Recycle) had not been done yet. 
- Burning solid waste was still often done.
- The lack of socialization about the awareness of disposing waste.

The amount of waste production every year until 2013 is illustrated below:

The amount of waste volume and waste production In Kendari City Year 2006 to 2013 (M³)

Year	The amount of waste handled (M ³ /day)	The amount of waste volume and waste production (M ³)	%
2006	160.600	216.934	74,032
2007	160.600	223.015	72,013
2008	207.320	225.205	92,058
2009	456.517	652.168	70,00
2010	507.440	724.915	70,00
2011	517.539	739.343	70,00
2012	533.508	762.155	70,00
2013	726.584	1.037.978	70,00

Source: Department of Public Cleanliness of Kendari City (2013)

The Initiative

To solve the problems, DR. Ir. Asrun, M. Eng, Sc., the mayor of the city, initiate a program, turning waste into alternative energy in the form of methane gas. The initiative was inspired from many districts succeeding in turning waste into biogas, such as Brazil and Malang. The initiative was followed up by mapping the condition of waste disposal, developing technology of turning waste into methane gas, and designing the use of methane gas for society.

The program of turning waste into alternative energy is seen as one of the right solutions to solve the waste problems in Kendari City. This innovation not only manifests a service to society in managing waste but also facilitates the poor people, like waste pickers, by supplying free electricity in their houses and free energy to cook through the installed pipes connecting to the houses and the cooking sites around the Final Waste Disposal.

Strategy Implemented

The innovation, from the planning to the concrete implementation, of turning waste into alternative energy was begun in 2009 up to 2010. The journey of the innovation involves the initial process which can be described as follows:



The stages done to run the program of turning waste into alternative energy were:

1. The problem identification was done with a survey to obtain the data of waste quantity produced daily by society. Then, the analysis on the use of waste as alternative energy was carried out.
2. Organic waste was made into compost and inorganic waste. While organic waste was turned into biogas raw material, the waste which had not been handled but already collected and sorted was then managed using 3R (Reduce, Reuse, Recycle) by some groups of craftsmen spreading out in several spots of Kendari City. Inorganic waste was sometimes directly sold to the collectors outside Kendari City, such as those in Surabaya, to be recycled.



Pengelolaan sampah menjadi barang yang bermanfaat


3. Groups of environment cleaning were formed and educated. They consisted of 12 groups, each of which included 10 to 15 people.
4. The process of turning waste into methane gas in Kendari included the following simple steps:



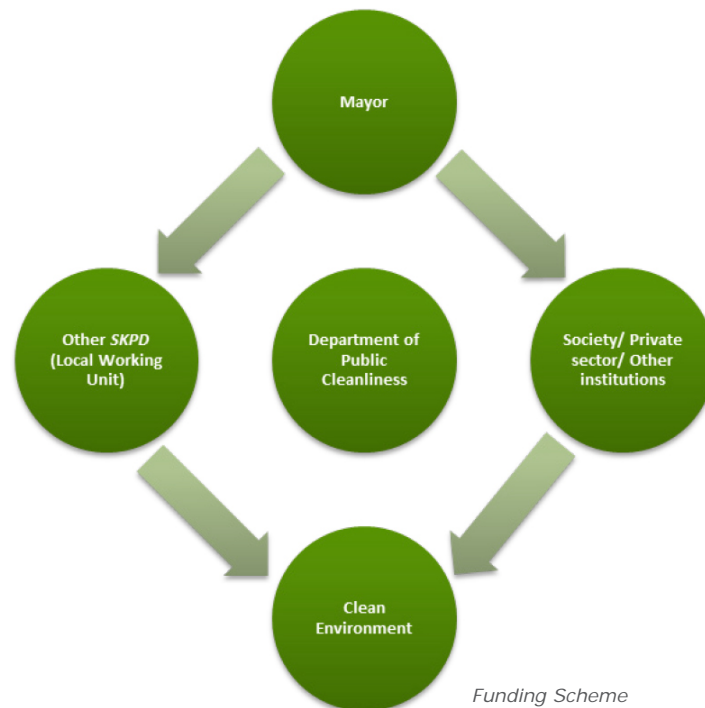
The gas was channeled through some pipes to the waste pickers' houses near the Final Waste Disposal for cooking and lighting their houses and the disposal site from the generator with the capacity as much as 7000 watt in the beginning of 2011.



The process of waste management with the use Methane Gas as fuel

To turn waste into methane gas, the local government of Kendari used the human resources, who had been educated and trained to develop biogas, from the Department of Public Cleanliness of Kendari City. However, in designing and planning thus program, the local government involved Institute of Technology in the form of study on waste. To guarantee the legal security, this program was supported with Mayor' Regulation Number 21 Year 2009 (PERWALI NOMOR 21 TAHUN 2009) about Area with Well-Ordered Waste. 

The scheme of funding this waste management program had been made since the planning process was done, beginning with the proposal of SKPD (Local Working Unit) derived from the Working Plan and the five-year Strategic Plan of local Working Unit.



Data of using the Yearly Budget to develop Methane Gas

No	Year	Description	Total Per Year	Budget For The Installation Of Methane Gas
1	2009	Rearranging the final waste disposal	115,477,900	98,579,400
2	2010	Rearranging the final waste disposal	70,470,000	-
3	2011	Rearranging the final waste disposal	612,871,960	-
4	2012	Rearranging the final waste disposal	255,000,000	-
5	2013	Rearranging the final waste disposal	802,343,800	325,000,000
6	2014	Rearranging the final waste disposal	1,368,953,000	92,000,000
TOTAL			3,225,116,660	515,579,400

Besides being funded from APBD (Local Revenue and Expenditure Budget), this program was also supported by external stakeholders, i.e.:

- Directorate General of Cipta Karya, Ministry of Public Work in 2009-2010 in the form of facilities of comparative study and capacity improvement of Cleansing Service apparatus;
- GIZ (*Deutsche Gesellschaft für Internationale Zusammenarbeit*) in the form of the initial study on the potential of methane gas (the GRK of municipal waste management in Kendari City was as much as 200,000,000 rupiahs), including the counselors of ITB working with Board of National Development Plan, Ministry of Public Work, Ministry of Ecology, Ministry of Internal Affairs and GIZ. The result of this study showed that Puuwatu Final Waste Disposal Site of Kendari City had potential of CO₂ emission in the amount of 149.372,680 kg/year, CH₄: 1.273.726,403 kg/year and N₂O: 117,208 kg/year with the potential of CO₂: 26.933.862 kg/th in

total, in which the emission of glasshouse gas was dominated from the activity of burying and burning solid waste openly as well as composting.

- Besides, the fund was also obtained from company CSR (Customer Service Representative) by making coordination and synergy between the waste management program of Kendari City and the program of company CSR.

In running the program of turning waste into alternative energy was not without any obstacle. If noticed, there were several obstacles faced by the local government of Kendari, some of which were:

- The lack of human resources related to the greater innovation in any other inhabited areas.
- The insufficiency of equipment to develop and to continue the program of turning waste into alternative energy in Kendari City.
- The insufficiency of funding in planning to develop the larger use of methane gas.
- The lack of society understands, especially in sorting organic and inorganic waste.

Meanwhile, the efforts done to overcome the obstacles were:

- Doing continuous socialization to society. Formally, socialization was done in the form of the monitoring activity executed by the Department of Public Cleanliness twice a week, i.e. on Tuesdays and Fridays, which were the days of doing mutual work in every governmental instance of Kendari. Meanwhile, the informal socialization was done every day by the staff of the Department of Public Cleanliness who in turn monitored the cleanliness around the city.
- Budgeting the funding special for cleanliness stage by stage, i.e. the yearly planning done based on the prevailing program in each Local Working Unit (SKPD), especially that of the Department of Public Cleanliness and Department of Ecology in Kendari City about developing and using new and renewable energy, mainly methane gas, as written in Local Revenue and Expenditure Budget, in accordance with the condition and target to achieve every year.
- Involving the elements of society in managing waste, e.g. schools, governmental instances, private institutions, and Non-Government Organization.
- Dividing the assisted districts in Kendari City to all SKPD (Local Working Units) as the districts responsible for the cleanliness in their environment.
- Solving the problem of cleanliness funding by directing or using CSR funds of the companies in Kendari City, both for doing reforestation and providing facilities as well as infrastructure. So far, the business instances having participated were BCA, PT. Pertamina, Pt. Jasa Raharja, Bank Panin, BNI, PT. Pelindo, and ASKES.



CSR Programs

Result Achieved

The results of taking some steps to turn waste into methane gas are:


1. There are several locations with self-sufficiency of energy through turning waste into alternative energy in the form of biogas technology as many as 14 units spreading out in 7 districts, i.e. Waste Management Site of Puuwatu's Final Waste Disposal Site, Integrated Waste Management Site of BTN Beringin, Integrated Waste Management Site of Lahundapepe, Integrated Waste Management Site of Baruga Market, Integrated Waste Management Site of Graha Asri Housing, Integrated Waste Management Site of Baruga Civil Servants' Housing, and Integrated Waste Management Site of Saranani Official Housing. There are also pilot project programs in several inhabited areas, consisting of 2 units in Watulondo Ward, Baruga Correctional Institution and Watubangga Ward, 1 unit in Rahandauna Ward.
2. A ward with self-sufficiency of energy has been formed and centered in Puuwatu Ward, Puuwatu Sub district. It serves light for society and for the street to Final Waste Disposal as well as cooking energy for 126 heads of family with 40 KVA or 40,000 Watt of electricity. The gas for cooking is provided for 24 hours.
3. The efficiency of household cost which can be achieved is calculated as follows:

It is assumed that the routine expenditure of 126 poor heads of family before using methane gas is:

The use of gas to cook, which is 12 kg per month	Rp 126.000,-
The use of electricity for light per month	Rp 120.000,-
The total expenditure per month in each household	Rp 246.000,-
The cost efficiency per month (126 x Rp246.000,-)	Rp 30.996.000,-

Despite its simplicity, the calculation above at least touches the basic need of society. Turning waste into alternative energy obviously brings long-term positive effects, in which the more population there is, the more waste they produce. If this innovation keeps on being done and developed, there will be massive opportunities of using methane gas.

The positive impact of turning waste into gas is that it decreases people's dependence on oil fuel like kerosene. By way of illustration, using methane gas only costs people 6,000 rupiahs per liter (for electricity), while using fire-wood and charcoal furnace costs 40,000 rupiahs per sack of charcoal (cooking necessity requires to buy charcoal once in 2 or 3 days).

4. The ward with self-sufficiency of energy is a facility provided by the municipality to be inhabited by 126 heads of family all of whom are the waste pickers with the right of borrowing and using the land for 10 years. This is determined with an expectation that someday they can earn a living self-sufficiently with the present stimulant given by the local government. The houses they inhabit were even built with the aid of the Ministry of Social Housing (via Social Service) and contribution. 



Free methane gas fueling station





Houses in the ward with self-sufficiency of energy at Puuwatu sub-district

5. Puuwatu Final Waste Disposal Site has now changed into a tourism object, from which we can sightsee Kendari City in the distance.



Entrance to Puuwatu Final Waste Disposal



Puuwatu Final Waste Disposal scenic view

6. The development of turning waste into alternative energy in Kendari City bears fruit for society. The local government has given them more opportunities to present their program in various forums, one of which was held in Bangkok in July 2014, with a prestigious award from eight ministries, namely AMPL Award in 2013, besides Adipura Kencana in 2014, in which Final Waste Disposal was one of the assessed points.

Sustainability

Along with the success of Kendari Government in turning waste into something useful in the form of gas for household need, it is clearly seen that the program requires continuous support to be executed. Therefore, Kendari Government has designed some follow-up plans as follows:

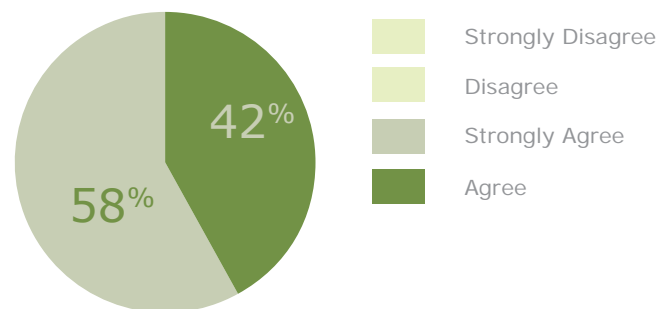
1. Regulations to guarantee the innovation continuity are the waste management program included in Mid-Term and Long-Term Development Plan of Kendari City (RPJMD 2012-2017 and RPJP 2025 which have been already regulated)
2. The next development plan is:
 - a. Establishing Wards with Self-Sufficiency of Energy in other sites of Kendari City, including the public areas, such as market, etc., which produce waste, by working with companies in the form of CSR;
 - b. Developing the waste management producing methane gas on industrial scale to be the potential of electric generator with the power of $\pm 1 - 2$ mw by involving private stakeholder to invest;
 - c. Managing waste to produce compost on industrial scale by cooperating with private stakeholder in the form of investment.
3. The scheme of innovation funding is still attached to *RPJMD* of Kendari City whose plan is up to 2017.

4. One of the ways to ensure the continuity of waste management program after 2017 is that Kendari Government will cooperate with *LIPi* (Indonesian knowledge Institution) and *BPPT* (House of Technology Research and Development Agency) to develop the alternative energy produced by Final Waste Disposal. By involving the two big institutions, it is expected that there will be continuous development of this innovation.

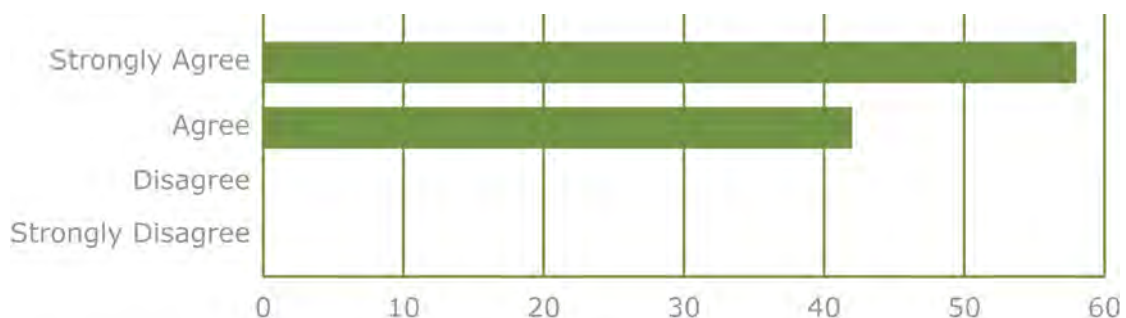
To make a description and to conduct a duty to ensure the continuity of this waste management program, a survey to observe society's satisfaction of the efforts done by Kendari Government was conducted, including:

1. Opinions of the inhabitants living in the ward self-sufficient of energy on the use of methane gas for cooking and electricity.
2. Support of continuing the program in Puuwatu Final Waste Disposal:

The survey of (People Satisfaction Index) has been conducted with snowball technique using the questionnaire instrument filled by the respondents who are the inhabitants of the ward with self-sufficiency of energy in Puuwatu Sub district. People satisfaction can be seen from their agreement on the use of methane gas to cook and to light as much as 58 and 42 percent. Additionally, the statements to really support the continuity of the waste management program producing methane gas reach 84 percent, while those that support it are as much as 16 percent.




Opinions of the inhabitants living




Lesson Learned

The program of turning waste into methane gas is actually related to three missions, i.e.: (1). To prevent soil pollution from alkaline water and waste; (2). To prevent air pollution from the unused methane gas since it probably causes emission of greenhouse gas and contributes to global warming; (3). The most important mission is humanity mission, which is to afford the people's basic need in the form of daily light and cooking energy.


Besides the three missions above, another lesson to learn of this waste management is that raw materials are available every day. All districts in Indonesia have such a potential, even its quantity tends to increase every year. If not used wisely, waste will result in a big problem in the future. On the contrary, it will be beneficial if used for many people.

Innovation  this waste matter seems to be able to make a change to society and government. To society, it can make them understand that waste can be useful in daily life. To government, this innovation is a method of empowering the people to manage their own potential by not fully burdening government in such a way that the program to fulfill their basic need can be successfully done.

Transferability

Noticing the process of turning waste  into methane, the following points can be good reasons that this program is transferable to other districts:

1. This innovation can be done with simple method and technique as well as the fund which is reasonable for the government of other districts.
2. Pre-conditions needed to apply this innovation are the infrastructure and facilities to turn waste into methane gas. They can be identified as follows:
 - a. Government's commitment is clearly stated in *Renstra* (Strategic Plan), in which, in realizing a Smart Green City, a good environmental management becomes the first point to achieve by making a clear budget every year and always building relation, communication, and cooperation with stakeholder mutually and independently.
 - b. Providing cleansing equipment is the local government's obligation through Local Working Unit, in which the provision must suit the kind of equipment, regarding whether it is for single use in mid-term, e.g. in 5 years, so that it must be routinely provided every year or once in three years and so forth.
 - c. Land preparation must be adapted to the need of municipal Spatial Plan (RTRW) and capacity building of the human resources must be continuously improved along with the scientific and technological development in the expectation that the future problem can be handled without any significant obstacle.

The waste management by turning it into methane gas in Kendari City has been seen by various elements of society, at local, national  and international level. The ones having ever visited Kendari and learned about waste management there are:

- La Rosche Government of France
- Association of Indonesian Management Scientists
- All mayors and regents in Indonesia
- Association of Indonesian Municipality Government all around Indonesia, Local Commissariat VI (Apeksi Komwil VI),
- Ministry of Public Work
- ERC of Australia
- Government of Tebo District, Jambi
- Ministry of Environment
- Kendari citizens
- Haluoleo University
- Board of National Development Plan (Bappenas)
- Balikpapan City Government
- Government of the cities/regencies all around Southeast Sulawesi

For more information you may contact:

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FEATURING IRIGA CITY, CAMARINES SUR SOLID WASTE MANAGEMENT

A BEST PRACTICE PROGRAM IMPLEMENTATION

Engr. Arthur A. Batomalaque

Background Information

Known as the City of Crystal Clear Springs and dotted by verdant hills and mountains, Iriga City is the primary growth center in the 5th District of the Province of Camarines Sur serving as the trading, commercial, educational, administrative and ICT Hub. It has a population of 111,757 (PSA 2015) but an estimated population of 150,000 is observed during daytime. There was a noted increase per year in investments along the areas of banking, fast food chains, hypermarts and other services thereby attracting more people to do business in the City.

Brief Description Of The Program

The Solid Waste Management Program of the City of Iriga is anchored on the provisions of RA 9003 or the Ecological Solid Waste Management of 2000 and its IRR. The City believes that there is a need to adopt serious strategies for safeguarding the environment particularly in addressing the emerging issues concerning the unregulated and unsystematic waste disposal by adopting sound collection and management practices emphasizing resource recovery and conservation. Thus, in response to this premise, the City Government of Iriga implemented the following programs, projects and activities.

Programs, Projects And Activities Undertaken

A. *Formulation of 10 Years Solid Waste Management Plan*

The Iriga City 10 Years Solid Waste Management Plan CY 2015-2024 was formulated adopting the concept of Integrated Solid Waste Management aimed at protecting the health, safety and the well-being of the constituents utilizing innovative technologies on the areas of recycling, composting, resource recovery and other environmental friendly approaches. This document has been approved by the National Solid Waste Management Commission through Resolution No. 631, series of 2016 last May 31, 2016.

B. *Public-Private Partnership Agreements*

One of the most noteworthy innovations adopted by the City is strong partnership with the private sector. They played a very important role in effective implementation of environmental laws and local legislations. Among the most significant of these are:

1. Memorandum of Agreement with the Iriga City Plastic Manufacturing and Recycling Industries (ICPMRI). It manufactures and recycles plastic materials that effectively complement our Programs on Solid Waste Management especially in the reduction of solid waste being collected in the locality. In support to the program, ICPMRI launch a program for schools where collected non-biodegradable waste are being exchanged with schools supplies or equipments depending on the volume.
2. Memorandum of Agreement with 10 Accredited Junkshop Owners that resulted in the substantial reduction of Non-Biodegradable Waste being collected daily thereby provided savings in terms of fuel consumption and manpower expenses.

C. *Strengthening of City Solid Waste Management Board and Barangay Solid Waste Management Committees*

The Iriga City Solid Waste Management Board was created defining its role and responsibilities with a goal to establish a legacy of excellence and to provide the Iriga People of today and the generations to come with true confidence of a good system of Solid Waste Management built with people's right attitude and participation and enhanced through leadership by example.

The creation of Barangay Solid Waste Management Committee was facilitated to establish an equally responsive and dedicated task force at their level and to make them understand their responsibilities as mandated in RA 9003 to actively implement the programs on Solid Waste Management following Segregation of Solid Waste at source.

Composition of these two major bodies were strengthened through additional membership from other stakeholders, i.e. Youth, Manufacturers, Schools, NGOs and others to generate more inputs and new ideas in plan formulation, implementation and impact evaluation. Series of Capability Building Programs were provided such as Waste Analysis Characterization Study (WACS), Barangay Solid Waste Planning and Workshops to concerned beneficiaries.

D. *Conduct of Waste Analysis Study for the Technical Committee*

Orientation and Write-Up Seminar Workshop in the conduct of WACS (Waste Analysis Characterization) also have been done to equip the technical working committee with the necessary skills. The orientation seminar for WACS was facilitated by the personnel from EMBI Regional Office.

WACS Orientation is important in Solid Waste Management as it reflects the quality of waste generated within the area and serves as the determining factor in addressing concerns on solid waste and to come up with an appropriate solution to the specific solid waste generated in a particular area.

E. *Conversion of Bio-degradable Waste into Bio-Organic Fertilizer/Vermicast Production/Vermi-Composting*

Collection of waste is done separately for non-biodegradable and biodegradable waste along the service areas. Biodegradable waste are delivered directly to the Iriga City Organic Agriculture Learning Farm and Production Center for conversion into bio-organic fertilizer and vermicast production, which are used in the production of organic product such as, vegetables, high value crops, rice and corn, and other organic product. Some components of the biodegradable waste are also added as ingredients in the production of Charcoal Briquettes. This best practice on organic production using bio-organic waste earned the Nod of Department of Agriculture by bestowing several awards and recognitions such as, Special Citation on Organic Agriculture Practice 2013, Outstanding Organic Agriculture Award 2014, Outstanding Organic Practitioner 2014 including the granting of composting equipments such as Composter, Shredder, and Pelletizer to further enhance production of bio-organic fertilizer and vermicast for distribution to farmers-co-operators.

F. *Advocacy IEC Campaign in the Implementation of RA 9003*

Orientation seminar to owners of business establishment and operators of tricycles is mandatory before their business permits be released to give them complete information of the enacted local laws regarding Solid Waste Management and to keep them fully aware of its importance and benefits.

Tricycle operators are required to equip their vehicles with a garbage receptacle where riders could drop their waste.

Mass media are also being utilized for the fast information education campaign on proper waste disposal as provided in ordinances and policies.

Massive IEC is conducted led by GSO Staff, grabbing every opportunity to educate and to encourage peoples' participation in the reduction of Solid Waste by segregating Bio-Degradable from Non-Biodegradable waste, and promoting the practice of Reuse, Reduce and Recycle. Brochures, flyers, slogans, trimedia outlets, posters, symposia, fora and Barangays Assembly's were used to disseminate important information.

Orientation Seminar Workshops on RA 9003 to Schools were conducted with the common idea that Teachers play a distinguished role and significant influence to growing children as they used to say: **"SABI NI TEACHER."** Whatever the teacher says will be a word to consider by a pupil. The idea brings us the importance of involving the School/Institutions into the programs on SOLID WASTE MANAGEMENT. As the youth is our hope, children as they are when taught and instilled with correct values and practices will form as habit and will become their routinely practices. The Teacher-participants were required to present their plans and programs to be best implemented in their respective school assignment coupled with a commitment of implementation.

Seminar Orientation Workshop on RA 9003 to Members of the Barangay Solid Waste Management Committee was conducted which aims to impart better understanding on RA 9003. The Program also aims to educate and to orient them of their role as barangay leaders and to make them understand the provisions and penalties of RA9003. A collective effort from its members is of great significance in building a strong foundation towards achieving one common goal: **A ZERO WASTE AND ENVIRONMENTALLY FRIENDLY COMMUNITY.**

Different organizations, institutions and other identified groups were tapped to get involved in making the City Clean and Environmentally Friendly by having a system of Solid Waste Management. Commitment was given by each participant to come up with specific plans and programs on Solid Waste Management to be implemented to their respective area of assignment.

G. *Local Legislations*

The following ordinances were enacted to support the effective and efficient implementation of the Solid Waste Management Program of the City:

- Ordinance 2014-02 – Regulating the Use, Sale and Advertisement of Cigarettes and other Tobacco Products in certain places.
- Ordinance 2012-12 – Anti-Plastic/Styro Foam Ordinance.
- Ordinance 2009-06 – Ordinance Enacting the Environmental Code of Iriga City
- Ordinance 2009-02 – The Smoke Free Ordinance Iriga City.
- Ordinance 2005-01 – Ordinance Amending Section 3.dd.hh.108, 109 of City Ordinance No. 97-01 otherwise known as Sanitary Code of Iriga City.
- Ordinance 2003-03 – Ordinance Directing All-Out Drive for Cleanliness.
- Ordinance 1997-01 – Ordinance Prescribing/Implementing the Health and Sanitary Code of Iriga.
- Ordinance 1996-02 – Ordinance Establishing an Ecological Waste Management Program in the City of Iriga.
- Ordinance 1995-04 – Ordinance Prohibiting the Throwing, Pitching, and Hurling of Human and Animal Waste, Garbage and Other Waste Materials to Canals Creeks, Springs, Rivers within the Territorial Jurisdiction of the City Providing Fines and Penalties for the Violation thereof.

Impact Of The Project

The implementation of the different program of activities resulted in the following:

1. Substantial Reduction in the generation of Solid Waste per day from 45 cubic meters to 22 cubic meters resulting in the savings of the City in terms of fuel consumption, manpower and other operational expenses.
2. Opening Up of Opportunities for Livelihood.
3. Biodegradable Wastes are now converted into Bio Organic Fertilizers and Vermicast Production which are now linked to the Iriga City Organic Agriculture and Learning Farm for the production of organic products thereby increasing the productivity and income of farmers.
4. Maintenance of Environmental Integrity brought about by clean and safe surroundings being a way of life now by the people.
5. Minimized Flooding due to the Culture of Cleanliness and Proper Waste Disposal.
6. Lesser Incidence of Morbidity.
7. Children are now taught the proper practice of the 3Rs – Reduce, Reuse, Recycle.
8. Rural Barangays are now practicing the communal and household composting.

Sustainability

Priority Programs, Projects and Activities (PPAs) were included in the short and medium term development plans of the City providing appropriate funding thereof, specifying implementation schedule and responsible agencies. It also includes the Priority PPAs of the different Barangay Solid Waste Management Committees.

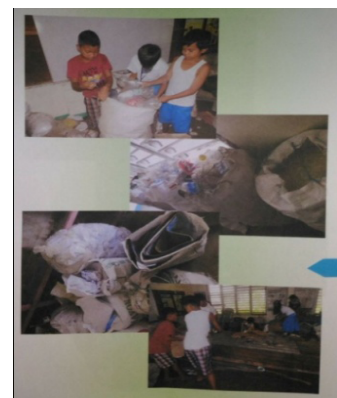
Pictorials



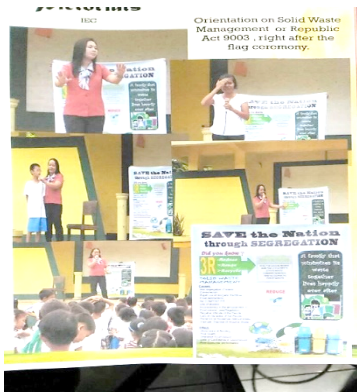
Actual Waste Analysis Characterization Study



Compost Making of Biodegradable Waste



Segregation of Recyclable Waste in Campus



Flyers used in School Information Dissemination Campaign



Products Out of Recyclable Wastes.



River Protection Clean-Up Drive



Information Seminar Workshop R.A. 9003 to BSWMC and School-Based Implementers



Daily Collection of Solid Waste with "No Segregation, No Collection Policy"



Actual Inspection of Garbage Receptacles to Tricycle



Launching of Anti-Plastic/Styro Ordinances



Iriga City Plastic Manufacturing & Recycling Industry Production Plant



Organized School-Based Ecosavers Club



Public Schools Teachers undergoing Orientation of RA 9003 –“Sabi Ni TEACHER” Program Component



Barangay Material Recovery Facility



“Gulayan sa Paaralan Program ” making use of Compost Fertilizer



MOA Signing with Iriga City Plastic Manufacturing & Recycling Industries (ICPMRI)


'WASTE'CASE SCENARIO:

IMPLICATIONS OF SOLID WASTE MANAGEMENT IN TIMES OF CATASTROPHE


Gennessy Detubio

Aftermath of calamities



Unexpected, unpredictable, no one knows when it will happen, it's a Disaster.

Over the past decades, the Southeast Asia (SEA) Region is considered one of the most prone area to disasters according to the United Nations Office for Disaster Risk Reduction. As every country in SEA is affected, they address common problems in the aftermath of calamities such as Waste Management problems. As to the World Health Organization(WHO), if wastes are not disposed properly it can create significant health problems and can cause discomfort in your living environment. Disaster waste management program of each country plays a vital role as it is not only cleaning up the waste scattered all over the affected vicinity but improperly disposed wastes can also aggravate breeding sites for insects and pests that can cause disease transmission and can also pollute water sources and environment which is the long-term effect of unmanaged wastes. Most of the details in this article refer to the technical notes of Solid Waste Management in emergencies by the WHO. 

The relation of disaster in waste management

SEA Region  is considered to be one of the most vulnerable area to disasters, in fact, almost every year powerful typhoons hit the region not only that the region also face risk from earthquakes, volcanic eruptions, tsunamis, and forest fires that leaves evident damage to the environment of each country. The extra waste caused by the situation will affect the existing waste collection and disposal system. First and foremost, refugees or displaced people cannot be avoided during such incidents and each government shall have an efficient strategy on how their waste shall be managed.

What are the solid wastes (SWs) that are commonly subsequent from a disaster? According to the WHO technical note on Solid Waste Management in emergencies these are the following SWs: (1) general domestic garbage such as food waste, ash and packaging materials, (2) human feces disposed of in garbage, (3) emergency waste such as plastic water bottles and packaging from other emergency supplies, (4) rubble resulting from the disaster, (5) mud and slurry deposited by the natural disaster, (6) fallen trees and rocks obstructing transport and communications, (7) medical waste from hospitals and toxic waste from industry and unfortunately, there might be dead bodies to dispose of during and after an emergency.

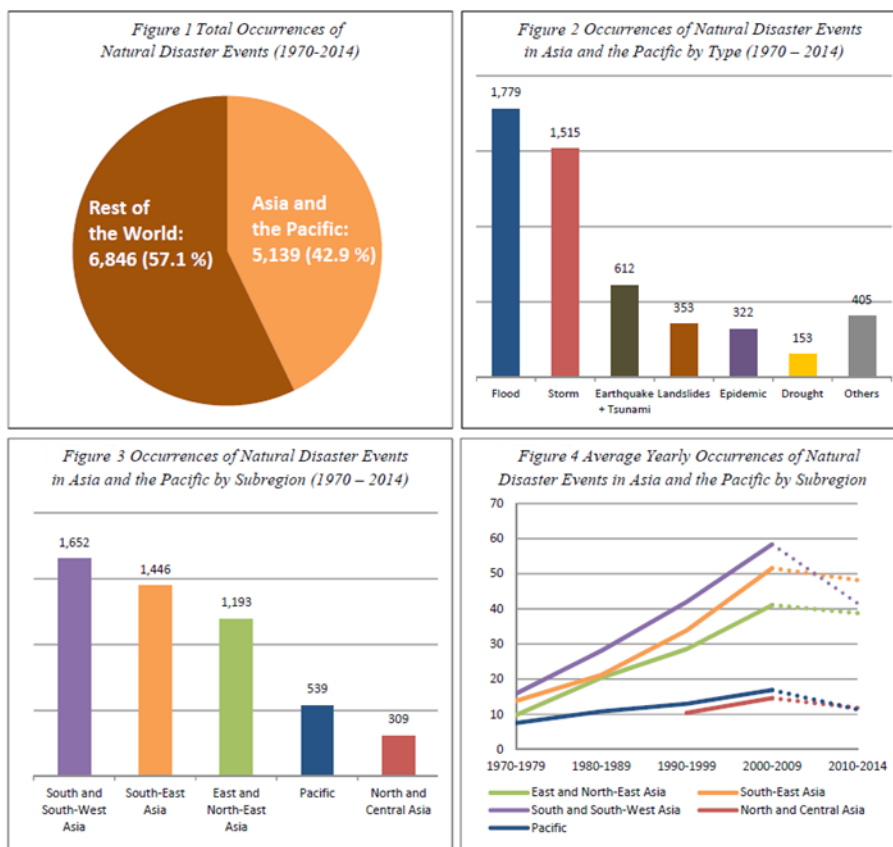
Each of the country in SEA Region, which  experiences disasters from time to time, cannot evade the fact that management of wastes created by disasters is extremely important to address because of its scale, complexity and the costs of  living a livable community again.

On the key findings of the Synthesis Report on Ten ASEAN Countries Disaster Risks Assessment: ASEAN Disaster Risk Management Initiative last 2010 produced by the UNISDR and the World Bank, the quantitative risk assessment performed in the study confirms the following risk patterns for the ASEAN countries:

Cambodia: floods represent the dominant risk followed by droughts;

Indonesia: forest (wild) fires, earthquakes and tsunamis, and floods represent the dominant risks followed by volcanoes, droughts, and landslides;

- Lao PDR:** cyclonic storms, and floods are the dominant risks followed by droughts;
- Malaysia:** floods are the dominant risks followed by forest fires, tsunamis, and cyclonic storms;
- Myanmar:** cyclonic storms are the dominant risk followed by tsunamis, floods and forest-fires;
- Philippines:** typhoons (cyclonic storms) are the dominant risk followed by floods, earthquakes, volcanoes, droughts, and landslides;
- Thailand:** floods are the dominant risk followed by tsunamis, cyclonic storms, and droughts;
- Vietnam:** cyclonic storms, and floods are the dominant risk followed by droughts, and landslides;
- Brunei and Singapore:** no disaster data is available Due to paucity of disaster loss data, the Social Vulnerability ranking could not be carried out.



Overview of occurrence. Source: Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 – 2014, UNESCAP

Based in the technical paper by UNESCAP produced last March 2015 entitled "Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 – 2014," the world reported a total of 11,985 natural disaster events, of which 5,139 (or 42.9 per cent) took place in Asia and the Pacific (Figure 1). Floods and storms were the most frequent in the region, accounting for 64 per cent of the total number of such events reported between 1970 and 2014. This was followed by earthquakes and tsunamis (12 per cent) and landslides (6.9 per cent) (Figure 2). South and South-West Asia witnessed the largest number of natural disaster events with 1,652 cases reported. South-East Asia and East and North-East Asia also reported over 1,000 events. The Pacific and North and Central Asia had significantly lower numbers of reports (Figure 3). Disasters have been reported with increasing frequency in all parts of the region since 1970. However, the numbers of reports on natural disaster events are diverging among ESCAP subregions (Figure 4).

More than 5,000 disasters have come across the Asia Pacific region since 1970 that has caused billion of fatalities, damages and lives of the people have been affected. One of the recent disasters in Southeast Asia that has been a tremor in the whole world was the Super Typhoon Haiyan that hit the Philippines on November 2013. The disaster has caused over 6,000 people who died and approximately displaced about 4 million according to NDRRMC record of 2014. Earthquakes and tsunamis were also inevitable visitor over the past years. There are many social, economic and environmental factors that determine the vulnerability, exposure and impact of a disaster on people or a country.

Given the number of disasters SEA Region had, it is hard to imagine the impact in the country and how much disaster waste shall be taken care of. Disaster wastes can generate problems on public health and progress more environmental threats. It is best to take a look on how countries in Southeast Asia region deal with disaster waste management. Assessment shall be done to see the actions involve, if there's any, as improper dumping may create long-term environmental problems that may significantly affect the community. But the fact that during times of disaster, national authorities are also overwhelmed of the situation that sometimes neglects the importance of how the wastes left shall be taken care of.

What can be done

Due to the fact that the SEA Region cannot avoid such natural disasters, perhaps a good recycling and composting system might help in time of the catastrophe, the possibility of turning the waste to provide source of income can be done by the local recycling industries to encourage entrepreneurs or waste collectors to gather recyclable materials. Even households can help on this agenda, home composting can also be an alternative to reduce collection and disposal of wastes.

Community participation takes a vital role in this situation. Management and implementation for proper waste disposal at times of emergency situation shall not be taken for granted and shall be strongly enforced by the local community. Sustainability of waste management practices shall be given importance,

Based on the Sphere standards, the objective of managing solid waste states that people should be able to live in an environment that is uncontaminated by solid waste, including medical waste, and have the means to dispose of their domestic waste conveniently and effectively. In addition to this objective there is also the need to make the environment safe and provide access for people and services in the area.

WHO Technical Note No. 7 on Solid Waste Management in Emergencies provides the process of planning of solid waste management in an emergency is illustrated in Figure 5.

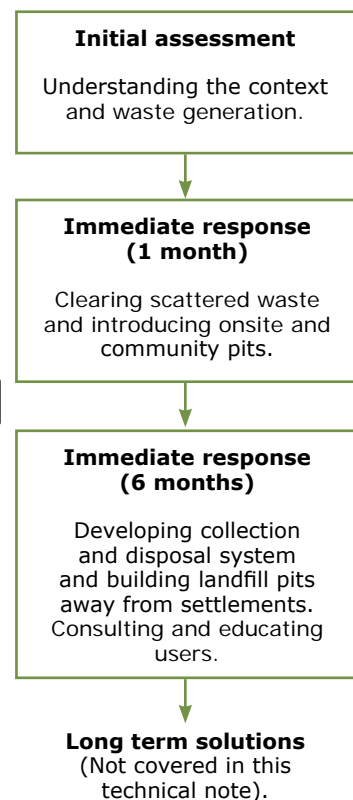


Figure 5 The process of planning solid waste management in an emergency

STAGE 1: Initial Assessment

The first stage in dealing with solid waste is to understand the emergency context and the nature of waste being generated. The following sections outline key questions for considerations:

A. The Context

- What solid waste management systems/equipment is already in place? How has it been affected? Is it possible to work with and learn from the existing systems?

- How many people are affected? Where are they? What are they doing with waste at present? Are there any pertinent cultural factors?
- What opportunities or restrictions does the environment present? Is it possible to dig pits? Where are surface water sources located? At what level does the water table lie? Where is land available?

B. *The Waste*

- What waste is being generated (e.g. organic, hazardous dry etc.)?
- Where are waste generators?
- How much waste is generated?

STAGE 2: Immediate Response (1 month)

Activities should be prioritized to present and future health hazards of different waste types and sources. Activities are likely to focus on clearing of existing scattered waste and managing waste from households and markets.

A. *On-site household disposal*

- Suitable where space is not too limited and where waste has a high organic content as it will decompose and reduce in volume. Also useful in areas where access is difficult.
- Pits should be 1m deep and be frequently covered with ash/soil to prevent access to waste by insects and rats and to reduce odors.
- Note that on-site disposal is labor-intensive and requires advanced household cooperation.

B. *Community Pits*

- Must be located within 100m walking distance of any household (SPHERE Guidelines)
- As a rough guide, 50 people will fill 1m³ of a pit each month, depending on generation rates and density.
- These are rapid to implement and require little operation and maintenance. Note that some people may object to walking 100m to deposit waste

STAGE 3: Intermediate Response (6 months)

A. *Community issues*

- Consultation. It is useful and important to consult potential users of a waste management system before and during design and implementation.
- Education. It is important for participating communities to understand how good solid waste management can be achieved and can benefit their health.

B. *Collection and Storage*

- In some on-site, community pits may be a suitable medium-term solution, whilst in others it will be necessary to devise ways removing and disposing of waste. This will usually involve the following: storage in the house, deposition at intermediate storage point and collection and transport to final disposal.

- In the home, plastic bags or a small container with a lid make suitable storage containers.
- For intermediate storage points in my communal areas bins of maximum 100 liter capacity are required when full this will weigh around 40kg. oil drums cut in half can be suitable. Ideally the bin will be arranged so that it can be emptied easily. A 100 liter bin is required for each 50 people or for a few market stalls. Bins require daily emptying and this is labor-intensive.

C. *Transport*

- When electing suitable vehicles, waste generation rates and densities need to be considered along with areas they need to access and distance between collection and disposal points. For example, a wheelbarrow could collect waste from approximately 50 individuals before requiring emptying.

D. *Disposal*


- As a medium-term solution, larger scale landfill pits can be constructed. Without leachate (liquid runoff) treatment these are not suitable for long term use. They should be situated at least 0m from surface water sources. Carefully consider drainage where the pit is on sloping ground and erect fences to keep animals and scavengers out.


E. *Staff*

- Approximately 2.5 workers are required for 1000 community members (WHO/UNEP 1991). Protective clothing and equipment need to be considered.

The provided technical notes from WHO can be used as a guideline of each country on what has to be done to the wastes caused by the disasters. There are also other Disaster Waste Management guidelines that the international community such as the one produced by the United Nations Office for the Coordination of Humanitarian Affairs and United Nations Environment Programme.

The Future

Solid Waste Management is already a day-to-day basis concern of each country in South East Asia. There are best practices that can actually be replicated to one another on a regular basis of waste segregation. However, it is also important to take a look on how to properly manage the wastes that are caused by disasters as these have to be case-to-case scenario how to get rid of the waste scattered all over the affected area that can result to another problem such as health condition of the people affected. Dealing with waste from disasters, on top of the regular waste that are for disposal and collection, is a surreal challenge for each government aftermath. As this cannot be avoided, a good contingency plan on disaster wastes can be associated with Disaster Management plan of each country in SEA. 

With so much experience of the SEA Region on disaster, each government shall have learned from it on how to deal with disaster waste every time it may occur. Awareness raising and capacity building of each community shall be reinforced during disaster as they will be the most affected one dealing with the waste on the grounds. Point of realization has yet to come to each of the member states of the ASEAN to give importance to the long-term effects of disaster wastes. As we are challenged by climate change, we cannot predict when will it strike again thus each country in the region can start an efficient system of disaster waste management to be used in the future. As we celebrate the 50 Years of ASEAN in 2017 with the theme of "Partnering for change, engaging the world," high hopes are expressed that dealing with aftermath of disasters shall be addressed. 

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FINANCIAL SUSTAINABILITY AND REPLICATION OF WASTE-TO-RESOURCE INITIATIVES IN ASIA: LESSONS LEARNED FROM ESCAP'S REGIONAL PROGRAMME

Rowan Fraser

Overview of the waste crisis in the Asia and Pacific region

A waste crisis is clearly evident in the Asia and Pacific region, fuelled by rising quantities of waste and changing consumption and production patterns, poor regulation and limited management capacity and resources. A combination of urbanization, demographic growth and economic development means that annual waste generation rates in the region are rising. According to World Bank data, the total daily waste generation rate in the Asia Pacific region is expected to more than double from current levels, to around 2.4 million tons daily in 2025. The emerging waste crisis threatens to overwhelm the resources and capacity of local governments and communities alike.

Within this crisis, however, is a significant and largely untapped opportunity for transformative change. To seize this opportunity, towns and cities need new methods and strategies for managing solid waste. In particular, a paradigm shift is required whereby towns and cities, that usually see waste as a problem and burden, begin to understand it as a valuable resource from which sustainable benefits can be derived.

A waste-to-resource approach can help cities and towns turn this waste crisis into an opportunity. Such an approach is built on the principles of 3R (reduce, reuse, recycle) and aims at making the most of a range of recycling opportunities. Typically, the organic fraction of solid waste in low- and middle-income cities averages between 51-65 per cent and the fraction of recyclable inorganic waste averages between 26-33 per cent. This presents a considerable and largely untapped opportunity for resource recovery in these towns and cities. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and its partners are committed to helping cities and towns in the region to seize this opportunity, thereby bringing a wide range of benefits across a number of sectors, including green job creation, better health, cost savings, improved food security and climate change mitigation.

ESCAP's regional waste-to-resource programme

Since 2009, ESCAP, Waste Concern and their partners have been promoting a waste-to-resource approach to sustainable solid waste management in towns and cities across the region, with financial support from the Bill and Melinda Gates Foundation. To do this, ESCAP's work has focused on the Integrated Resource Recovery Center as a model uniquely suited to the realities and constraints of managing solid waste in town and cities in developing countries.

The Integrated Resource Recovery Center model was first developed in Dhaka, Bangladesh by Waste Concern. An Integrated Resource Recovery Center is a low-cost, low-tech, decentralized facility that converts incoming waste into various resources, such as fertilizer (compost) or energy. Products from Integrated Resource Recovery Centers can be sold on local or national markets: compost can be sold to local farmers, homeowners and the municipal parks department, for example, and recycled plastic bottles can be sold into the recycling industry. Integrated Resource Recovery Centers usually are small-scale (2-20 tons), do not require mechanization and, therefore, are simple and cheap to operate, offering municipalities and communities in developing countries a viable and cost-effective way to sustainably manage and even benefit from solid waste.

ESCAP, in partnership with Waste Concern and a range of country partners, has been assisting cities in the region to develop sustainable waste management solutions based on a waste-to-resource approach. Seventeen cities and towns across Asia and the Pacific have taken part in ESCAP's regional programme. Waste-to-resource initiatives have been launched in a range of these, including eight cities where Integrated Resource Recovery Centers have been built.

Value creation from waste-to-resource initiatives

Waste-to-resource initiatives produce a wide range of advantages to communities, municipalities and the environment. Some benefits are largely local, such as financial savings to municipal budgets, while others have global implications, such as reduced greenhouse gas emissions. Economic value created by ESCAP's waste-to-resource initiatives include reduced landfilling costs, reduced need for subsidy for chemical fertilizer, extended landfill life, and improved crop yield. These initiatives also create social value, such as better job opportunities, reduced incidence of disease due to reduced vermin, improved living conditions and better environmental awareness. Lastly, environmental value is created through a reduction in pollution, improvements in soil quality, reduction in greenhouse gas emissions, and the generation of low-carbon fuel.

Value creation can be quantified and expressed in monetary terms. Because waste-to-resource initiatives bring both sustainable development and climate change mitigation benefits, such value quantification is an expression of the co-benefit of these initiatives. For example, research conducted by ESCAP, Waste Concern and their partners in Bangladesh, Sri Lanka and Viet Nam, found that the combined co-benefit of composting one ton of organic waste using the Integrated Resource Recovery Centre model produced a total co-benefit valued at almost USD 47 in Bangladesh, USD 57 in Sri Lanka and greatest of all, USD 92 in Viet Nam.

Importantly, much of this value does not accrue directly to the project implementer, but is disbursed to a range of community, sub-national and national actors. In this sense, much of the value created constitutes positive externalities of the project. Indeed, many waste-to-resource initiatives tend to struggle to become financially viable, partly because the value created by these initiatives can be difficult to capture and monetize. As such, mechanisms for capturing and managing value are needed. Such mechanisms serve as incentives for investment in waste-to-resource initiatives, and as incentives for performance improvement. Essentially, these mechanisms allow both private and public sector waste-to-resource project implementers to realize a return on their investment. Such mechanisms include tipping fees, feed-in tariffs, tax exemptions, subsidies, and pay-for-performance schemes.

Revenue structure and financial sustainability

Data collected from Integrated Resource Recovery Centers established by ESCAP and its partners indicate that the revenue structure of these facilities is distributed across four main classes: the sale of products generated in the facility; a tipping or collection fee; in kind support, most often from local government; and climate finance allocated as a result of the climate change mitigation benefit of waste-to-resource initiatives.

The collected revenue data clearly demonstrate the importance, if not necessity, of a tipping or collection fee for the financial sustainability of facilities. For example, the facility in Quy Nhon, Viet Nam maintains financial sustainability through a core revenue stream of collection fees amounting to 86 per cent of total revenue. The sale of compost and recyclables accounts for just 14 per cent. Similarly, in Islamabad, Pakistan, even with a strong local market for recyclables, the facility can derive only 31 per cent of its total revenue from the sale of recyclables. Sale of compost accounts for 8 per cent. Conversely, collection fees provides 61 per cent of total revenue. In Kushtia, Bangladesh a similar situation is observable, with the facility deriving 88 per cent of its income through fecal sludge collection fees. The sale of compost accounts for only 12 per cent. And lastly, the facility in Matale, Sri Lanka, derives some 76 per cent of its revenue from municipal subsidy. This subsidy is provided via the allocation of municipal workers to the facility and payment of utilities bills. Collection fees account for 5 per cent, and sales of compost and recyclables for a further 19 per cent.

This analysis clearly demonstrates the need for facilities to actively pursue financial diversification. The sale of recyclables and the sale of compost account for relatively minor components over all – typically between 3-11 per cent of total revenue – and are vastly insufficient to cover costs. For financial sustainability, a stable, monthly income from collection or tipping fees is essential. To support this, financial diversification should be pursued through various means . Case studies from Qui Nhon, Viet Nam, and Kushtia, Bangladesh, as well as other cities where ESCAP and its partners have been working, reveal effective strategies that other waste-to-resource initiatives can learn from in terms of financial diversification. These include conceptualizing the waste-to-resource initiative in terms of products and services delivered to stakeholders; considering the overall value chain, including access to waste (input), operational capacity and products (outputs); actively analyzing and responding to the size and demand for products and services on the local market, and making choices accordingly; vigorously and proactively pursuing cost recovery from the start; remaining focused on the business case of the initiative, and ensuring that the business case is well researched and planned; and building partnerships based on shared objectives, clear roles and responsibilities and correct risk allocation.

For more information on ESCAP’s programme, knowledge products and courses on this topic, please visit ESCAP’s dedicated Knowledge Corner for Waste-to-Resource Initiatives at www.unescap.org/waste-to-resource and www.waste2resource.org.

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INTERNATIONAL OVERVIEW: CASE ANALYSIS ON WASTE MANAGEMENT IN THE RHINE-SIEG DISTRICT, GERMANY

Michael Dahm



Center of the region

The Rhine-Sieg-District

The Rhine-Sieg-District (RSK) constitutes a county in the south of the federal state of North Rhine-Westphalia. It encompasses an area of 1.153,5 km² and its 583,772 citizens make it. In terms of population, it is the third largest German administrative district, following only the region of Hannover and the district Recklinghausen. The RSK almost completely encompasses the independent, district-free city of Bonn and they jointly constitute the region Bonn/Rhine-Sieg.



Rural area

Data on the Waste Management: Waste Management Concept 2014-2019 and Waste Balance

In principal, waste from private households can be divided into the categories of 'waste for disposal (WfD)' and 'waste for recycling (WfR)'. In contrast to waste of other origin (esp. commercial companies) both groups are to be left to the public waste management authorities. Insofar, the waste produced within the Rhine-Sieg-District is recorded separately according to its kind and fraction and consequently transported to the respectively appropriate treatment. The particular quantity streams are recorded and documented separately.

Waste for Disposal: Solid Waste / Residual Waste

'Solid Waste' includes wastes for disposal which are produced in private households as well as small business enterprises. It is collected as residual waste through the residual waste containers licensed within the waste management area, transported and directed towards further disposal. Similar business wastes from business equivalent institutions such as administration, barracks, hospitals, medical and office practices, sports sites, camping sites and schools, religious sites, kindergartens, retirement homes which are disposed of via separate waste containers are not listed in the category of solid waste

Collection systems are provided for the record of residual waste from households. Here, dominantly large waste containers (MGB) (80, 120 and 240 litres, respectively selectable for bi- or 4-weekly collection) and larger sized containers (660, 770 and 1.100 litres, respectively selectable for collection twice or 3 times per week up to a 4-weekly collection) are employed. Bin bags can be used for occasionally produced extra amounts of household waste. These specially marked grey plastic bags can be purchased at selling points across the Rhine-Sieg-District.



Large waste containers

Since year 2000, the solid waste is transported, delivered and transferred in 3 different ways on the basis of a long term disposal contract, until end of 2015, with the current disposal company or a third party private company respectively, so-called the 'residual waste disposal contract.' The special compactor / container vehicles have now been substituted with highly advanced Walking-Floor-Vehicles which guarantee a greater and more efficient vehicle load capacity as well as a more flexible employment. Alternatively, the residual waste is transported directly, or via the disposal plant in Swisttal-Miel, to the waste incineration plant.

Waste for Disposal: Bulky Waste



Organized waste street containers

According to the waste statute, 'Bulky Waste' includes mobile objects from private households which, due to their size or weight, do not fit into the waste containers or bin bags. Concerned are objects from homes which would usually be taken along during relocation.

Since 2000 the bulky waste disposal takes place district wide upon request by telephone through a customer friendly announcement by the citizen. The amount is restricted to 3 ccm per disposal. In July 2009, the sorting and processing of the bulky waste from the Rhine-Sieg-District was transferred to

the special purpose unit REK. In order to realize another sustainable objective, the installation of a local site bulky waste sorting, the construction of a sorting site in Troisdorf was initiated in 2010, the facility commenced operations in January the same year. Through a centralized bulky waste processing in the Rhine-Sieg-District long routes of transport are avoided. Since the beginning of 2012, the bulky waste from the 13 municipalities to the right of the Rhine and the 6 towns to its left is transported to the Rhine-Sieg-Waste Management Association (RSAG) owned facility on the property of the waste disposal plant Troisdorf by direct delivery and thus without additional transshipment or long distances. In 2014 slightly above 18,000 tons of bulky waste were recorded through the public collection; exactly 6,300 tons of bulky waste for disposal (sorting residue) and 11,700 tons of bulky waste for recycling.

The ways of disposal for sorting residue are essentially identical with those for solid waste. The recycling of the latter fraction (around 65%) is done through selected third party companies. Thereby, the practiced system does not only correspond to the objectives of waste avoidance and recycling but also reflects the principle of polluter. The method of collection on request and the subsequent processing serve the sustainable reduction of quantities as well as the separation of commodities and the conservation of resources.

Waste for Recycling

In the Rhine-Sieg-District, recorded waste for recycling encompasses glass, paper, scrap metal, lightweight packaging and non-packaging of similar material as well as cork, polystyrene, CDs, household appliances, electric and electronic appliances but also includes biodegradable waste and bulky waste.

District wide there exists the same system for recording the waste for recycling. In 2012, within the framework of a pilot project and together with the dual systems, the recycling bin (lightweight packaging and non-packaging of similar material) was introduced area wide. The recycling bin was well adopted by the citizens. With 763.800 containers as of January 2015, over a 3/4 million waste containers for disposal, collection and recycling including the residual waste containers are now available to the approximately 586,000 citizens of the Rhine-Sieg-District. Altogether, the mentioned collection systems in the Rhine-Sieg-District provide a comprehensive separate record of the different wastes for recycling.

In the Rhine-Sieg-District the following collection systems (collection and delivery systems) for the separate recording of the wastes are available:


- waste paper bin (4-weekly collection, 240 l, green)
- waste glass depot container (separated by color: white, brown and green glass)
- organic waste collection bin (biweekly collection, weekly collection during the summer months, 120 l / 240 l, brown)
- recycling bin (4 weekly collection, 240l, yellow)
- bulky waste collection (street collection, 3sqm restriction, request by telephone, provision of collection dates via date hotline)
- electro and electronic appliances collection (street collection, request by telephone, provision of collection dates via date hotline)
- small electro appliances receipt (small electro appliances-mobile, 4 times a year in every commune)
- small electro appliances container
- old clothes container
- pollutants and harmful waste receipt (pollutant-mobile, monthly in 2 alternating previously announced districts per commune)
- The citizens in the Rhine-Sieg-District can also deliver paper, glass, scrap metal, electro and electronic appliances as well as other recyclable waste, such as cork and polystyrene, to the respective disposal plants of the RSAG in Swisstal-Miel, Troisdorf-Friedrich-Wilhelms-Hütte and Eitorf. Since 2005, the citizens in the Rhine-Sieg-District also have the opportunity to dispose of their old CDs within the framework of a district wide collection initiative at the respective city halls of the 19 communes or the district halls.
- Due to the existing obligation of producers and distributors to take glass and lightweight packaging back, these are exempted from the public waste management and are recorded and managed by the dual systems.

Through the establishment of an online 'giving away'-platform, the RSAG offers an additional instrument to reduce the respective waste quantities or direct them towards reutilization via the so-called 'Exchange and Give-Away Market in the Rhine-Sieg-District' old objects can be comfortably researched online, as well as exchanged, given away or offered. Currently, a total of 244 advertisements are administrated and visually presented in this way in different 3 categories on 49 sites.

Organization of the Waste Management in the Rhine-Sieg-District

Principle Objectives

The objectives of the waste management are determined by the political decision makers of the Rhine-Sieg-District. Essentially, they aim to promote a sustainable, resource conserving, recycling management in accordance with the waste hierarchy. In particular, this means:

- To avoid or reduce waste and pollutants,
- To recycle produced wastes, especially glass, paper, metals, plastics, construction waste as well as organic and green wastes, in an orderly, damage avoiding and high-quality fashion,
- To treat non-recyclables if required,
- To sustainably dispose wastes that do not require further treatment,
- To educate of citizen  of the cities and municipalities, as well as the commercial economy in order to realize objectives 1 to 4.

In 1982, the district politicians had envisioned upcoming major investments, at a time waste incineration plant was deemed impossible. The RSAG remained responsible for the operative implementation of the waste management measures in the Rhine-Sieg-District. They pursued the importance of environmental protection and waste avoidance through resource conservation with the following principle: "Waste avoidance is required by law, and thus there is consultancy and advising to that effect with the avoidance of sanctions". In matters of waste avoidance the RSAG collaborates closely with consumer advice centers and the environment advisors of the 19 cities and municipalities. The overall development is positive. The waste quantities have not increased, despite of the increase in waste consumption.



Waste Site Problem Areas

Furthermore, there are a number of measures within the so-called five stage waste hierarchy. The following are some examples: bulky waste sorting, waste paper sorting, 'location service plus', additional-service-offers, recyclables containers, Citizen Value, environment education, citizen advice, waste advice, dishes-mobiles, ground and construction waste exchanges, disposable dishes, acquisition, internet platform exchange and give-away market.

In the context of initiatives for waste avoidance, for several years now, the participation in the 'European Week of Waste Avoidance' has been underscored by the RSAG with regular participation in special projects such as 'Repairing and Exchange of Electro Appliances'. Furthermore, brochures about waste avoidance in the areas of food waste or electro appliances are published.

Organizational and Administrative Implementation

The recycling management law, which came into force on June 01, 2012 determine the legal framework concerning waste for the Rhine-Sieg-District as a public management provider in creation of its waste management concept.

The waste management law of Nord-Rhine-Westphalia appoints the districts and district-free, independent cities as the public entities liable for the waste management. In fulfilling their obligations and the consequent tasks the districts and the district affiliated municipalities may employ eligible third parties. It resides with the districts' municipalities to collect the waste produced in their respective areas and transport it to the waste management plants.

The 19 cities and municipalities of the Rhine-Sieg-District have transferred their responsibilities to collect and transport the waste produced within their areas to the Rhine-Sieg-District. In accordance with Agreement of the 16.12.2011 (original agreement of the 30.11.1998), the Rhine-Sieg-District as the public entity responsible for waste management employs the Rhine-Sieg-Waste Management Association (RSAG) as a 98% district owned association for the conduct of the waste management insofar as waste from private households and the waste from commercial businesses, for whom the district sets proper fees and who are coequal according to waste and fee statute, are concerned. Within the framework of this commission the RSAG assumes the responsibilities described in the waste and fee statutes (so-called commission in accordance with § 16 par. 1 KrW- / AbfG; since June 2012 according to § 22 KrWG).

2% of the shares of the RSAG are held by the 'Rhenish Waste Management Cooperation' (REK), founded in 2009 by the federal city of Bonn and the Rhine-Sieg-District.

With respect to mineral wastes the RSAG, together with 16 private construction companies, founded an association for the operation of earth disposal sites dominantly in the northeastern parts of the district. The Rhine-Sieg Earth Disposal Site Enterprise GmbH (RSEB) is currently developing a corresponding management concept, on the

basis of which the management security of the Region for this particular waste stream can be guaranteed, the so-called 'Ground and Construction Waste Concept' for mineral substances such as soils, construction wastes as well as road construction waste and muddy wastes.

Choice of the Association Form

With the turn of the year 2013/2014 the Rhine-Sieg-District conducted the change of the legal form of its 98% subsidiary Rhine-Sieg-Waste Management-Association mbH (RSAG mbH) to a public-law institution (RSAG AöR). In the future, the new business model will secure the in-house competence of the RSAG. The relating resolutions were adopted by the District Assembly on 12 December 2013. The business structure was consequently changed along several stages. The RSAG AöR embarked into the year 2014 with this new structure. Over the course of this, the employees of the RSAG mbH were transferred into the RSAG AöR; the RSAG mbH was subsumed under the district holding as a purely fund management company and subsidiary without employees. There it is situated alongside the Rhine-Sieg-Traffic Company (RSVG), the non-profit, Public Housing Association (GWG) and the Traffic Company of the Left Rhine Side (LVG).

These changes had no impact on the daily conduct of the waste management. Wastes and recyclables are still collected, processed and recycled by the RSAG. However, not by the GmbH but the AöR. Only visually, i.e. on written documents, printed material and digital mandatory information can, depending on the respective purpose, the AöR's abbreviation be found besides the RSAG's corporate name.

The establishment of the public-law institution (AöR) ought to entail economic advantages as well. Thus, an AöR saves the turn over tax on personnel costs; these savings can be used for the stabilization of the waste fees.

Supervision and Monitoring

In North Rhine-Westphalia a three-level model exists within the framework of this area. Beginning with the supreme (federal) state level, the Ministry for Climate Protection, Environment, Agriculture, Nature and Consumer Protection (MKULNV) in Düsseldorf is the responsible authority for such tasks within the area of supervision and monitoring.

The district government (BZR, department 52) in Cologne constitutes the intermediate hierarchy level, and the so-called 'Office 66' (lower waste authority) in Siegburg functions as the lower waste management authority on the district level.

Financial Situation: The Fee System



Waste Site Problem Areas

The Rhine-Sieg-District transferred its responsibilities as a public waste management authority to the RSAG - public-law institution (RSAG AöR) insofar as they were not transferred to the association Rhenish Waste Management-Cooperation (REK). The setting of fees as well as the enactment of the waste and fee statute still resides with the Rhine-Sieg-District.

For the utilization of the public institution waste management of the RSAG AöR as well as for the utilization of the services of the Rhenish Waste Management-Cooperation - here: the management of bulky waste and paper waste from private households including the transport (from and to the waste management sites) - the Rhine-Sieg-District collects fees for the coverage of the costs (in accordance with a special statute = fee statute).

These services transferred to or provided by the RSAG AöR as well as the REK include, amongst others, the expenditure on the collection and management, respectively processing, of the wastes listed in the waste statute. This also includes the necessary contingency costs. This 'overall package' is consequently charged to the account of the Rhine-Sieg-District, whereas the district is reimbursed by the citizens in form of fees.

The fee setting and collection happen on the basis of the communal fee law for the state of North Rhine-Westphalia and observes in its details the provisions of the waste fee statute of the Rhine-Sieg-District.

Therein, the benchmark for fees is based on a total fee which is composed of two different components. Apart from the basic fee there exists a service / working fee. The polluter pays principle is the supreme maxim: Whoever produces less waste pays less fees. Whoever produces more waste, accordingly pays more.

The basic fee is collected from every household, independently of how many people live there. The basic fee reflects, amongst other things, the running costs of the operation of the RSAG-waste management plants, of follow up expenditures, of the pollutant management, the environment- as well as small electro appliances-mobile or of the customer service and the collection of bulky waste, major household appliances as well as green waste and of the collection of illegally disposed waste.

The working fee represents the flexible part of the fees. It considers the individually accruing costs, to which belong for example the provision of the containers, the collection and transportation of the waste and their final processing. The working fee also reflects the container size and the frequency of collection.



Waste container equipment and collection

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