

Japan International Cooperation Agency (JICA)

Ayuntamiento del Distrito Nacional (ADN)

**THE STUDY ON INTEGRATED SOLID WASTE MANAGEMENT PLAN  
IN SANTO DOMINGO DE GUZMAN  
NATIONAL DISTRICT  
DOMINICAN REPUBLIC**

*Final Report  
Volume I*

**SUMMARY**



## **PREFACE**

In response to a request from the Government of Dominican Republic, the Government of Japan decided to conduct “The Study on Integrated Solid Waste Management in Santo Domingo de Guzman, National District” and entrusted to the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Ikuo Mori of KOKUSAI KOGYO Co., LTD. between July 2005 and October 2006. In addition, JICA set up an advisory committee headed by Dr. Hidetoshi Kitawaki, Professor, Toyo University, which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Government of Dominican Republic and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Dominican Republic for their close cooperation extended to the study.

March 2007

Ariyuki Matsumoto  
Vice President  
Japan International Cooperation Agency

March 2007

Mr. Ariyuki MATSUMOTO  
Vice President  
Japan International Cooperation Agency

### **Letter of Transmittal**

Dear Sir,

We are pleased to submit the report of The Study on Integrated Solid Waste Management Plan in Santo Domingo de Guzman, National District, Dominican Republic.

This report consists of two fields, i.e., Municipal Solid Waste Management and Healthcare Waste Management. The former introduces the result of current status diagnosis, the result of Pilot Projects, Master Plan and Action Programs. The latter shows the result of current status diagnosis, the result of Pilot Project and Action Plan.

Santo Domingo Municipality's vision regarding Municipal Solid Waste Management (MSWM) is "Clean City." The Master Plan is to contribute its fulfillment, which advocates "the municipality, the citizens and the private sector shall collaborate with each other in order to establish high quality and sustainable solid waste service," and has the following goals: 1) 100% collection rate, 2) establishment of sanitary final disposal, 3) 15% waste minimization, and 4) 30 – 50 % dependency rate on the municipal general finances, by 2015. These challenging goals were set by the municipality itself.

Implementation of the Master Plan has begun. The Municipal Regulation on Non-hazardous Waste Management, which is a legal infrastructure for all individuals and organizations concerning MSWM, was promulgated and enforced during the period of the Study. The Pilot Project of Integrated Improvement of Collection Service has been expanding with participation of the private sector.

Meanwhile, in the field of Healthcare Waste Management, the Action Plan aims at "proper management of healthcare waste in order to reduce health risks of cleaning workers in healthcare centers, patients, waste collection workers and citizens." The goal is that healthcare waste is to be properly managed in all healthcare centers in Santo Domingo by 2015."

On the basis of the success of the Pilot Project carried out in Ciudad Sanitaria, Dr. Luis E. Aybar, the Secretary of State for Public Health and Social Assistance and the Secretary of State for Environment and Natural Resources, witnessed by the Mayor of Santo Domingo, declared the expansion of the proper Healthcare Waste Management to other hospitals. Some hospitals have already commenced the proper management.

We would like to take this opportunity to express our sincere gratitude to your Agency, the Advisory Committee for the Study, the Ministry of Foreign Affairs and the Ministry of Environment of Japan. We would also like to extend our deep appreciation to the Government of Dominican Republic, the Embassy of Japan and the JICA office in the Dominican Republic for their vital cooperation during the implementation of the Study.

Last but not least, we hope that the output of the Study presented here will contribute to the improvement of Solid Waste Management and citizens' welfare in Santo Domingo de Guzman, National District.

Respectfully,

Ikuo MORI  
Team Leader  
The Study on Integrated Solid Waste Management  
Plan in Santo Domingo de Guzman, National  
District, Dominican Republic

# The Study on Integrated Solid Waste Management Plan in Santo Domingo de Guzman, National District Dominican Republic

## List of Volumes

### **Volume I Summary (English, Spanish, Japanese)**

This Volume is consisted of two parts, Municipal Solid Waste Management and Healthcare Waste Management. The former part is a summary of the Volume II, Main Report, Municipal Solid Waste. The later part is a summary of the Volume IV, Main Report, Healthcare Waste.

### **Volume II Main Report; Municipal Solid Waste (English, Spanish)**

This Volume contains the whole items conducted and planed during the Study on the aspect of the Municipal Solid Waste Management.

### **Volume III Annex; Municipal Solid Waste (English, Spanish)**

This Volume contains detailed results of site surveys conducted and products such as manuals prepared during the Study.

### **Volume IV Main Report; Healthcare Waste (English, Spanish)**

This Volume is consisted of two parts, Main Report and Annex. The former contains the whole items conducted and planed during the Study. The later contains tools such as manuals and posters used for the Pilot Project.

## **This is the Volume I, Summary (English)**

In this report, the project cost is estimated by using the August 2006 price and an exchange rate of US\$1.00=RD\$33.00=JP¥116.00

Japan International Cooperation Agency (JICA)

Ayuntamiento del Distrito Nacional (ADN)

***The Study on  
Integrated Solid Waste Management Plan  
in Santo Domingo de Guzman, National District  
Dominican Republic***

**Final Report  
Volume I**

**SUMMARY  
(Municipal Solid Waste)**

March 2007

**KOKUSAI KOGYO CO., LTD.**

## Outline of the Study and the Master Plan

These yellow pages outlines the Study conducted and the Master Plan formulated with the Municipality of Santo Domingo National District (ADN) during the period of 2005 and 2006.

### 1 Outline of the Study

#### 1.1 Objectives

- 1) To formulate an Integrated Solid Waste Management Plan setting 2015 as the target year, to understand, through the plan formulation process, the actual situation of the solid waste management conducted by ADN, Dominican Republic, and to clarify the long-term measures for improvement of the solid waste management
- 2) To transfer technology and know-how on solid waste management to the counterpart personnel through joint work in the Master Plan formulation, so as to support the improvement of the ADN solid waste management capacity

#### 1.2 Study Area

Target area: Santo Domingo National District, 93.48 km<sup>2</sup>, and related facilities in surrounding areas

Target population: around 980,000 in 2005

#### 1.3 The Solid Waste to be covered in the Study

The types of solid waste to be included in this Master Plan Study are

- Municipal waste, and
- Medical waste.

#### 1.4 Current Situation of the Municipal Solid Waste Management

The investigation of the current SWM clarified problems to be solved in order to establish a sustainable SWM. They are as follows.

- Problem 1: The city is not necessarily kept clean.
- Problem 2: The current accounting system does not enable the measurement of efficiency of the SWM
- Problem 3: The amount of fee collected is still low.
- Problem 4: The final disposal is in an unstable situation.
- Problem 5: The city generates huge amount of waste.
- Problem 6: Medical waste is mixed with municipal waste.
- Problem 7: The city has a high possibility to generate huge amount of waste due to hurricane.

#### 1.5 Pilot Projects

The following pilot projects were conducted during the Study, in order to verify the applicability of measures recommended in the Master Plan, taking into account the problems and challenges analyzed in the previous chapter.

- Integrated Improvement of the Collection Service
- Establishment of Data Management
- Promotion of the Citizen Participation
- Environmental Education

## 2 Outline of the Municipal Solid Waste Master Plan

### 2.1 Objectives

*The Master Plan aims to establish a “Sustainable Solid Waste Service” which has the following objectives:*

- 1) to collect waste to maintain the healthy living environment,*
- 2) to dispose of waste in an environmentally-sound manner,*
- 3) to minimize waste amount to reduce burden on the solid waste management and to contribute to resource conservation, and*
- 4) to provide the service efficiently in order for the service to be financially sustainable.*

### 2.2 Scope

Scope of the Master Plan is as follows.

Target Area: National District, Santo Domingo de Guzman

Target Year: 2007 – 2015 that is divided into three stages

1st stage 2007 – 2008

2nd stage 2009 – 2011

3rd stage 2012 - 2015

Target Population: Citizens, about one million, and visitors in the National District

Target Solid Waste: Municipal waste, which is non-hazardous waste generated from households, institutions, commercial entities, small industries and public areas

### 2.3 Goals

The Master Plan set up the following four goals according to its objectives mentioned above.

Table: Goals of the Master Plan

Item	1st stage 2008	2nd stage 2011	3rd stage 2015
Collection rate	95%	100%	100%
Final Disposal	Improved operation at Duquesa	Improved operation at Duquesa	Improved operation, at Duquesa or a new sanitary landfill*
Waste Minimization	8%	10%	15%
Subsidy/Cost	30-50%	30-50%	30-50%

\*It is uncertain if Duquesa could receive waste and operate until 2015. Therefore, The M/P prepares two scenarios. MP1 assumes to use Duquesa until 2015. The other, MP2, supposes to use Duquesa until 2011 and to operate a new landfill from 2012.



## 2.4 The Master Plan

The Master Plan is summarized in the table below.

Table 2-1: The Master Plan

Phase	Present	Phase 1	Phase 2	Phase 3
Components	(2005)	(2008)	(2011)	(2015)
0. Population	980,653	1,023,176	1,067,543	1,129,706
<b>I Principal Indicators</b>				
Collection rate in weight	95%	98%	100%	100%
Collection rate in population	90%	95%	100%	100%
Collection service quality	Low	High	High	High
Final disposal	Duquesa	Duquesa	Duquesa	Duquesa (New)
Minimization	7%	8%	10%	15%
<b>II Waste Stream (ton/day)</b>				
1 Generation potential	1,529	1,595	1,664	1,761
2 Generation control	0	16	33	53
3 Generation	1,529	1,579	1,631	1,709
4 Discharge	1,489	1,538	1,547	1,527
5 Self-disposal	7	7	7	8
6 Recycling at source	33	34	77	174
7 Collection	1,412	1,499	1,546	1,526
81 Transport - direct	996	1,057	1,094	1,053 (0)
82 Transport - transfer	416	442	452	440 (1,492)
9 Direct haul	1	1	1	1
10 Clandestine dumping	76	38	0	0
111 Compost in	0	0	20	51
112 Compost residue	0	0	7	18
113 Compost product	0	0	2	5
114 Compost reduced	0	0	13	33
12 Haulage into disposal site	1,413	1,500	1,534	1,494
13 Recycling at disposal site	69	72	33	0
14 Final disposal	1,344	1,428	1,501	1,494
15 Minimization	109	129	164	268
<b>III Discharge, Collection and Transport</b>				
<b>a. Nos. of containers</b>				
Urban area	-	2,969	3,043	2,962
Marginal area	-	1,906	1,953	1,901
<b>b. Nos. of collection vehicles (compactor)</b>				
Ordinary Area 20yd3	-	63	65	63 (53)
Marginal Area 6yd3	-	40	41	40 (40)
c. Transfer station	1 (existing)			1 (2)
<b>VI Public area cleansing</b>				
a. Sweeping	Manual	Manual		
b. Street trees pruning	-		Prevention of hurricanes	
<b>V Final Disposal</b>				
a. Operation quality	Low	Middle	Middle	High
<b>VI Minimization</b>				
a. Generation control	-	-	Environmental education, application of weight/volume based tariff	
b. Recycling at source	-	-	In operation	In operation
c. Composting	-	-	In operation	In operation
<b>VII Cost</b>				
a. Cost per year (1,000US\$)	-	24,943	25,829	25,603 (29,693)

Numbers in parenthesis are MP2.



## 2.5 Strategies

The following six strategies are recommended to attain the M/P Goals.

Strategy 1: To establish legal infrastructure

Strategy 2: To strengthen organization

Strategy 3: To establish order in the collection service market

Strategy 4: To built a consensus among the municipalities in the Metropolitan Area

Strategy 5: To begin the 3Rs and to apply the principle of Extended Producer Responsibility

Strategy 6: To apply the Polluter Pay Principle, but to consider the poor

### **Strategy 1: To establish legal infrastructure**

To establish an infrastructure that legally supports the M/P.

### **Strategy 2: To strengthen the management organization**

To strengthen the functions of ADN so as to properly manage the MSWM system, in which various actors, such as the citizens as waste dischargers and the private companies as SW service operators, are elaborately related each other.

### **Strategy 3: To establish order in the collection service market**

To establish order in the collection service market, where various SW service operators including ADN are currently working in a disorderly manner.

### **Strategy 4: To built a consensus among the municipalities in the Metropolitan Area**

To built a consensus among the municipalities about final disposal such as improvement of Duquesa and construction of a new landfill which are issues for the whole Metropolitan Area.

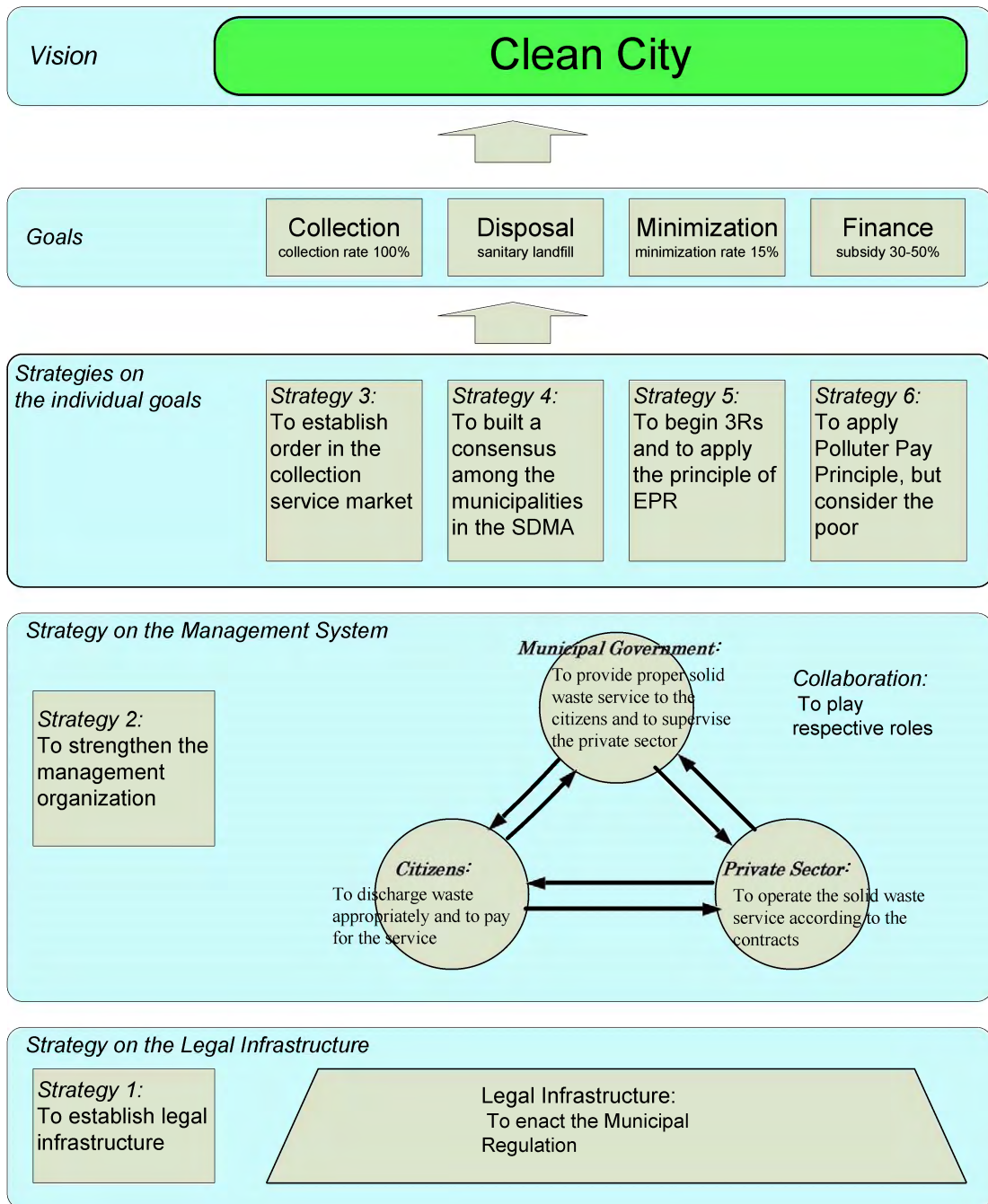
### **Strategy 5: To begin the 3Rs and to apply the principle of Extended Producer Responsibility**

In order to encourage waste minimization, to conduct environmental education for the 3Rs and to practice waste minimization, such as pet-bottle recycling with the initiative of manufactures.

### **Strategy 6: To apply the Polluter Pay Principle, but to consider the poor**

To ask for payment corresponding to the cost of the MSWM to business entities and the citizens who have the ability to pay applying the Polluter Pay Principle, but use the subsidy for citizens who do not have the ability to pay for the cost.

*Some of measures were conducted under the Strategies during the Study. One of remarkable results was enactment of a municipal regulation on cleansing, or "Regulation on Non-hazardous Waste Management," which is a solid legal foundation of appropriate MSWM in the Study Area. Also, it could be a model for other municipalities in the country.*



Strategies of the Master Plan

## 2.6 Action Programs

Action Programs are formulated in order to achieve what the Master Plan describes. The following table shows relations between the Strategies and the Action Programs, and schedules of Major Expected Results to be achieved.

Action Programs

Strategies	Action Programs	Major Expected Results	2006-08	2009-11	2012-15
1. To establish legal infrastructure	101: Establishment of Basic Rule	<ul style="list-style-type: none"> <li>Municipal regulation for cleansing is enacted.</li> </ul>	◆		
	201: Strengthening of Coordination among Directorates of ADN	<ul style="list-style-type: none"> <li>Functions of Directorates of ADN are clarified</li> </ul>	◆		
	202: Reform of the Urban Cleansing Department of EMUCD	<ul style="list-style-type: none"> <li>Necessary number of qualified personnel are assigned to the Urban Cleansing Department</li> </ul>	◆		
2. To strengthen the management organization	203: Establishment of Municipal Company	<ul style="list-style-type: none"> <li>A Municipal Company is established</li> </ul>		◆	
	301: Categorization and Definition of Collection Services	<ul style="list-style-type: none"> <li>Deferent services are well categorized and defined</li> </ul>	◆		
	302: Design of Collection Routes	<ul style="list-style-type: none"> <li>Collection routes are designed</li> </ul>	◆		
	303: Establishment of Collection Service Structure	<ul style="list-style-type: none"> <li>Contracts with the private sector are revised or newly made</li> </ul>	◆		
	304: Establishment of Contract Auditing System	<ul style="list-style-type: none"> <li>New collection services are implemented</li> </ul>	◆		
	305: Expansion of Collection Data Management				
	306: Reform of ADN Direct Operation				
3. To establish order in the collection service market	307 Communication with Citizens				
	401 Improvement of the Current Disposal Operation	<ul style="list-style-type: none"> <li>Operation of Duquesa disposal site is improved</li> </ul>	◆		
	402 Landfill Site Selection	<ul style="list-style-type: none"> <li>A new landfill is constructed and operated if necessary</li> </ul>		◆	
	403 Construction and Operation of a New Transfer Station	<ul style="list-style-type: none"> <li>A transfer station is constructed and operated if necessary</li> </ul>			◆
4. To build a consensus among the municipalities in the Metropolitan Area					

Action Programs

Strategies	Action Programs	Major Expected Results	2006-08	2009-11	2012-15
5. To begin 3Rs and to apply the principle of Extended Producer Responsibility	501: Generation Control	<ul style="list-style-type: none"> <li>Environmental education is conducted by the Information Center</li> </ul>	◆		
	502: Discharge Control	<ul style="list-style-type: none"> <li>Recycling activities are conducted at supermarkets, colmados and/or schools</li> </ul>	◆		
	503: Resource Recovery	<ul style="list-style-type: none"> <li>Composting is carried out targeting the market waste</li> </ul>	◆		
6. To apply the Polluter Pay Principle, but to consider the poor	601: Increase of Income	<ul style="list-style-type: none"> <li>Income from collection service charge is increased</li> </ul>	◆		
	602: Reduction of Expenditures	<ul style="list-style-type: none"> <li>Commercial service fee for billing and bill collection is reduced</li> </ul>	◆		
	603: Subsidy to the Poor	<ul style="list-style-type: none"> <li>Subsidy is applied to the poor</li> <li>Total amount of subsidy is reduced</li> </ul>	◆		

### 3 Recommendations

The following recommendations are made for achieving the M/P goals and for realizing the ADN's vision, "Clean City."

#### a. Towards achievement of the Master Plan Goals

It is recommendable to begin with the Action Programs under the Strategy towards achievement of the M/P Goals. What are described in the M/P will become reality by implementing the Action Programs.

#### b. Keep in mind the Objectives of the MSWM

Main objectives of the MSWM are 1) to eliminate waste from living environment so as the citizens to enjoy their healthy life, 2) to dispose of waste so as the collected waste not to give adverse impact on the environment, and 3) to encourage waste minimization to reduce the burden on the MSWM and to preserve the natural resources. In addition, the MSWM should contribute to the social well-being as a public service.

The Master Plan set its goals according to the objectives. Therefore, the most important is the objectives and the goals are the second important.

The M/P Goals are considerably challenging. ADN is expected to give efforts to attain the goals. However, the objectives should be always kept in mind. Those should not be underestimated. For example, if waste is illegally dumped to reduce transportation time, in order to collect more waste in the city. It will cause serious environmental contamination and undermine the citizens' confidence in the MSWM.

Therefore, ADN is also required to continuously review the goals taking into account results of measures and the external environment.

#### c. Carrying out of "Check – Plan – Do – See"

Various actors play in the MSWM and act according to their characteristics. Such behavioral traits change corresponding to the socioeconomic system. For example; consumption increases along with economic upward trend, then amount of waste also increases; technical innovation shifts use of glass for containers to plastic, then, it results in waste. The MSWM is a mirror of the socioeconomic system, it changes along with the time, and there is no absolute unique answer for the MSWM.

In order to cope with such changeable MSW issues, the management body has to set goals according to the objectives, to plan activities for attaining the goals, to establish indicators to measure results of the activities, to continuously monitor and analyze the indicators and to feedback to the activities. In short, the management body is required to carry out the "Check – Plan – Do – See," in the day to day operations. During doing so, if it is clear that the goals do not meet with the objectives, new goals have to be set up again.

ADN is also expected to accumulate experiences and knowledge by carrying out the "Check – Plan – Do – See," and continuously to strengthen its ability. First, in the contract management of the collection service, it is expected to employ qualified persons, to design collection routes, to review the contracts or to invite bid, and to establish a contract auditing system according to the Action Plan.

ADN has just begun to walk towards establishment of the proper MSWM. It could make a big step, if it gets a certain technical support to follow this Study at the initial stage in the Master Plan.

In conclusion, the Study Team would like to express its appreciation to all the organizations and individuals in both the Dominican side and the Japanese side, who participated and cooperated with the Study. We expect that what we have done together with the counterpart will lead to establishment of sustainable MSWM in Santo Domingo de Guzman , National District, Dominican Republic.

The Study on Integrated Solid Waste Management Plan  
in Santo Domingo de Guzman, National District, Dominican Republic  
Location Map





**STUDY AREA**



Consistorial Palace (Municipal Palace) in Colonial City



Plaza Colón in Colonial City



View of Study Area



Other view of Study Area



Houses settled at the shores of Ozama River



Street of PP area (trees pruning and branches in streets)



**Analysis of Waste Amount**



Collection of samples from houses



Collection of samples from houses

**Analysis of Waste Composition**



After mixing them adequately, the waste was divided in four segments of approximately the same size.



The reduced sample was placed in plastic containers calibrated to register its volume and weight.



The reduced sample was divided into components



The components were dried to analyze its content of humidity.



**Time and Motion Survey**



Survey of collection works



Survey of collection works



Survey of collection works



Interview with waste collection truck driver

**Public Opinion Survey (POS)**



Household interview



Household interview



### Survey of Recycling Market



Scavengers recovering metals around Duquesa landfill to sell them to recycling companies.



Metal melting at local smelting companies .



Packaging of paper for recycling



Plastic recycling companies.

### Survey on Social Considerations



Interview with focal groups



Interviews with street sweeping workers



**ENVIRONMENTAL EDUCATION “MINIMIZING WASTE FOR A CLEAN CITY”**



Workshop on environmental education for the C/P personnel



Personnel of C/P (ADN, SEE, SEMARN)

**1<sup>st</sup>. Workshop for Teachers of PPP Area (Public Schools)**



Participating teachers of public schools



Activity of making recycled paper

**2<sup>nd</sup>. Workshop for Teachers of PPP Area (Private Schools)**



Participating teachers of private schools.



Explanation during workshop by personnel of C/P