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Economic Instruments for Solid Waste Management

Case Study Bayawan, Philippines

Published by: giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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List of Abbreviations

AHT	AHT GROUP AG Management & Engineering, Essen, Germany, Consultant for the implementation of GIZ SWM4LGUs project and this Case Study
AFR	Alternative Fuels and Raw materials for co-processing in cement kilns
BAWAD	Bayawan City Water District
BCWMEC	Bayawan City Waste Management and Ecology Center
City ENRO	City Environment and Natural Resources Management Office
DED	Former Deutscher Entwicklungsdienst (German Development Service) that is integrated into GIZ since January 2011
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
EcoGov	Official Development Project of USAID in the Philippines that addressed Ecological Governance (2001 – 2010)
FFM	Forest and Farm Management Division in Bayawan City
EcoSan	Ecological Sanitation
EI	Economic Instruments
EMB	Environmental Management Bureau
FCA	Full Cost Accounting
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IEC	Information-Education-Campaign
IRA	Internal Revenue Allotment
ISWM	Integrated Solid Waste Management
LGU	Local Government Unit
LO	Local Ordinance
MoA	Memorandum of Agreement
M&E	Monitoring and Evaluation
MRF	Material Recovery Facility
MWF	Abbreviation locally used for the waste collection schedule for bio-waste on Monday-Wednesday-Friday
NGO	Non-governmental organization
NSO	National Statistics Office
NSWMC	National Solid Waste Management Commission
PAYT	"*Pay-As-You-Throw*" scheme for solid waste collection
PCWMB	Pollution Control and Waste Management Board Bayawan City
RDF	Refused-derived fuel
SLF	Sanitary Landfill
SWM	Solid Waste Management
SWM4LGUs	Solid Waste Management for Local Government Units in the Philippines, Project conducted by AHT GROUP AG on behalf of GIZ with DENR
UEM	Urban Environmental Management Division in Bayawan City
USAID	United States of America International Development Agency
WACS	Waste Analysis and Characterization Study

Executive Summary

To establish and operate reliable Solid Waste Management systems, efficient technologies, stable organizational structures, skilled personnel, sound operational management and appropriate financing concepts are required. In order to sustain such systems, the implementation of suited legal framework conditions and economical instruments are considered as key success factors. Complementary, proper financial management allows to determine the real costs of SWM and to design local policies that provide the needed mechanisms to conduct Solid Waste Management on community level and to formulate rules and user fees that are not only acceptable by residents and users but likewise secure participation of stakeholders and transparency for the public.

As in other developing countries, the financial sustainability of SWM systems remains a severe issue also in the Philippines. Cost recovery is an important requirement for sustainable waste management, but it does not always correspond to political priorities, the willingness of the population or the capacities of the administration to implement it. Fees to cover SWM costs are either not asked for, or existing fees are not raised effectively by the authorities in charge. However, fees will directly affect the capacity and willingness of service recipients to pay as well as the maximum level of cost recovery that can be achieved. The lower the level of cost recovery, the higher the resulting risk of poor services rendered or ultimately service interruptions. Hence, sustainable financing of waste management systems by local means is imperative. It reduces the dependency on external aid and strengthens local capacities. However, to achieve this target a set of economic instruments (EI) needs to be installed that provide fair mechanism and charge user fees on acceptable levels.

EI can be broadly classified into three categories according to the purpose with: a) revenue-raising instruments, e.g. to raise capital or to cover operational cost for establishment and operation of SWM programs; b) revenue-providing instruments; e.g. mechanism that encourage to install a desirable behavior based on user charges such as waste collection and tipping fees, or fines to eliminate wrong SWM practices (e.g. littering, burning), or deposit-refund programs; and c) non-revenue instruments, these could combine a fee with a subsidy whereas the fee is waived when the desired effect is reached, e.g. time/target-linked tax-holidays for certain SWM tasks or projects.

In this context the GIZ sector project “Concepts for sustainable waste management” was initiated with the main aim to analyse available EI that could be used in SWM and to compare their effects and the pre-conditions for their implementation. To support this endeavour, GIZ proposed to analyse experiences from several partner countries where bilateral SWM programs have worked on the implementation of fee systems or other EI. Therefore, GIZ commissioned AHT GROUP AG on June 20, 2012 (VN: 81147527, PN: 10.2161.7-001.00) to conduct a Case study for the Philippine context for the Local Government Bayawan City, located on Negros Island in the Visayas Region, a partner Local Government Unit (LGU) during the implementation of the GIZ SWM4LGUs project that started in January 2005.

Development history and legal framework

Based on the development history of the presented Case study it appears that the LGU Bayawan City was mainly driven by legal demands but also through official development co-operation programs provided by the USAID Eco-Governance project, the DILG-GIZ water program and the DENR-GIZ SWM4LGUs project. Initially, RA 9003 was the main driving force that demanded to enhance their municipal SWM systems, whereas these enhancements were related with substantial investments and efforts. Secondly, with their desire to participate at the DENR-GIZ development project SWM-4LGUs they had committed as one selected LGU to contribute to a specifically formulated development objective of this project, namely: “Selected local governments implement integrated solid waste management systems proficiently and economically”. This target includes that efforts will

be made to refinance municipal SWM services as formulated with project indicator 3: "In at least 5 cities the operation costs for waste management are financed by a system of waste fees that cover at least 30% of the local budget for waste management".

The authority to legally collect fees for provided SWM services by the implementing municipality is manifested by Republic Act (RA) 9003, Chapter V (Financing SWM), Section 47. Based on that the Local Government can impose fees to recover provided cost for waste management services that repay the direct cost incurred related to the implementation of the municipal waste management program and for the collection of local fees.

Objective of Case study

The main objective of this Case study is to analyse the characteristics and effects of the various locally applied EI and to clarify the preconditions and various development steps that were necessary to install them. The study further aims to analyse the approaches and success factors that were relevant to implement the chosen EI and to identify and evaluate their currently prevailing effects in detail.

Brief on local waste management situation

To enhance its local SWM system and to implement the legal prescriptions of RA 9003 Bayawan City established a new 10-Year SWM Plan in August 2004. Following, the city passed Ordinance No. 63-2005, called „Bayawan City Integrated and Ecological Solid Waste Management Ordinance of 2005". This ordinance provides the needed regulations and local policy framework to implement the 10-Year SWM plan. Likewise it integrates various mechanism to introduce and apply user charges.

In 2007, with technical assistance from GIZ, the city proceeded to establish a central waste management and recycling center with integrated sanitary landfill (SLF). In parallel, the city created a SWM unit under the Urban Environmental Division of the City Environment and Natural Resource Management Office (City ENRO). This SWM unit is responsible for the implementation of all SWM projects identified under the 10-Year SWM Plan. To implement a new Waste Management Center the city acquired a 24-hectare site located 7 km northeast of the city center. This SWM facility was launched in April 2010 and includes a sorting plant, a composting area, an office building, a weighbridge and a 1-hectare landfill with leachate and septage treatment facilities. The SWM center was financed by own municipal funds with a total investment of 35 Mio PhP Peso respectively 700,000 Euro and provides the needed facilities for the LGU to implement EI such as tipping fees, fees for waste collection or sales of recovered materials and produced compost.

Preconditions, issues and challenges

Although various local ordinances that addressed SWM issues existed prior to release of RA 9003 in Bayawan City, the local discussion to enhance the municipal SWM system basically started with the drafting of a new 10-Year SWM plan in March 2003. This plan aimed to overcome the following shortcomings of the existing SWM system and related challenges:

Organizational	Unclear responsibilities, roles, functions, tasks within the LGU, e.g. "scattered SWM responsibilities" over several departments
Political/Legal	Hesitance to address SWM issues and to propose and implement suited local ordinances
Technical	Lack of knowledge for all aspects of technical SWM, e.g. waste characterization, collection, segregation, recycling, composting, treatment, disposal
Financial	Lack of budget allocation for basic SWM duties, lack of data and SWM accounting, lack of cost recovery mechanism and EI
Public relations	Lack of tools to inform and involve the community in waste avoidance strategies, e.g. reduction at source programs, waste segregation, household composting; lack of motivation and incentives
Awareness	Lack of participation of local decision-makers in SWM capacity building measures, lack of environmental awareness by majority of residents
LGU processes	Lengthy processes to propose and approve budgets for capacity building and SWM pilot activities/projects; barriers between departments, loss of information due to changes in participation

Many of the discussed issues were already addressed within the 10-Year SWM Plan. However, the establishment of EI and introduction of "polluter pays principle" was a new task and challenge for the municipality, the involved decision-makers, residents and other waste generators who were used that waste management services are provided cost-free by the municipality. Prior to 2006 the LGU did not generate any revenues from SWM whereas income from sales of recovered materials was merely aimed at by local junkshops and the informal sector. Since the LGU had neglected to refinance provided public SWM services, knowledge and experiences how to establish the needed technologies and EI as well as to address respectively convince the community to participate in new SWM systems were lacking. However, after approval of the 10-Year SWM plan the LGU explored new mechanism and regulations for community participation as part of the proposed SWM system and gradually introduced new local ordinances (LO) that set targets for waste reduction, waste segregation, and changes of unwanted habits/behavior with the following EI:

Pay-as-You-Throw (PAYT) with prepaid sticker system (LO 63-2005 and LO 2-2007)

This scheme requires that Bayawan City citizens purchase one sticker per garbage bag (up to 40 litres) for the collection of residual and special waste only but also for bio-waste for those households or establishments in the city center that cannot provide space for composting. The stickers have to be acquired at the city hall (City Treasures Office) or at authorized selling stations at the public market or barangay halls for a price of 2 Peso respectively around 4 Eurocents per sticker, based on the regulations of LO 2-2007.

Tipping fees from septic tank management (LO 216-2011)

Presently, around 5,000 septic tanks are installed within the urban center or Bayawan City. It was assumed that observed groundwater quality problems within the shallow aquifer may also be influenced by non-functioning or overloaded septic tanks. Consequently, the LGU proposed with LO 216-2011 a fee system for the cleaning of septic tanks and collection/treatment of related sludge based on the „polluter pays principle". This ordinance requests all owners of septic tanks to at least clean their septic tanks every four (4) years. The operation of this system was started in August 2011. The requested fee per tank cleaning is 2,160 Peso respectively around 45.00 Euro whereby this fee is collected with the local water bill from the Bayawan City Water District (BAWAD).

Proposed solid waste tipping fee for 3rd party users of the SLF at BCWMEC (pending)

This new ordinance would allow that 3rd parties can use the SLF based on a tipping fee. The envisioned LO from 2012 proposes in Section 3 „that the BCWMEC shall only accept waste from parties that have a Memorandum of Agreement (MoA) with the City of Bayawan in which the mode of payment, maximum tonnage delivered and other relevant matters are agreed upon". Section 4 of said LO proposes a tipping fee of 1,000.00 Peso/ton (around 20 Euro) for segregated residual waste and a tipping fee of 500.00 Peso/ton (around 10 Euro) for delivered bio-waste.

Proposed compost sale ordinance (pending)

Although the introduced PAYT system under LO 63-2005 reduces the collection of bio-waste, it is assumed that households from the city center who may not have access to private property or a garden to set up a compost bin, likewise institutions, commercial establishments and the public market will continue to generate bio-waste. Consequently, the LGU provides a central composting facility. To regulate the marketing of produced compost and to enhance cost recovery for the SWM program this LO was proposed in 2011. It would authorize the City ENRO to sell compost within the area of jurisdiction.

In the meantime, the LGU proposed three further ordinances that aim to ban open burning and burning of waste, to reduce the utilization of plastic bags and to ban oil disposal into canals and water bodies; all based on fines and penalties mechanisms.

Summary of perceived success factors

From the Bayawan experiences it appears that the main success factor that enabled the LGU to implement the new SWM program was the strong political will and continued interest to implement environmental enhancement programs of the former Mayor German Sarana, who acted as City Mayor within the time period 2001 to 2010. He initiated and attended many project activities together with members of the local City Council. Besides, the intense capacity building process offered by the USAID EcoGov program and two GIZ development co-operation projects that started in 2005, enabled the involved city personnel and key stakeholders to plan, organize and implement the detailed SWM program efficiently.

The continuous and full-time presence of a long-term DED adviser in the time period February 2008 to March 2012 contributed largely to enhance know how transfer and to speed up the development process itself. This is also reflected in the increasing number of LO for SWM during this time period that provided the needed regulations to more efficiently address SWM issues and to enhance community participation, e.g. through changes in waste reduction and segregation methods. The new LO on the other hand integrated EI, especially to increase cost recovery for provided municipal SWM services. Additionally, the newly established organizational framework for SWM with bundled functions under the City ENRO increased the efficiency and sustainability of the SWM program by far.

Effects of the newly applied EI

So far the LGU implemented a PAYT system for segregated waste collection and a further tipping fee for the cleaning of septic tanks raised through the local water bill. Both fee systems already contribute to increase the cost recovery. The effects perceived with their implementation so far are assessed as follows:

- the proposed PAYT scheme for segregated waste collection was accepted by the community and so far generates revenues of roughly 4,800.00 Euro/year. Additionally, the introduced fee for septage management already reaches a level around 1,900 Euro/month. Based on these developments, the overall cost recovery rate may increase to around 17% in 2012, a significant increase if compared with the 3% cost recovery rate from 2009. However, the cost recovery rate for municipal SWM service would only reach 3% if the fees collected from septage management would be neglected;
- since implementation of the PAYT the overall waste collection rate decreased by around 23%, whereas the amount of bio-waste delivered to the BCWMEC decreased from 78% in 2003 to 58% in 2010. Furthermore, the amount of recyclable materials decreased by far from 14% in 2003 to only 0.9% in 2010 which means that the majority of sellable materials are now segregated at source and delivered to local buyers or junkshops or taken away by them instead of being collected and disposed;
- Although the waste collection rate decreased relatively since introduction of the PAYT, this aspect is not reflected within the annual expenditures for SWM. Main cost items are salaries, wages, equipment and facility operation costs. These cost items did not decrease so far since the LGU continues to extend the SWM facilities at the BCWMEC for the material recovery and composting sites and included 2 further barangays into the collection area;
- due to the reduction of residual waste collected the life span of the SLF may be lengthened, whereas related emission potentials and operation cost may decrease;
- the introduction of the new SWM system and EI triggered an reorganization of SWM roles, functions and tasks within the LGU; this measure assisted to clarify responsibilities and increased process efficiency and skills of involved staff;
- further visible effects of the PAYT within the collection area are increased cleanliness at public places, e.g. at the central market and along main roads. Although waste burning in backyards is still practiced in many households, the number of visible burning places along roads decreased;

- based on the results of a SWM Service Satisfaction Survey from May/June 2011, the most residents from the collection area are aware of the importance of SWM and welcome the provided LGU services. However, around 30% of residents still question if the sticker system is needed and reasonable; further information campaigns may be needed to fully explain the functions and benefits of the sticker system in order to increase community participation and appreciation of the new PAYT system;
- so far two kind of negative effects of the introduced PAYT system were observed: a) some users try to use larger bags per sticker in order to reduce their cost for sticker acquisition; b) some residents started to dispose waste illegally in order to avoid collection costs, both actions demand the LGU to increase efforts and budget for enforcement interventions. However, revenues from issuance of violation tickets is relatively low with 31 tickets as highest number in 2009 but only 6 violation tickets in 2011. Hence, the income from violation tickets remains irrelevant for the cost recovery situation;
- lastly, the revenue for the selling of waste stickers gradually decreases as a side effect of the targeted enhancement of waste segregation and reduction at source.

Recommendations

To further increase cost recovery for SWM services the pending LO should be approved by the City Council, especially the proposed LO that targets the utilization of the SLF through 3rd party users based on tipping fees. Furthermore, the local government should explore options to extend the service collection area in order to increase the income for prepaid waste stickers. Since the income from waste stickers so far reaches only 3.5% of the SWM expenditures, it is recommended to either adjust the fee per sticker or to reduce the allowed volume or weight per collected bag/sticker used. Furthermore it should be checked if the total value of sold stickers correlates with the actual collected waste volume/weight by the municipal waste collection. In case of miscorrelation, the SWM unit and enforcement team should propose measures to prevent illegal waste dumping respectively the collection of unjust large waste volumes handed over for waste collection per sticker.

From the positive experience made with the more efficient cost recovery for septage tank management it is proposed that the City Council considers to refinance a certain portion of provided municipal SWM services through regular energy or water billing. Alternatively, it could be discussed to introduce a general waste management fee linked to the annual business permit as practiced in Dumaguete City.

Related to the utilization of revenues from SWM services it is recommended to establish the proposed SWM trust fund as proposed with LO 63-2005, Article 18, Section 47 (Use of Fund): “The City Solid Waste Management Fund shall be used only to support the implementation of the City Solid Waste Management Plan, including endeavors that will enhance its implementation” in order to safeguard the sustainability of the new municipal SWM system.

For the waste treatment at the BCWMEC it should be explored if waste-to-energy options could be integrated to a) better utilize bio-wastes that are not compostable, b) to enhance the treatment of collected sludge from septic tanks, e.g. through co-processing with manures to produce biogas and c) to recover plastic and packaging residuals as Alternative Fuels and Raw materials (AFR) for co-processing in cement kilns. For the latter, a revenue of around 8 Euro/ton AFR could be expected based on the experiences made in a related pilot project in Iloilo City. Such measures could also address the legally requested local actions to tackle climate issues as mandated by the Climate Change Act of the Philippines (RA 9729). In this context it should be explored if the LGU can participate in related pioneering programs that are presently in discussion by the Climate Change Commission of the Philippines related to the emerging Nationally Appropriate Mitigation Actions (NAMA) approach.

For the National Solid Waste Management Commission it is recommended to formulate a sample ordinance or guideline that demonstrates and explains options for EI and PAYT approaches that are applicable in the Philippine context in order to provide a standard for municipal SWM financing and to support LGUs in related local policy making.

1 Introduction

1.1 General remarks

The financial sustainability of solid waste management (SWM) systems is a severe issue in low- and middle-income countries. Cost recovery is an important requirement to operate SWM systems in a sustainable manner, but it does not always correspond to political priorities, the willingness of the population or the capacities of the administration to implement it. Fees to cover SWM costs are either not asked for, or already implemented fees are not raised effectively by the authorities in charge. In many partner countries, development cooperation projects have addressed aspects of financing and economic instruments in SWM. But most of the time, this topic was not in the focus of the joint activities. Therefore, the GIZ sector project "Concepts for sustainable waste management" was initiated with the main aim to analyse available EI that could be used in SWM, compare their effects and the pre-conditions for their implementation. In this context, GIZ commissioned AHT GROUP AG on June 20, 2012 (VN: 81147527, PN: 10.2161.7-001.00) to conduct a related case study for the Local Government Unit (LGU) Bayawan City, located on Negros Island in the Visayas Region. Bayawan City is partner LGU of the DENR-GIZ development project "Solid Waste Management for Local Government Units in the Philippines" (SWM4LGUs) that started in January 2005.

1.2 Brief on the solid waste management situation in the Philippines

SWM is still a pressing issue in the Philippines and environmental degradation caused by steadily increasing volumes of domestic wastes, uncontrolled dumping and burning of refuse remains a severe problem. Most landfills hardly comply with minimum standards in water, soil and air protection as stipulated by RA 9003. Although this law mandates to increase resource recovery to at least 25%, to close dumpsites and to implement SLF already in 2006, compliance with the legal prescriptions remains low. This has led the National Solid Waste Management Commission (NSWMC) to prepare a so-called 3-Strike Policy in 2008, which consists of a solid review of all municipalities that have not complied with RA 9003, reminder letters for concerned LGUs to implement the legal prescriptions and subsequent issuance of warnings for around 200 LGUs that did not respond accordingly. As of December 2010, merely 331 of the total 1,610 municipalities have submitted a 10-Year Solid Waste Management Plan and 790 municipalities still operate open dumpsites although this is illegal since February 2006 according to RA 9003. However, enforcement acts against violating local governments are hardly implemented so far. Some progress is made with the establishment of SLF whereas around 60 SLF are in planning stage respectively 30 of them are already in operation as of December 2011. Furthermore, the established municipal or private waste collection systems mostly serve only urban or town centres. Hence, a significant portion of non-collected waste is being burned or buried at household level or ends up in natural depressions, drainage systems, waterways, mangroves and in the sea. Considering the importance of SWM and especially the need for proper waste disposal and sound treatment of organic waste to mitigate climate impacts, the urgency to provide solutions intensifies. However, many LGUs and private SWM operators still lack knowledge to plan, finance, implement and operate SWM programs efficiently. Consequently, cost recovery mechanisms to refinance municipal SWM services are seldom in place and their relevance is not recognized. Besides, many citizens expect that SWM is provided cost-free by the government and reject user fees, at least initially. The latter aspect may be a major reason why local decision-makers often hesitate to explore options to establish local waste management fees. However, without efficient cost-recovery mechanism, the sustainability of waste management services and enhancement projects will remain questionable.

2 Objectives

The main objective of this study is not to analyse the characteristics and effects of different EI in general, but rather to clarify the preconditions and various development steps that were necessary to install and use EI within the documented pilot projects. The study further aims to analyse the approaches and success factors that were relevant to implement the chosen EI, to identify and evaluate their currently prevailing effects and related development interventions. Specifically the Case study aims to answer various questions sorted into three steps of analysis as follows:

2.1 Description of the basic elements of the systems

Initially, the background of EI as applied in the Case study is clarified whereas involved stakeholders, project issues and objectives are explained. Following, the established respectively proposed EI are explained in detail and reasons and main steps for their development elaborated. As part of this analysis responsibilities of involved stakeholders and mechanism of the newly established financing system and their link to regulatory policies are clarified.

2.2 Analysis of preconditions and challenges

In a following analytical step the details of pre-conditions and challenges during the introduction of new EI are evaluated. As part of this the main perceived drivers and barriers that were observed during introduction of new EI are identified and the approaches to overcome obstacles respectively hindrances clarified. Furthermore the details of the various established financing mechanism and the reasons for their implementation are discussed based on the local administrative capacities, local ordinances and common SWM practises. Based on the findings the main perceived success factors of the Bayawan case are summarized.

2.3 Analysis of the effects of the EI introduced

In a final analytical step, the effects of the newly applied EI and mechanisms for financing/refinancing of the local SWM system are assessed. As part of that the major effects of the new system are elaborated with focus on waste evolution, changes in waste management practises and cost recovery rate. Lastly, conclusions and recommendations are formulated that focus on the enhancement of EI for the Bayawan case and for the Philippine context.

3 Case Study Bayawan City

3.1 Local setting and solid waste management situation

3.1.1 Study area

Bayawan City is a medium-size City with a population of 114,074 (Census NSO 2010) located at the southern tip of Negros Island. Bayawan City was declared a component city on December 5, 2000 per Republic Act 8983 and is part of the 3rd Congressional District of the Province of Negros Oriental. It is located 101 kilometers southwest from the provincial capital, Dumaguete City, and covers a total land area of 699 km². The city is accessible by land through a coastal highway. It is bounded by Kabankalan City and the Municipalities of Mabinay and Basay to the north and west, by Tanjay City and Bais City towards the east and to the southeast by the Municipality of Santa Catalina (compare Figure 1).

Figure 1: Location of study area

Bayawan City is subdivided into three development zones: Firstly, the urban center that comprises around 17 km² of the total area of jurisdiction and hosts the main institutional, commercial and central business activities of the city. It functions as the main economic hub, while economic development follows some major roads that link to strategically located barangays in the hinterlands. Secondly, the sub-urban area with 102 km² of the municipal jurisdiction that comprises agro-industrial zones, industrial zones and human settlements along the southern lowlands. Further residential zones are in development within this area to provide settlements for people employed in commercial centers and industrial zones. However, 580 km2 of the city are rural areas and hilly hinterlands that are basically utilized for agricultural production, mainly for forests, coconut production and sugarcane farming. The city has two distinct climate seasons: the dry season, well pronounced in the months of January to May, and the wet season, in the months of June to December. Typhoons intermittently occur in the time period May to December.

3.1.2 Local solid waste management situation

To enhance its local SWM system and to implement the legal prescriptions of RA 9003 the LGU Bayawan City established a new 10-Year SWM Plan in August 2004. In 2007, with technical assistance from GIZ, the city proposed to establish a central waste management center with integrated

SLF, with funding from its own revenues as outlined in the 10-Year SWM Plan in the magnitude of 700,000 Euro (compare Annex 1). In the same year, the city passed Ordinance No. 63-2005, called „Bayawan City Integrated and Ecological Solid Waste Management Ordinance of 2005" (compare Annex 2). With this ordinance the LGU reorganized its SWM system based on the new SWM plan whereas this ordinance already integrates various mechanisms to introduce and apply user fees.

In 2007, a further local ordinance, the „Revised Revenue Code of the City of Bayawan" (compare Annex 3) was released that provided a new waste management fee system based on prepaid stickers that employ the „generator's pay principle" also called „Pay-As-You-Throw" (PAYT) scheme. Parallel, the city created a SWM unit under the Urban Environmental Division of the City ENRO. This SWM unit is responsible for the implementation of all the integrated SWM projects identified under the 10-Year SWM Plan and supervises around 50 employees that are tasked with the daily waste management works.

Waste generation and collection

To analyze the local waste generation situation, waste characterization studies (WACS) were conducted in the years 2003, 2009 and 2010. In the year 2003, a 7-day waste stream analysis took place as base for the preparation of the 10-Year SWM Plan Bayawan City (compare Annex 1, Chapter 3.8, pages 38 ff). To actualize the data base the LGU Bayawan City conducted a further WACS in 2009 in the urban and rural barangays of the city (compare Annex 4). During these assessments, samples were taken from selected waste generators to analyze amounts of biodegradable, recyclable, residual and special wastes in weight and volume in order to provide the needed extrapolations and projections for SWM planning. Based on that, the average waste generation rate was estimated in the magnitude from 0.29 kg/capita/day for rural areas and up to 0.58 kg/capita/day for the urban center. Main waste generators are households from residential areas, commercial establishments and institutional sources. As of 2009, the total waste generation within the jurisdiction was estimated with around 40 tons/day. Due to the limited road access, the municipal waste collection presently reaches only 30% of all households and only serves 7 urban and 3 rural barangays out of a total of 28 barangays with 4 compactor trucks and 1 small dump truck. The LGU established a collection system with separate collection days for biodegradable and non-biodegradable wastes. The collection schedule covers Monday, Wednesday and Friday (MWF) for biodegradable wastes while Tuesday and Saturday non-biodegradable wastes are collected. Every first Thursday of the month special wastes from households are collected.

The following Table 1 summarizes relevant data for waste generation, population and economical development including waste generation projections extrapolated from the above mentioned planning documents of the LGU for the time period 2009-2018. However, it is emphasized that the planning and implementation of new technical SWM projects such as adjustment of the waste collection system, the design of the BCWMEC as well as EI were based on the 10-Year SWM plan that only provided a planning horizon until the year 2014:

Table 1: Projected waste generation Bayawan City for the time period 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Population Growth Rate (%)	1.66	1.63	1.59	1.49	1.46	1.43	1.40	1.39	1.38	1.37
Econ Growth (%)	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Population [1]	113,215	114,074	117,075	120,107	123,097	126,125	129,190	132,290	135,542	138,676
Total number of households [2]	22.374	22,544	23,173	23,736	24,327	24,925	25,531	26,144	26,786	27,406
Total waste gen. (tons/day) [3]	40.6	41.7	42.8	43.9	45.0	46.1	47.3	48.6	50.0	51.4
Projected 30% waste collection (tons/day)	12.2	12.5	12.8	13.2	13.5	13.8	14.2	14.6	15.0	15.4
Collected waste (tons/year) [3]	4,453	4,562	4,672	4,818	4,928	5,037	5,183	5,329	5,475	5,621

1) Projection based on NSO census data 2010, data from 10-Year SWM Plan and WACS (Annex 1 and 4)
2) Number of residents 5.06 per household according to 10-Year SWM Plan Bayawan City
3) Projections based on WACS 2009 (Annex 4) and [Boorsma et al, 2009] whereas the total waste generation was computed for 27,117 urban residents with average waste generation rate of 0.58 kg/cap/day and for 85,804 rural residents with an estimated waste generation rate of 0.29 kg/cap/day

Based on Table 1 it is estimated that the municipal waste collection may increase from around 4,453 tons/year in 2009 to up to 5,621 tons/year in 2018, which means an increase of 26%. However, this scenario does not yet consider an increase of the coverage area that is targeted by the LGU as well. In general, the waste generation and collection development is expected to be dynamic whereas system changes affect the amount and composition of collected waste. The perceived changes of waste amounts and composition in time, also due to the newly introduced policies and technical SWM enhancements, will be explained and discussed later on.

Table 2 summarizes the average composition of generated and collected waste in Bayawan City for the year 2009.

Table 2: Average amounts and composition of waste in Bayawan City for the year 2009

Composition	Waste generated 2009 [1]		Collection coverage in 2009 [1]	
	(tons/year)	(%)	(tons/year)	(%)
Bio-degradable	8,299	56	2,271	51
Recyclable	2,223	15	757	17
Residuals	4,149	28	1,380	31
Special waste	148	1	45	1
TOTAL	14,819	100	4,453	100

1) Based on data from data from 10-Year SWM Plan (Annex 1), WACS 2009 (Annex 4) and [Boorsma et al 2009]

The data displayed in Table 2 underline that the municipal waste collection still gathered > 50% of bio-waste in 2009 although some household and barangay composting contributed already to reduce bio-waste within the waste collection. This issue was already addressed by the 10-Year SWM Plan and various following interventions of the LGU Bayawan City. The chosen strategies how to reduce bio-waste at source and prior to waste disposal will be explained later on.

Presently, the material flow for the recovery and collection respectively treatment of domestic type wastes is organized as shown in Figure 2:

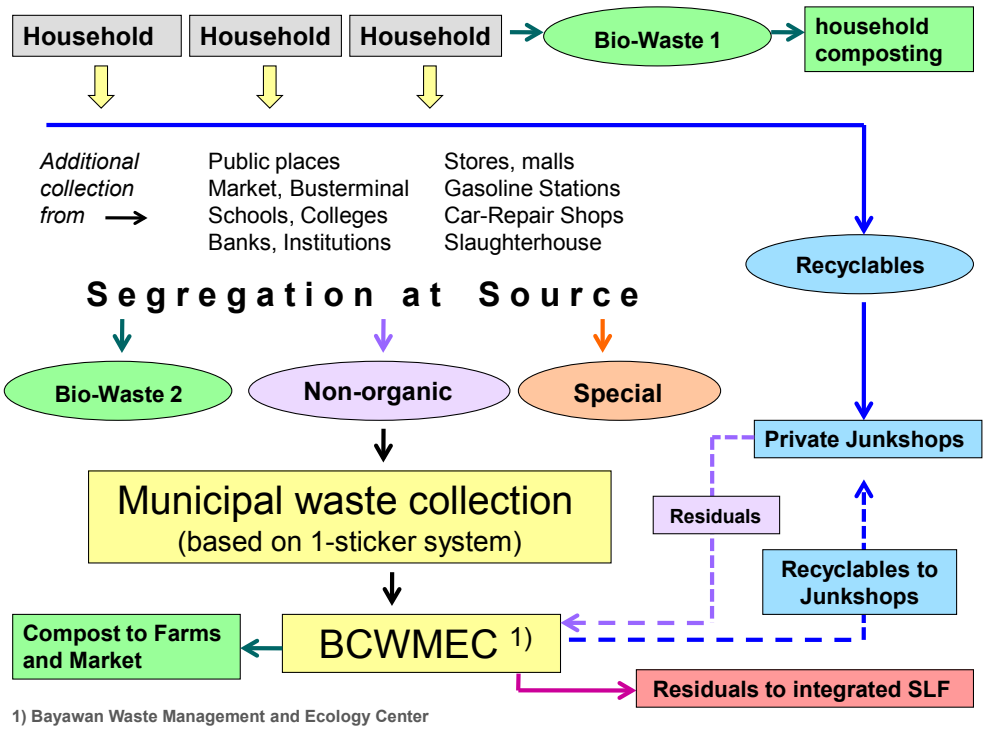


Figure 2: Material Flow in Bayawan City based on the new SWM program

The information presented in Figure 2 includes already various introduced changes of the SWM system that followed the launching of the BCWMEC in April 2010, especially the implementation of waste segregation at source based on a prepaid sticker system.

Material Recovery, Recycling and Composting at the BCWMEC

The BCWMEC was launched in April 2010 and integrates a sorting plant, a composting area, an office building, a weighbridge, a 1-hectare SLF unit and septage and leachate treatment facilities. The integrated SLF has a projected lifespan of >30 years. This center is located 7 km northeast of the urban center in Barangay Maninihon. It covers 24 hectare and was realized with LGU investments from the Local Development Fund, in total 35 Mio Peso, respectively 700,000 Euro.

The central Material Recovery Facility (MRF) and windrow composting area are both located within the BCWMEC (compare photos Annex 11). The MRF is a permanent shed/building that allows segregation of materials by utilizing gravity force. Materials can be pushed down from an input area to lower working areas, where they are sorted into various material fractions and forwarded to storage units. The use of a gravity-based system does not only provide an efficient way to segregate materials for the tasked workers but also reduces operation and maintenance cost. Through operation of the MRF and the composting plant the disposal of recyclables and bio-waste can be reduced and hence the lifespan of the SLF being increased. Biodegradables that are gathered with the segregated collection on MWF are delivered to the MRF/composting plant. Two different types of composting are applied: windrow composting and vermi-composting whereas the latter significantly increases the quality of the final compost product.

3.2 Context for the introduction of EI in Bayawan City

Based on the development history of the presented Case study it appears that the Local Government Bayawan City was mainly driven by legal demands but also through official development cooperation programs provided by the USAID Eco-Governance project, the DILG-GIZ water program and the DENR-GIZ SWM4LGUs project. Initially, RA 9003 was the main driving force that demanded to enhance their municipal SWM systems, whereas these enhancements were related with substantial investments and efforts. Secondly, with their desire to participate at the DENR-GIZ development project SWM4LGUs they had committed to contribute to a specifically formulated development objective of this project, which reads as follows:

“Selected local governments implement integrated solid waste management systems proficiently and economically”. This target integrates that efforts will be made to refinance municipal SWM services as formulated with project indicator 3: “In at least 5 cities the operation costs for waste management are financed by a system of waste fees that cover at least 30% of the local budget for waste management”.

The authority to legally collect fees for provided SWM services by the implementing municipality is manifested in Chapter V (Financing SWM), Section 47 of RA 9003 and reads as follows:

“The local government unit shall impose fees in amounts sufficient to pay the costs for preparing, adopting, and implementing a solid waste management plan prepared pursuant to this Act. The fees shall be based on the following minimum factors:

(a) *Types of solid waste;*

(b) *Amount/volume of waste; and*

(c) *Distance of the transfer station to the waste management facility.*

The fees shall be used to pay the actual costs incurred by the LGU in collecting the local fees. In determining the amounts of the fees, an LGU shall include only those costs directly related to the adoption and implementation of the plan and the setting and collection of the local fees”.

Furthermore, Section 49 of RA 9003 provides the framework for fines and penalties of prohibited acts that are listed in detail in Chapter V, Section 48 such as littering, burning, dumping or unauthorized collection and transport of waste, illegal operation of waste management facilities, distribution or import of non-environmentally acceptable packaging materials and others. Based on these legal requirements every LGU should formulate and agree upon a local policy framework that allows the implementation of the legally requested measures. Although the set up of a fines and penalty system for prohibited acts is mandatory, RA 9003 authorizes LGUs to collect fees for their provided SWM services, but the collection of such fees is not mandatory.

Similar as in other cities in the Philippines, Bayawan City was challenged with various and growing waste management problems during the last decade. For this reason, the LGU had drafted and approved its 10-Year SWM plan in 2004 that manifests proposed SWM programs and interventions for the time period 2005-2014 (Annex 1). This plan was supported by the official development cooperation program of USAID, Eco-Governance (EcoGov) since March 20, 2003 (compare Chapter 2.2.1 "Legitimization of LGU-EcoGov Partnership", page 6 of 10-Year SWM Plan, Annex 1). This SWM plan already proposed the implementation of various mechanisms to enhance waste reduction and segregation at source, participation of users and establishment of MRF systems and a SLF besides others. It appears that the LGU-EcoGov development partnership was the main driver besides RA 9003 to initiate the establishment of new SWM policies and EI that could enhance the local SWM system. The 10-Year SWM Plan states on pages 50-54 within Chapter 3.11 "Analysis of current ISWM Policy environment" the insufficiency of various former local ordinances with regard to SWM. Hence it proposed in Chapter 7.6 "Revenue generation" the development of fee systems to enhance cost recovery for provided municipal SWM services e.g. through garbage fees, tipping fees and fines and penalties (compare pages 91 and 92 of Annex 1).

However, parallel to the LGU-USAID/EcoGov development cooperation various other developments may have inspired and supported the LGU Bayawan to explore new SWM approaches and related EI. Firstly, the City of Dumaguete already implemented a PAYT system successfully in the year 2002. This system was originally based on a prepaid 3-sticker system whereas green stickers were used for bio-waste, red stickers for residual waste and yellow stickers for special waste. However, the yellow sticker application was terminated after one year since special wastes from household were mostly mixed with residual waste and a regarding segregation could not be enforced by the LGU. Close relationships among many local politicians and governmental employees in the area most likely have triggered information exchange and discussions related to this topic. Secondly, the author had met the former City ENRO Department Head, Mr. Roger Dael several times during his prior development work assignment in Bais City from 2000-2004, a neighboring municipality of Bayawan that had already implemented a SLF in the year 2003. Specifically, information exchanges and meetings with the City ENRO of LGU Bayawan increased following the launching of the new SLF in Bais City from April 2, 2003. The related information exchange may have clarified that the establishment of a landfill could be financed by the LGU Bayawan by own means and that options for the refinancing of such SWM investment are at hand. In fact, the idea to establish a PAYT that uses a prepaid sticker system was adapted by the Dumaguete City approach but later modified in Bayawan City with utilization of only one prepaid sticker. This system will be explained later on.

Furthermore, Bayawan City had joint the DILG-GIZ Water Program in 2005 and participated in many capacity building measures and various pilot projects e.g. a wetland establishment for a local fishermen village, EcoSan, social preparation programs and others. Since SWM4LGUs was closely working with the DILG-GIZ-Water Program during the time period 2005-2007, various joint activities were conducted that triggered the integration of LGU Bayawan City as partner LGU of SWM4LGUs in September 2007. To further strengthen this partnership, a DED-development worker, Mr. Jouke Boorsma, was extended to the LGU in February 2008. He focused especially on development support for the new SWM program of the LGU. Although the main framework for new LO was proposed with the 10-Year SWM Plan prior to his arrival, he initiated a discussion to explore the need and opportunities of further SWM enhancements and related EI. Furthermore, he supported knowledge management and was a significant driving force for the establishment of the BCWMEC [Boorsma et al, 2009; Boorsma et al, 2011].

3.3 Basic elements of the newly proposed EI system

Based on the recommendations of the 10-Year SWM Plan and the following developments the LGU proposed various local ordinances (LO) that integrate EI. Table 3 summarizes the existing and pending local policies that propose EI in order to enhance the local SWM system.

Table 3: Compilation of Local Ordinances that propose EI for SWM in Bayawan City

Name of Ordinance	Proposed EI	Targets	Date (number)
Bayawan City Integrated and Ecological Solid Waste Management Ordinance of 2005	Garbage collection fee, sale of recyclables, tipping fee at SLF and penalties & fines	Enhancement of all municipal SWM system components	8.11.2005 (63-2005)
Ordinance adopting the Revised Revenue Code of the City of Bayawan	User fee through garbage stickers for waste collection (1.5 Peso/ sticker for 40 liter)	To enhance waste segregation and material recovery at source, to enhance cost recovery	12.3.2007 (2-2007)
Ordinance establishing the Septage Management System and Water Usage Policies in the City of Bayawan	Tipping fee	Cleaning of domestic septic tanks and treatment of removed sludge	27.4.2011 (216-2011)
Ordinance establishing a tipping fee on a per ton basis for the disposal of SW for governmental and private entities to the BCWMEC)	Tipping fee	Increase of waste collection coverage; enhancement of economical performance of BCWMEC	Pending Draft 2011 UEM/SWM unit
Ordinance authorizing the City Environment and Natural Resources Office to sell compost produced at the BCWMEC	Sale of recycled products	Increase of compost production and use in Bayawan City, enhanced cost recovery	Pending Draft 2011 UEM/SWM unit
Ordinance prohibiting the use of plastic bags and dry goods, regulating its utilization on wet goods, and prohibiting the use of Styrofoam/Styropor in the City of Bayawan and prescribed penalties therof	Fines & penalites	Reduced use of plastic bags	Pending Draft 2012 UEM/SWM unit
Ordinance banning open burning in Bayawan City and providing penalties for violations thereof	Fines & penalties	Prohibition of open burning and waste burning	Pending Draft 2012 UEM/SWM unit
Ordinance prohibiting disposing and pouring used oil or any other polluting toxic liquid directly into drainage canals, creeks, rivers, coastal waters or any body of water	Fines & penalties	Reduce pollution from unsound disposal of used oil	Pending Draft 2012 UEM/SWM unit

The above mentioned ordinances contain several EI that also target to change certain unwanted but well known SWM behavior/habits of residents and other users and EI that could support the sustainability of technical operations of the LGU.

The following Figure 3 displays the main elements of the presently established SWM system in Bayawan and indicates the position of intervention points from the provided LO and EI.

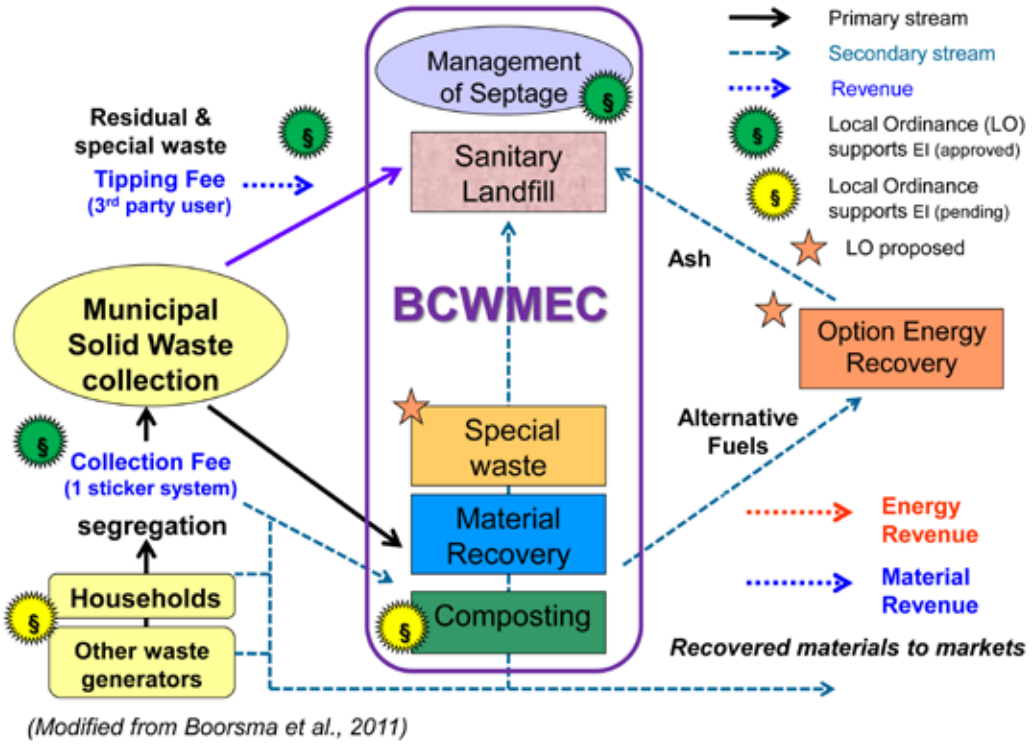


Figure 3: Overview of Economic Instruments for SWM in Bayawan City

Pay-as-You-Throw (PAYT) with prepaid sticker system (LO 63-2005 and LO 2-2007)

Since the year 2009 the LGU applies a PAYT system for all waste generators that are located within the collection area and can be linked to the regular waste collection at the points of waste generation (at source) with a prepaid sticker system. This scheme requires that Bayawan City citizens purchase one sticker per garbage bag (up to 25 litres) for the collection of residual and special waste only but also for bio-waste for those households or commercial establishments in the city center that cannot provide space for composting. However, the LGU monitors the waste segregation at source and encourages composting on household and barangay level. Prior to the introduction of the new PAYT system more than 50% of collected waste was biodegradable. The stickers have to be acquired at the city hall (City Treasures Office) or at authorized selling centres at the public market or barangay halls for a price of 2 Peso respectively around 4 Eurocents per sticker, based on the regulations of LO 2-2007. The authorized selling stations do not receive a commission for the selling of stickers since they are already otherwise supported by various LGU activities. The sticker itself is composed of two units; both contain a corresponding identification number (compare Photo 1, Annex 11). The collection crew checks if a sticker is connected correctly at the garbage bag placed for collection and takes off the smaller unit that will be forwarded to the City Treasures Office for documentation. The remaining portion could be kept by the waste generator, but is mostly left on the garbage bag for collection. Garbage bags that are not labeled with a sticker or are labeled incorrectly will not be collected. The related enforcement procedures for such cases are discussed later on.

At this stage of project development it is still unclear if and how the LGU will establish a special SWM trust fund that will receive all revenues from SWM activities and could only be used for SWM operations. In fact, the various LO released and proposed (compare Table 3) are non-unifom in this regard, some mention that revenues should go to a SWM trust fund, some of them do not provide any related information.

Tipping fees for septic tank management at the BSWMEC (LO 216-2011)

Since the year 2011, sludge removed from domestic septic tanks is processed at the BCWMEC at a specifically constructed sludge treatment plant that also utilizes the leachate treatment system provided for the SLF. Presently, around 5,000 septic tanks are installed in houses located within the urban center or Bayawan City. Groundwater quality problems observed within the shallow aquifer were assumed to be triggered by non-functioning or overloaded septic tanks. However, local services to clean septic tanks were hardly available and if provided the treatment and disposal of extracted sludge unclear. Consequently, the LGU proposed with LO 216-2011 a fee system for the cleaning of septic tanks collection/treatment of related sludge based on the „polluter's pay principle". This ordinance requests all owners of septic tanks to at least clean their septic tanks every four (4) years. The LGU acquired special equipment for sludge extraction and installed a central treatment facility at the BCWMEC. The operation of this system was started in August 2011 and integrated as routine task under the supervision of the local SWM unit of the CENRO. The requested fee per tank cleaning is 2,160 Peso respectively around 45.00 Euro whereby this fee is collected with the local water bill from the Bayawan City Water District (BAWAD). The collected sludge is delivered to the BCWMEC for treatment. However, BAWAD charges the users for the septic tank cleaning not per case but with a regular add on fee included into the water bill as shown in Photo 2, Annex 11. Since the LGU covers all cost for the tank cleaning, BAWAD forwards the collected fees fully to the LGU.

Proposed solid waste tipping fee for 3rd party users of the SLF at BCWMEC (pending)

During the development of the BCWMEC it was already discussed if 3rd parties could later on use the SLF for the disposal of residual solid waste. Since the capacity for landfilling was estimated with > 30 years this endeavor was favored by the LGU. It was especially thought of to offer the SLF to the neighboring municipalities Santa Catalina and Basay assuming that they may not be in the position to establish a landfill on their own. Besides, the generated revenues through tipping fee could enhance the cost recovery situation of the LGU Bayawan. The envisioned LO from 2011 proposes in Section 3 „that the BCWMEC shall only accept waste from parties that have a Memorandum of Agreement (MoA) with the City of Bayawan in which the mode of payment, maximum tonnage delivered and other relevant matters are agreed upon". Section 4 of said LO proposes a tipping fee of 1,000.00 Peso/ton (around 20 Euro) for segregated residual waste and a tipping fee of 500.00 Peso/ton (around 10 Euro) for delivered bio-waste, whereas all fees would be deposited to a special SWM project account to be used only for SWM activities of the LGU.

Proposed compost sale ordinance (pending)

Although the introduced PAYT system under LO 63-2005 and LO 2-2007 targets a significant reduction of bio-waste within the waste collection area, it is assumed that households from the city center who may not have access to private property or a garden to set up a compost bin, likewise institutions, commercial establishments and the public market will continue to generate bio-waste. Hence the BCWMEC provides a composting facility. To regulate the marketing of produced compost and to enhance cost recovery for the SWM program this LO was proposed in 2011. It would authorize the City ENRO to sell compost within the area of jurisdiction and to deposit the revenue under the special SWM project account of the LGU. According to Section 3 of the proposed LO „the price of compost shall be established on a semi-annual basis and based on the average price of three quotations from local compost producers".

Proposed plastic bag avoidance ordinance (pending)

To reduce residual waste generation, clogging of drainage systems and contamination of waterways, the LGU proposed a further LO in 2011 that especially aims to reduce the use of plastic bags and styrofoam/styropor through prohibition or regulated respectively restricted use. It further promotes to revive the utilization of alternative, locally made packing materials to provide substitutes for packaging. As control mechanism fines and penalties are proposed with a level of 4, 10 or 20 Euro fines for the second, third respectively fourth offence. The first offence would be a written notice (citation ticket) by the enforcement unit of the City ENRO.

Proposed ordinance to ban open and waste burning (pending)

With this ordinance, the LGU targets to reduce the still widely practiced burning of various agricultural residues and domestic type waste. Section 2 of this pending ordinance states: „No person shall kindle, start, maintain or allow open burning of solid waste, agricultural waste, special wastes, and construction and demolition waste except as provided in this ordinance".

As control mechanism fines and penalties are proposed with a level of 6, 10 or 20 Euro fines for the second, third respectively fourth offence. The first offence would be a written notice (citation ticket) by the enforcement unit of the City ENRO.

Proposed ordinance to ban used oil disposal into canals and any water body (pending)

To reduce contamination of surface and groundwater the City ENRO proposed this ordinance in 2012. All households, institutions and establishments, especially gasoline stations and car repair shops would be tasked to store used oil properly and to hand over collected used oil for further treatment to the LGU as coordinated by the City ENRO. Fines for non-compliance would be in the magnitude of 1,000, 3,000 and 5,000 Pesos respectively 20, 60 and 100 Euro for the second, third respectively fourth offence. The first offence would be a written notice (citation ticket) by the enforcement unit of the City ENRO.

3.4 Analysis of preconditions and challenges during system implementation

3.4.1 Preconditions and challenges

Although various LO that had also addressed SWM issues existed prior to release of RA 9003 in Bayawan City (compare pages 51 ff, Annex 1) the local discussion to enhance the municipal SWM system basically started with the commencement of drafting the new 10-Year SWM plan in March 2003. The author participated in several SWM workshops conducted by USAID-EcoGov (Dumaguete City, Bayawan City, Bais City) where municipal SWM officers were trained to conduct the various components of the SWM plan. The fact that up to date only around 350 out of 1,610 municipalities in the Philippines were able to formulate and submit such a SWM Plan underlines the following shortcomings on the working level and related challenges:

Organizational	unclear responsibilities, roles, functions, tasks within the LGU, e.g. "scattered SWM responsibilities" over several departments
Political/Legal	hesitance to address SWM issues and to implement suited LO
Technical	lack of knowledge for all aspects of technical SWM, e.g. waste characterization, segregation, recycling, composting, treatment, disposal
Financial	lack of budget allocation for basic SWM duties (only collection and waste dumping), lack of data and SWM accounting, lack of cost recovery mechanism and EI
Public relations	lack of tools to inform and involve the community in waste avoidance strategies, e.g. reduction at source programs, waste segregation, household composting; lack of motivation and incentives
Awareness	lack of participation of local decision-makers in SWM capacity building measures, lack of environmental awareness by majority of residents
LGU processes	lengthy processes to propose and approve budgets for capacity building and SWM pilot activities/projects; barriers between departments, loss of information due to changes in participation

The discussed general shortcomings of SWM may have inhibited the LGU to formulate EI at early planning stages. To agree upon options for cost recovery, potential applicable SWM technologies, investment and operation costs, roles, functions and responsibilities for SWM within the LGU need to be clarified first. However, many of the perceived issues were already addressed within the SWM Plan and later on with various LO. The chosen strategies to overcome the discussed challenges are summarized in Table 4:

Table 4: Strategies chosen to overcome perceived shortcomings in SWM in Bayawan City

Perceived challenge	Strategies to address challenges	Reference	Perceived success
Organizational	Formulation of 10-Year SWM plan; set up of a local SWM Board and a responsible and leading LGU-SWM unit; creation of an enforcement section within the SWM unit	10-Year SWM Plan (pages76-80); LO 63-2005, especially Article 3	SWM unit under City ENRO capacitated and functional
Legal	Drafting and approval of three (3) Local Ordinances (LO) that implement proposals of 10-Year SWM Plan and update local SWM regulations; further five (5) LO propose to introduce additional EI (SLF tipping fee, composting sales, plastic bag reduction, ban of open waste burning, controlled treatment of used oil)	All LO as listed in Table 3	3 LO approved, 5 further LO are pending but have a realistic chance to be approved by the City Council
Technical	Conduct of series of workshops started with USAID-EcoGov, continued with DILG-GIZ water program and GIZ-SWM4LGUs program; conduct of WACS; implementation of BCWMEC and segregated collection system	LO 63-2005 and LO 2-2007, Environmental Compliance Certificate for BCWMEC	SWM office functioning; Approval of 10-Year SWM Plan in 2004; completion of planning/licensing process and inauguration of BCWMEC in April 2010
Financial	Establishment of a Full-Cost-Accounting system (FCA) for SWM, also as base to draft new LO that provides EI to enhance cost-recovery mechanism	FCA and all LO listed in Table 3	Drafting/approval of new LO, construction and operation of BCWMEC financed since 2010; revenues for SWM services increasing since 2009
Public relations and awareness	Inclusion of local decision-makers in all SWM capacity building measures, creation of community SWM committees; set up of an enforcement team that includes local police; creation of a „IEC Team“ (multi-sectoral group of LGU departments and local civil organizations) that links to enforcement team	10-Year SWM Plan (Chapter 6.1, pages 76-81); LO 63-2005, especially Article 12	Sticker system for segregated collection as proposed with LO 2-2007 introduced and functioning; cleanliness at public places and urban center significantly increased
LGU processes	Creation of a responsible and leading LGU-SWM unit; assignment of SWM officers for technical SWM sub-units (BCWMEC, enforcement, PR, financing); establishment of FCA	LO 63-2005	FCA established, increased budget for SWM enhancement projects made available, SWM functions/tasks bundled in one office

From the perspective of the involved development advisers (GIZ-AHT, DED) the most significant intervention to enable the LGU to implement a new municipal SWM program was to provide continuous capacity building. The series of trainings, workshops and jointly conducted pilot projects included SWM experts and local decision makers likewise with participation of 15-20 LGU staff. Furthermore, SWM4LGUs provided a specific SWM training course that contained 18 modules. This training was delivered during the time period 2007-2012 and complimented the ongoing construction and operation of the BSWMEC timely whereas two lead officers of the SWM unit participated at this training program in the time period 2008-2010.

The various meetings and trainings provided by SWM4LGUs allowed that the involved SWM experts from EMB and partner LGUs met regularly to exchange experiences and lessons learned. Lastly, many of the project experiences were documented as special publications for international conferences and whenever possible presented together with project partners. The related knowledge management products are documented at the project website (www.swm4lgus.net) and can be

downloaded cost-free. A further special project publication was produced for the expert network of the Technical Committee on Geotechnics of Landfill Engineering of the German Geotechnical Society (www.landfill-technology.info, 2011).

3.4.2 Establishment of a Full-Cost-Accounting-System for SWM

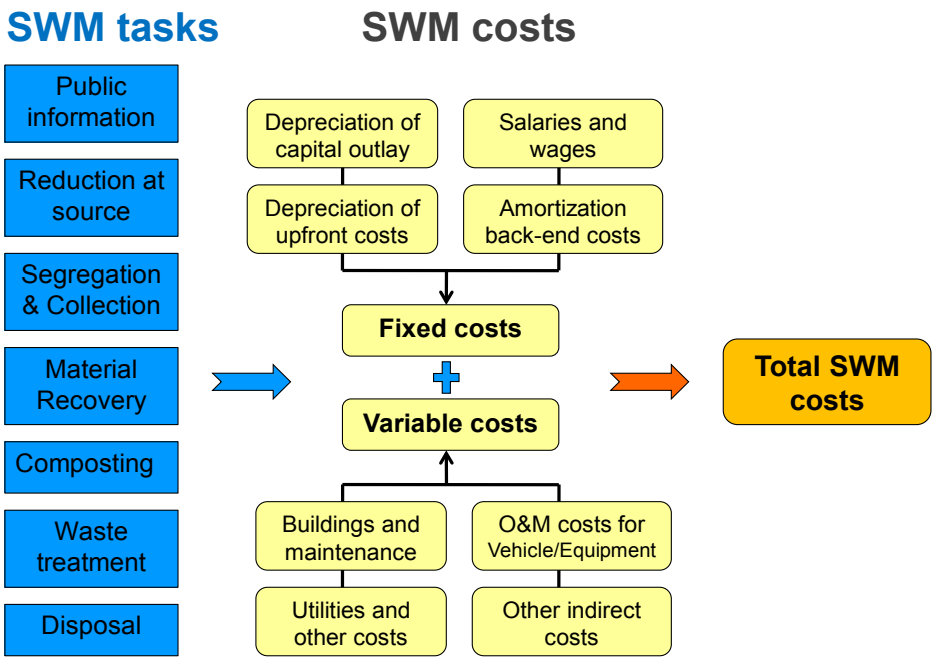
In most LGUs in the Philippines, the understanding for total expenditures of SWM and mechanism on how to finance and sustain municipal SWM services is rather meager. Information regarding the direct and indirect cost as well as hidden cost, e.g. for health and environmental impacts, are mostly incomplete or even absent. The actual money available for municipal SWM services basically relies on the outcome of budget negotiations that target the local development fund. This fund comprises 20 % of the total LGU budget; the latter is also called Internal Revenue Allotment (IRA) as handed over annually by the national government to the LGU.

Although FCA is perceived as a useful tool to clarify the actual cash flow for SWM and to augment the understanding for budget needs, it is hardly applied by LGUs so far. Nevertheless, there are more advantages that FCA can offer such as:

- Serves as a tool for planning and analyzing future budget requirements;
- Helps to identify hidden cost;
- Assists to trace and reform inefficiencies of a program and to identify relevant changes;
- Provides a tool to evaluate financial scenarios, especially in view of potential impacts and changes in quantity and quality of municipal solid waste; and
- Allows to investigate the potential for implementing additional and innovative systems of waste collection/segregation and related charging, whose intent is to render financial incentives to citizens for reducing waste generation, e.g. as provided with the PAYT system.

The decision to develop a first FCA for SWM in Bayawan was made prior to the implementation of the BSWMEC. However, it took the LGU around 3 years to trace all of the needed data for the involved departments and various sub-accounts and to compile them within a specific FCA for SWM.

The main elements of the established FCA in Bayawan City are summarized in Figure 4.



(Modified from Boorsma et al., 2011)

Figure 4: Main elements of the Full-Cost-Accounting system for SWM in Bayawan City

With the assistance of the DED development adviser, the following FCA was established for the year 2010:

Table 5: Summary of FCA cost units for SWM in Bayawan City for the year 2010

Allocation per Activity 2010 (in Euro [1])					
Particular	Reduction at Source	Collection	Composting	Disposal[2]	Total
Salaries & Wages	21,230	31,040	19,731	9,245	81,246
Vehicle & Equipment Operation and Maintenance Cost	757	14,741	5,182	11,726	32,406
Buildings & Grounds Maintenance	-	-	3,893	14,987	18,880
Utilities	-	-	1,161	2,709	3,870
Other Indirect Costs	2,233	5,210	4,469	8,189	20,101
Depreciation of Capital Outlay	685	5,080	6,633	24,344	36,742
Amortization of Back-end costs	-	-	380	4,723	5,103
Depreciation of Up-front costs	-	-	581	581	1,162
Contingency	2,740	6,168	4,623	8,416	21,947
Total	27,645	62,239	46,653	84,920	221,457
Processed total waste in tons/year		*4,453*	*2,271*	*1,380*	*4,453*
Average cost/ton processed waste		*13.98*	*20.54* [3]	*61.53*	*49.73*

1) Exchange rate on July 3, 2012: 1 Euro=51PHP, financial and waste processing data 2010 based on Boorsma et al, 2011 (Tables 1 and 3)
2) Includes monitoring and aftercare
3) True cost per ton composting are most likely higher since not all of the collected organic waste was properly composted at the BCWMEC in 2010 but a significant amount of organic waste only stored in heaps

The format for the FCA as proposed in Table 5 is not established as a LGU routine so far, meaning that potential project evaluations would have to trace and compile these data from the involved LGU offices again. However, the annual budget and direct cost for SWM are documented as routine tasks within the SWM unit of UEM.

The following Figure 5 displays the distribution of the various sub-budgets for SWM in percent. The histogram underlines that the main cost of the established SWM system are related to the payment of salaries and wages, waste collection and depreciation of capital cost with almost 70% of the total annual SWM budget.

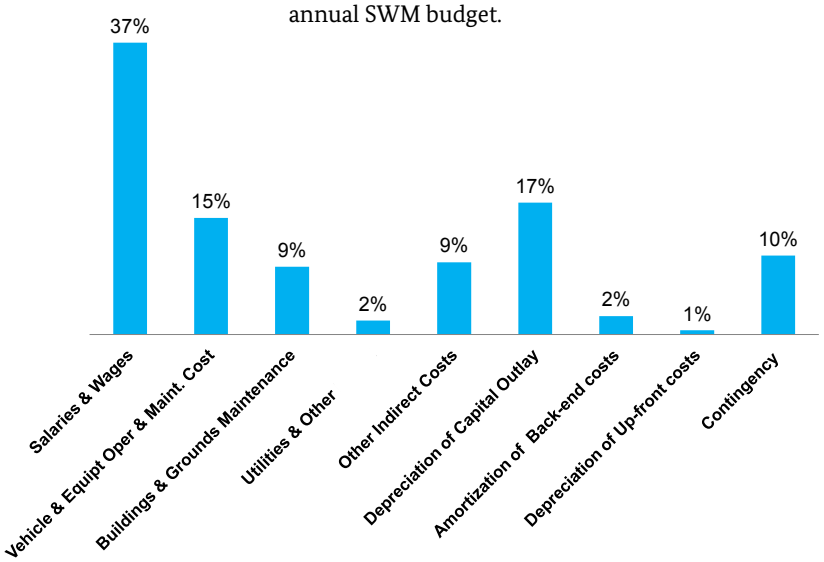
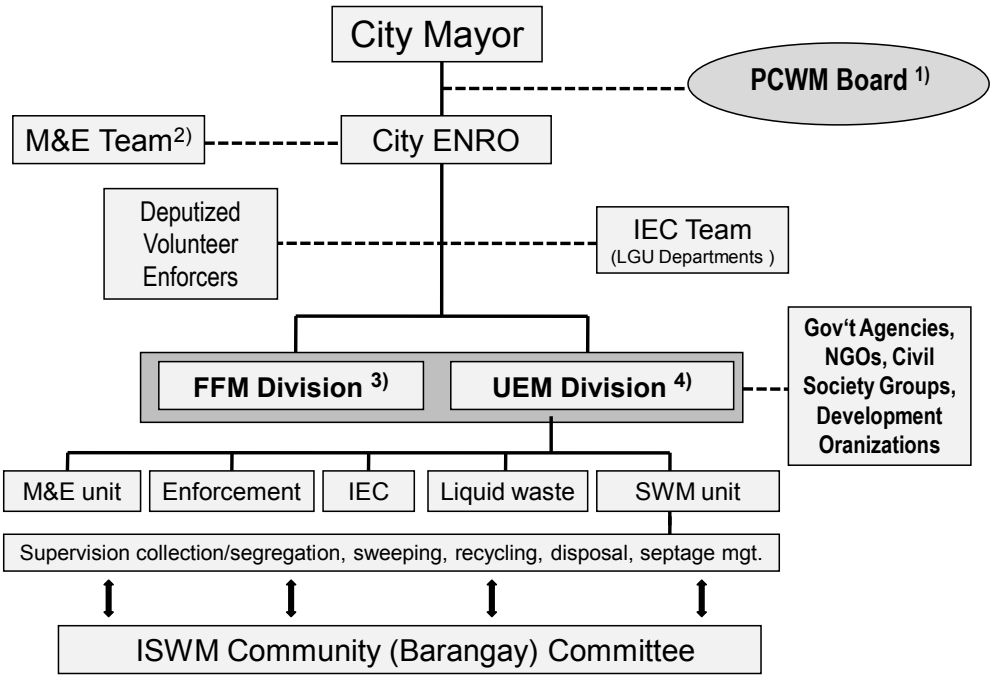


Figure 5: Overview of SWM cost components in percentage for Bayawan City (2010)

The data compilation of Table 5 and Figure 5 were used to inform the involved decision-makers and to provide the needed framework for the discussion of the additionally proposed LO as listed in Table 3. During various discussions related to the introduction of the new PAYT for waste collection it became clear that for a given waste collection of around 2,500 tons residual and bio-waste/year in Bayawan a total amount of around 100,000 stickers could theoretically be sold if 1 sticker would be used for the disposal of 25 kg waste. This would mean theoretical cost of 50 Peso respectively 1 Euro per sticker if this EI would be expected to fully recover the direct annual SWM operation cost of around 5 Mio Peso (baseline 2006). However it was decided to introduce the sticker system with cost of only 2 Peso/sticker in order to provide a social acceptable approach for all households and other waste generator. Focus on introducing the sticker system was not to reach full cost recovery in a short time but rather to introduce waste avoidance and segregation habits instead of waste disposal.

3.4.3 Institutional arrangements and role of stakeholders

To respond to the specific local conditions as efficiently as possible, every LGU needs to provide a "taylor-made" organizational framework and system that enables the involved waste generators and stakeholders to take part in the development process and SWM operations. The LGU Bayawan City organized its local SWM as displayed in the following Figure 6:



1) Pollution Control and Waste Management Board 2) Multi-sectoral Monitoring and Evaluation Team
3) FFM = Forest and Farm Management Division 4) UEM – Urban Environmental Management Division

Figure 6: Main stakeholders involved in the SWM program Bayawan City

The overall supervision and responsibility for the municipal SWM program rests upon the City Mayor who likewise chairs the local Pollution Control Waste Management Board (PCWMB). Significant innovations and developments are proposed by the City ENRO and discussed and approved respectively rejected by the PCWM Board. The City ENRO, who directly reports to the City Mayor, supervises all functions and tasks for the implementation of the municipal SWM program. For organizing and conducting the actual implementation works two divisions were formed under the City ENRO,

namely: a) Forest and Farm Management division (FFM) and b) Urban Environmental Management division (UEM). UEM supervises all functions related to the LGU SWM program whereas related functions and tasks are assigned to a SWM unit. UEM respectively the SWM unit communicate with all stakeholders tasked with SWM on community level (e.g. barangay committees) but also link to involved governmental agencies, NGOs, academe, the private sector (e.g. junkshops) and local civil organizations (e.g. Rotary Club, Cooperatives from Farmers, Fishermen and Barangays).

In summary, the tasked SWM unit under the City ENRO performs the following tasks and functions:

Table 6: Tasks and functions of the newly created SWM unit under the City ENRO

No.	SWM Tasks / Functions
1	Implements the SWM program of LGU, as mandated with LO 63-2005 and 10 - Year SWM plan.
2	Coordinates all participating offices, agencies and private sector participants in the conduct of information, education and communication (IEC) campaigns on mandated SWM strategies such as household composting, segregation at source, practices waste reduction measures at source, collection schedules and mechanisms and proper disposal management.
3	Regularly conducts, monitors and improves efficiency in the collection of wastes from various sources.
4	Initiates the entering into agreements with neighboring municipalities on the suitability/availability of the SLF at BCWMEC as their disposal site with equivalent fees.
5	Regularly improves production efficiency of the Central MRF as well as the marketing of recyclables and processed products.
6	Organizes deputized enforcement teams, speakers bureau and other relevant groupings for the effective enforcement and IEC campaigns on SWM.
7	Prepares and conducts of IEC campaigns.
8	Conducts necessary studies (i.e. time and motion study for waste collection, planning documents for the SLF; viability assessment of the Central MRF etc).
9	Technical assistance, logistical and training support to barangays and communities to help them formulate SWM strategies and plans; and to implement, monitor and evaluate SWM projects.
10	Formulates, reviews and refines procedures for SWM operations and enforcement, including coordination with groups and sectors providing support to the SWM program.
11	Technical and logistical support to the IEC Team, volunteer enforcers, multi-sectoral M & E team and other groups/task forces that were organized to assist implementation of the SWM plan.
12	Periodically prepares reports on the performance status and analysis of implementation and enforcement of SWM ordinances.
13	Prepares annual work and financial plans.
14	Supervises waste segregation and collection operations.
15	Prepares and supervises conduct of MRF and composting operations.
16	Prepares and supervises conduct of disposal operations and performs monitoring of BCWMEC.
17	Provides secretariat function for the local PCWM Board.

The creation of a City ENRO was voluntarily performed by the LGU in the year 2003 and is not mandatory. Likewise the creation of a SWM unit under the City ENRO followed in 2006 by initiative of the LGU. However, the establishment of these offices are relevant innovations, especially in order to overcome the initially observed "scattered roles/functions" over several departments within the LGU (compare Chapter 3.3.1). Hence, these organizational enhancements are considered as a further success factor that enabled the LGU to efficiently implement the new SWM program that employees 82 staff including waste collection.

3.4.4 Communication and enforcement system

To support the implementation of the new SWM Program, various strategies were proposed on how to inform system users like commerce, institutions and residents and to enhance their participation respectively acceptance of the new SWM program especially related to the targeted "polluter pays principle". LO 63-2005 prescribes in Article 12 the elements that the LGU should provide and implement to inform the public and to allow sufficient participation. The preparation of related activities, materials and tools has to be performed by the City ENRO respectively the integrated SWM unit. Key messages of SWM have to be delivered to schools, institutions and barangays within continuous information-education campaigns (IEC). Based on the outcome of a related interview from July 4 2012 with the responsible IEC officer from the UEM division, Mr. Ion Bollos, the IEC team prepares various materials such as flyers, brochures tarpaulins, presentations and video clips that are delivered to barangays, city offices, schools and other institutions. He stated that LO 63-2005 was explained including the PAYT to all barangays covered by the collection area. He further described the normal sequence of communication events to inform and involve the public but also to receive feedback related to the municipal SWM program or LO as follows:

Mechanism and events for information dissemination to the community

- LO is in discussion at the City Council and needs to be verified within a public hearing prior to approval;
- LO is approved and will be explained in every barangay through general assembly of barangay and being supported by bill board, flyers and/or tarpaulins;
- Process is supported by the weekly LGU radio program (1 hour, every Wednesday) which informs about relevant news, activities, developments, targets, LO etc.;
- Process is further supported by LGU published quarterly journal (Kabayan) that reflects on relevant LGU projects, developments, policies etc.;
- Tarpaulins, executive orders, innovations, important events, etc. are displayed at the barangay and city bill boards;
- The LGU proposes or supports school events that address SWM (e.g. competitions) and provides SWM inputs for all schools (elementary, high schools) within the collection area on a quarterly basis;
- The LGU informs the Parents-Teacher-Association (meets quarterly) which has to be established at every school nationwide through the local Superintendent for Education (is also member of the PCWMB)
- The LGU conducts surveys that clarify in what way the community and other users are willing to participate or verify to what degree the set targets of LO are accomplished and users content with provided SWM services. Willingness to pay surveys were conducted prior to the approval of the LO 63-2005 that proposed to introduce PAYT and again in 2010 to check the response and acceptance of users after SWM system change.

Processing of feedback and enforcement

Feedback regarding the SWM program and newly introduced LO very often follow similar patterns as explained by Mr. Bollos on July 4, 2012:

"Usually, after we introduce a new LO we get flooded with complaints and requests for clarification from many residents. We explain individually but also pick up the key issues in our weekly LGU radio program. In most cases the related complaints and requests fade after some weeks. This is one indicator for us that the public understands and accepts the new LO respectively targeted change. Besides, we monitor related violations and issue citation tickets if needed. When these violations go down in number we assume that the new LO and desired changes are accepted by the community".

The enforcement process established in Bayawan appears as an efficient communication and education tool. Members of the newly formed enforcement team (12 staff) were initially trained and equipped with uniforms and identification cards that prove their authority. DED provided bicycles and strong flashlights as well as trainings for self-defence and conflict management to increase their confidence.

Enforcers accompany the waste collection crews as routine operation and control the placed garbage bags regarding allowed amount of waste per sticker and segregation quality. They directly respond to the waste generator if they perceive deviations from the LO regulations for waste segregation. They clarify with the regarding waste generator as first measure. However, they would issue a citation ticket if the wrong behaviour is again observed in following collection days. Furthermore, enforcers visit certain "hot spots" were illegal waste dumping was observed. According to the SWM unit, illegal waste dumping was high when the new PAYT system was introduced and can still be observed but is diminishing. If they observe illegally disposed waste they search for any hint within the disposed waste such as contact data from letter envelopes or bills etc that could trace the violator. If they find such a hint, they confront the violator and apply enforcement acts, if needed issue a citation ticket. The division head of UEM established an interesting feedback system within the enforcement team called "Good news – bad news meeting" (takes place weekly). All enforcers meet and share their observations whereas open issues can be discussed and updated information and options for "trouble shooting" being provided for the whole enforcement team.

3.4.5 Discussion of success factors

Based on the project experiences, the main success factor that enabled the LGU to implement the new SWM program was the strong political will and continued interest to implement environmental enhancement programs of the former Mayor German Sarana, who acted as City Mayor within the time period 2001 to 2010 and initiated and attended many project activities together with the local City Council. Furthermore the intense capacity building process offered by the USAID EcoGov program and two GIZ development co-operation projects that started in 2005, enabled the involved city personnel and key stakeholders to plan, organize and implement the detailed works efficiently. The continuous and full-time presence of the DED adviser contributed largely to better practice know how transfer and to speed up the development process. This is reflected by the increasing number of LO for SWM that provide the needed tools and EI to more efficiently address SWM issues and to enhance community participation, e.g. waste reduction and segregation changes. The new LO on the other hand provided the needed EI to increase cost recovery for provided municipal SWM services. Besides, the newly established organizational framework for SWM with bundled functions under the City ENRO increased the efficiency and sustainability of the SWM program by far. However, the fact that Bayawan was declared a city in 2001 and consequently received a significantly increased annual budget needs to be mentioned as well. The division chief of UEM, Mr. Antonio Aguilar stated in this context during the interview on July 4, 2012: „When we started the new program, the increased city budget met the incoming development cooperation organizations and bilateral projects offered by them at the right time", whereas Mr. Ion Bolos from the SWM unit added: „From the beginning of the new SWM project there were always people who pushed us, people who had a clear view of what needs to be done, and they would tell us in an efficient way".

The discussed success factors enabled the LGU to establish the needed technical facilities for SWM enhancement and to formulate LO that reflect the local conditions and are acceptable by the community. The performed interventions such as the BCWMEC, FCA, LO and EI itself provide the needed tools and mechanism that enabled the LGU to further increase the efficiency and sustainability of the new municipal SWM system.

3.5 Analysis of effects of the EI introduced

With the inauguration of the BCWMEC on April 18, 2010 the LGU provided the needed technologies to improve the efficiency of segregation, recycling and treatment of collected municipal solid waste prior to disposal. Parallel, the LGU implemented two schemes that apply the „polluters pay principle", a) to enhance the municipal waste collection and b) to provide a new system for septage management. Further SWM policies that include EI are proposed with five additional LO that could assist to enhance provided municipal SWM services and related cost recovery in the longer run. However, with the already introduced EI the LGU received revenues for provided SWM services starting in 2009 which are steadily increasing so far. Prior to 2009 the LGU did not raise any fees related to municipal SWM services. The following table summarizes the revenues raised from the prepaid stickers for waste collection and for the septage management system since the year 2009 in detail.

Table 7: Cost recovery development for SWM in Bayawan City for the years 2009 to 2012

Year	Time period	Revenue from PAYT of SW collection (in Peso) [1]	Revenue for septage management (in Peso) [4]
2009	1st Quarter [1]	74,572.00	-
	2nd Quarter	54,320.00	-
	3rd Quarter	49,950.00	-
	4th Quarter	64,300.00	-
	Total revenues 2009	*43,142.00*	
	Total SWM Budget provided for 2009 [2]: 6,876,449.00 (= 3.5 % cost recovery)		
2010	1st Quarter [1]	81,884.00	-
	2nd Quarter	51,258.00	-
	3rd Quarter	57,588.00	-
	4th Quarter	51,262.00	-
	Total 2010	*241,992.00*	
	Total SWM Budget provided for 2010 [2]: 9,648,583.00 (= 2.5 % cost recovery)		
2011	1st Quarter [1]	72,550.00	-
	2nd Quarter	46,504.00	-
	3rd Quarter	43,040.00	242,634.50
	4th Quarter	52,650.00	285,575.00
	Total 2011	*214,744.00*	*528,209.50*
	Total SWM Budget provided for 2011 [2]: 10,113,441.00 (= 2.1 % cost recovery)		
2012	1st Quarter [1]	90,804.00	287,523.00
	2nd Quarter	65,298.00	293,694.00
	3rd Quarter	(expected 65,000.00)	(expected 285,000.00)
	4th Quarter	(expected 65,000.00)	(expected 285,000.00)
	Total 2012	*(expected 286,102)*	*(expected 1,151,217)* [4]
	Total SWM Budget provided for 2012 [2]: 8,090,753.00 (projected 3.5% cost recovery)		
	Annual average in Euro [3]	4,880.00	22,800.00

1) Data provided by City ENRO. The higher revenue levels for the 1st quarters of recorded years result from increased acquisition of stickers triggered by the renewal of business permits in the beginning of the year
2) SWM budget as approved for the regarding year, not actual expenditures, the mentioned cost recovery rate considers only the revenues from sticker sales (revenues from septage management are excluded)
3) Based on an exchange rate of 50 Philippine Peso per Euro
4) Level of annual revenues that could be expected for full year operation of septage management.

The implemented PAYT scheme for segregated waste collection generates revenues of around 4,800.00 Euro/year. Based on this development, the overall cost recovery rate for SWM so far only reaches 3.5 %. However, the additional proposed LO could later on assist to further increase the cost recovery, especially the proposed tipping fees for 3rd party users of the SLF. Revenues from fines respectively violation tickets reached a highest amount of 14,000 Peso/year respectively 280 Euro in 2009 but are decreasing since. Hence, fines remain irrelevant for the cost recovery situation (compare Annex 13).

Since the operation of septage management is also under the responsibility of the local SWM office, it is worthwhile to mention that revenues for this municipal service as raised through the water bill of BAWAD reached already a level of around 1,900 Euro/month within the 1st and 2nd quarters of 2012. Since this revenue system appears to be more efficient then the established sticker system for waste collection it could be discussed if a certain portion of SWM services could also be linked to the regular energy or water billing of users.

The largest waste diversion can be realized by reducing the amount of bio-waste collected since such materials are still the dominating waste fraction within the municipal waste collection. By reducing the amount of biodegradables, considerable cost savings could result for both collection and disposal, likewise the generation of leachate and gas emissions being reduced at the SLF. Furthermore, local junkshops may benefit from the increased recovery of reusable and sellable materials at source whereas the LGU could reduce the amount of bio-waste collected. Although a decrease of collected bio-waste through introduction of PAYT was confirmed within the waste analysis from 2010, this decrease did not trigger a cost reduction within the annual SWM budget yet. Main cost items of the SWM budget are salaries, wages, equipment and facility operation costs (compare Figure 6) whereas the LGU still continues to expand the facilities for material recovery and composting operations at the BCWMEC and included 2 further barangays into the collection area.

The effects of the PAYT on the local SWM stream become visible if the changes of waste composition at the "end-of-the-pipe" are studied. This was done in 2010 by the LGU by comparing the findings of the WACS from the years 2003 and 2010 and identifying changes in waste composition as summarized in Table 8:

Table 8: Changes in waste composition in Bayawan based on WACS 2003 and 2010

End of pipe analysis 2003 [1]			End of pipe analysis 2010 [4]			Observed change (%)
Type of waste	Collected (kg/day)	Percent (%)	Type of waste	Collected (kg/day)	Percent (%)	
Biodegradable	4,407.3	78.8	Biodegradable	2,534.8	58.3	-42
Recyclable [2]	448.9	8.0	Recyclable [5]	37.1	0.9	-92
Residual [3]	735.5	13.2	Residual [6]	1,773.3	40.8	+141
Total	5,591.7	100.0	Total	4,345.2	100.0	-23

1) Based on WACS data 2003 (Annex 1)
2) Consists of plastic bottles, scrap metal, cardboard, dry paper, cans and glass bottles
3) Includes special waste
4) Weighbridge data (June 2010–January 2011)
5) Consists of plastic bottles, scrap metal, cardboard, dry paper, cans and glass bottles
6) Includes special waste

Based on the data from Table 8 it appears that several of the envisioned targets for waste reduction at source are achieved through the PAYT introduction as follows:

- the overall waste collection rate decreased by around 23%, meaning the introduced user fee motivates waste generators to increase their segregation efforts in order to reduce their costs for acquisition of stickers;

- the amount of bio-waste decreased by approximately 42% whereas these materials are now processed within the households instead of being collected. So far, no detailed data are available that could clarify how much of the segregated bio-waste was treated by household composting or otherwise utilized, e.g. as feeds or for household fuel;
- the degree of recyclables decreased significantly by 92%. This allows to conclude that the majority of sellable materials are now segregated at source and delivered to local buyers or junkshops or taken away by them instead of being collected and disposed;
- residual waste within the waste collection increased relatively, meaning the waste collected increasingly contains materials that can so far only be landfilled whereas the portion of sellable or recyclable materials delivered to the BSWMEC decreases.

Aside from the described technical and financial changes, the provided new SWM system triggered further positive effects within the LGU and the community. Firstly the LGU itself reorganized functions and roles of employees involved with waste management and concentrated all SWM tasks within one office. This measure allowed more efficient capacity development for the involved key players. Further visible effects triggered by the new collection system are increased cleanliness at public places, especially at the central market and along main roads. Although waste burning in backyards is still practiced in many households the number of visible burning places along roads decreased.

To assess community awareness related to the new municipal SWM program and introduced changes, the City ENRO conducted a SWM Service Satisfaction Survey in May and June 2011 (compare Annex 12). This survey gathered feedback from 100 randomly selected residents from the collection area with a questionnaire. Based on the results of this survey more than 90% of the addressed residents welcome the new waste collection system and are satisfied with the provided services. 87% of them stated that they are aware of the LGU informs them through billboards, brochures and the local radio. Likewise 90% of respondents stated that they perceive benefits related to sanitation, health, cleanliness and environment. However, related to the cost of the sticker system 27% of the interviewed residents stated that the stickers are either too expensive for them or that they are not agreeing to pay for the waste collection through stickers. 36% of respondents expressed that they do not fully understand why the LGU introduced this new sticker system. Results of the survey further indicate that the majority of involved residents are aware of the importance of SWM and welcome the provided LGU services. However, additional information campaigns may be needed to fully explain the functions and benefits of the newly introduced sticker system in order to further increase community participation and appreciation of the new PAYT system.

Aside from the discussed benefits, there are as well negative issues concerning the PAYT principle introduced. In the planning stage of the system, it was unclear how much income it would generate. It was assumed that the waste generators would only use a bag with the size equivalent of a cement bag (around 40 liters volume). However, during implementation it was noticed that some users tried to use larger bags in order to save costs for stickers. This practice resulted in lower income generation for the LGU than expected. Currently, the average volume of many bags placed for collection is still more than the projected 40 liters/bag. In addition, the total amount of waste expected to be collected decreased as a result of the introduction of the PAYT system itself since users aim to save cost for prepaid collection stickers. Furthermore, it was observed that some residents started to dispose waste illegally in order to avoid collection costs. To tackle the issue, the enforcement team of the SWM unit searches for indications of ownership in the illegally disposed waste to trace the waste generator. If traced, the violator is confronted and requested for compliance. With this enforcement, the number of illegal dumping could be reduced in the meantime. However, the total number of issued violation tickets since introduction of the PAYT is relatively low with only 81 stickers since 2007 and a highest number of 31 per year in 2009, but only 6 tickets in 2011. This finding needs to be followed up with the enforcement team of the SWM unit since this number seems too low as an efficient response to the various reported implementation issues. Overall, the fines gathered from violation tickets are irrelevant for the cost recovery situation. (compare Annex 13).

4 Conclusions and Recommendations

In developing countries, lack of financial resources is one of the main hindering aspects to enhance municipal SWM systems and to sustain their operation. Common reasons mentioned by stakeholders are lack of knowledge, environmental awareness and financial means due to poverty and more pressing municipal needs. However, with the release of the Ecological Solid Waste Management Act of the Philippines in the year 2001 (RA 9003) all LGUs were requested to establish waste segregation systems, to increase material recovery and to upgrade their residual waste management facilities besides other enhancements.

To implement the new waste legislation the Local Government Bayawan City had formulated a 10-Year SWM plan in the year 2004. This plan served the LGU to propose legal, technical and organizational changes in order to enhance its SWM system. The plan formulation was supported by the USAID EcoGov development cooperation project starting in 2003 and through the GIZ development cooperation project SWM4LGUs since 2007, additionally through a DED adviser during the time period February 2008 until March 2012. From the experiences made during the implementation of a new municipal SWM system that also introduced the "polluters pay principle" and various EI, the following general conclusions can be summarized:

4.1 Preconditions and challenges related with the introduction of EI

Related to preconditions and challenges several conclusions are made that may also be useful as lessons learned for other municipalities:

- to overcome barriers, the weaknesses and gaps of an existing local SWM system need to be identified at an early stage of development and communicated with local decision makers;
- the local waste generation situation needs to be clarified and discussed with local decision makers and SWM staff; it appears that this process would benefit from development support in order to initiate best suited approaches and processes and to provide proper know how and applicable methods for data gathering and evaluation;
- the organizational system of SWM functions, roles and tasks within the LGU needs to be clarified as well as costs and partial budgets for the involved LGU departments; in Bayawan City the establishment of a FCA system was lengthy due to lack of SWM knowledge by involved staff;
- proposals to streamline the LGU organization for SWM are a very important precondition to identify and assign the key stakeholders that need to be involved into the capacity building process;
- the capacity building process itself has to start prior to the development of a local SWM plan in order to understand local SWM issues and to address them with the best suited approaches and options, but also to allow active participation and a sense of ownership of involved local stakeholders for the new SWM plan; an option analysis for EI and local policies should already be integrated into the initial SWM planning process;
- proposals and development activities for initial SWM planning and capacity building need to be attended by the local decision-makers;
- in order to introduce EI the existing LGU communication and enforcement systems and options for their enhancement have to be clarified during the SWM planning stage;
- the identified options for EI have to be matched with the local solid waste flow, involved waste generators, their SWM habits and proposed technical interventions; based on the outcomes the proposed EI can be anchored within local SWM ordinances.

4.2 Applied and proposed new EI in Bayawan City

In Bayawan City the following new EI were established based on the proposals of the 10-Year SWM plan respectively were added to respond to later developments and are in discussion within the local City Council for policy making:

- PAYT with prepaid sticker system (LO 63-2005 and LO 2-2007);
- tipping fees from septic tank management (LO 216-2011);
- solid waste tipping fee for 3rd party users of the SLF at the BCWMEC (pending);
- proposed compost sale ordinance (pending);
- proposed plastic bag avoidance ordinance (pending);
- proposed ordinance to ban open and waste burning (pending);
- proposed ordinance to ban oil disposal into canals and any water body (pending).

The pending LO were all submitted for processing to the City Council whereas the most of them only reached its 1st reading during an official council session so far.

4.3 Effects of the applied new EI

So far only the implemented PAYT system for segregated waste collection and the tipping fees for the cleaning of septic tanks contribute significantly to cost recovery and can be assessed towards other related effects as follows:

- the proposed PAYT scheme for segregated waste collection was accepted by the community and so far generates revenues of roughly 4,800.00 Euro/year. Additionally, the introduced fee for septage management already reaches a level around 1,900 Euro/month. Based on these developments, the overall cost recovery rate may increase to around 17% in 2012, a significant increase if compared with the 3% cost recovery rate from 2009. However, the cost recovery rate for municipal SWM service would only reach 3% if the fees collected from septage management would be neglected;
- since implementation of the PAYT the overall waste collection rate decreased by around 23%,whereas the amount of bio-waste delivered to the BCWMEC decreased from 78% in 2003 to 58% in 2010. Furthermore, the amount of recyclable materials decreased by far from 14% in 2003 to only 0.9% in 2010 which means that the majority of sellable materials are now segregated at source and delivered to local buyers or junkshops or taken away by them instead of being collected and disposed;
- Although the waste collection rate decreased relatively since introduction of the PAYT, this aspect is not reflected within the annual expenditures for SWM. Main cost items are salaries, wages, equipment and facility operation costs (compare Figure 6). These cost items did not decrease so far since the LGU continues to extend the SWM facilities at the BCWMEC for the material recovery and composting sites and included 2 further barangays into the collection area;
- due to the reduction of residual waste collected the life span of the SLF may be lengthened, whereas related emission potentials and operation cost may decrease;
- the introduction of the new SWM system and EI triggered an reorganization of SWM roles, functions and tasks within the LGU; this measure assisted to clarify responsibilities and increased process efficiency and skills of involved staff;
- further visible effects of the PAYT within the collection area are increased cleanliness at public places, e.g. at the central market and along main roads. Although waste burning in backyards is still practiced in many households, the number of visible burning places along roads decreased;

- based on the results of a SWM Service Satisfaction Survey from May/June 2011, the most residents from the collection area are aware of the importance of SWM and welcome the provided LGU services. However, around 30% of residents still question if the sticker system is needed and reasonable; further information campaigns may be needed to fully explain the functions and benefits of the sticker system in order to increase community participation and appreciation of the new PAYT system;
- so far two kind of negative effects of the introduced PAYT system were observed: a) some users try to use larger bags per sticker in order to reduce their cost for sticker acquisition; b) some residents started to dispose waste illegally in order to avoid collection costs, both actions demand the LGU to increase efforts and budget for enforcement interventions. However, revenues from issuance of violation tickets is relatively low with 31 tickets as highest number in 2009 but only 6 violation tickets in 2011. Hence, the income from violation tickets remains irrelevant for the cost recovery situation;
- lastly, the revenue for the selling of waste stickers gradually decreases as a side effect of the targeted enhancement of waste segregation and reduction at source.

Related to the discussed PAYT effects as observed in Bayawan a comparison with a similar PAYT system applied in Dumaguete City could assist to identify options for system enhancement. Dumaguete City reported a higher level of cost recovery with around 12% in 2010 respectively a total cost recovery of 1,7 Mio Peso (= 34,000 Euro) for annual SWM expenditures of 14 Mio Peso respectively 280,000 Euro in 2010. However, the income for the applied sticker system contributed only 1% towards cost recovery for municipal SWM services whereas the main revenues for SWM came from general waste management fees collected with the annual business permit (compare Annex 14). Further revenues were reported from issuance of citation stickers, special waste collection trips, tipping fees from the dumpsite and income of sales from compost. However, the latter contributed together only 1% towards SWM cost recovery.

4.4 Recommendations

To further increase cost recovery for SWM services the pending LO should be approved by the City Council, especially the proposed LO that targets the utilization of the SLF through 3rd party users based on tipping fees. Furthermore, the local government should explore options to extend the service collection area in order to increase the income for prepaid waste stickers. Since the income from waste stickers so far reaches only 3.5% of the SWM expenditures, it is recommended to either adjust the fee per sticker or to reduce the allowed volume or weight per collected bag/sticker used. Furthermore it should be checked if the total value of sold stickers correlates with the actual collected waste volume/weight by the municipal waste collection. In case of miscorrelation, the SWM unit and enforcement team should propose measures to prevent illegal waste dumping respectively the collection of unjust large waste volume handed over for waste collection per sticker.

From the positive experience made with the more efficient cost recovery for septage tank management it is proposed that the City Council considers to refinance a certain portion of provided municipal SWM services through regular energy or water billing. Alternatively, it could be discussed to introduce a general waste management fee linked to the annual business permit as practiced in Dumaguete City.

Related to the utilization of revenues from SWM services it is recommended to establish the proposed SWM trust fund as proposed with LO 63-2005, Article 18, Section 47 (Use of Fund): “The City Solid Waste Management Fund shall be used only to support the implementation of the City Solid Waste Management Plan, including endeavors that will enhance its implementation” in order to safeguard the sustainability of the new municipal SWM system.

For the waste treatment at the BCWMEC it should be explored if waste-to-energy options could be integrated to a) better utilize bio-wastes that are not compostable, b) to enhance the treatment of collected sludge from septic tanks, e.g. through co-processing with manures to produce biogas and c) to recover plastic and packaging residuals as Alternative Fuels and Raw materials (AFR) for co-processing in cement kilns. For the latter, a revenue of around 8 Euro/ton AFR could be expected based on the experiences made in a related pilot project in Iloilo City. Such measures could also address the legally requested local actions to tackle climate issues as mandated by the Climate Change Act of the Philippines (RA 9729). In this context it should be explored if the LGU can participate in related pioneering programs that are presently in discussion by the Climate Change Commission of the Philippines related to the emerging Nationally Appropriate Mitigation Actions (NAMA) approach.

For the National Solid Waste Management Commission it is recommended to formulate a sample ordinance or guideline that demonstrates and explains options for EI and PAYT approaches that are applicable in the Philippine context in order to provide a standard for municipal SWM financing and to support LGUs in related local policy making.

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Published by
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Concepts for Sustainable Waste Management

Registered offices
Bonn and Eschborn, Germany

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53113 Bonn
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Photographs
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As at
August 2012

On behalf of
Federal Ministry for Economic Cooperation and Development (BMZ),
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