

*Plate 9: Pilot Project of Improvement of the Integrated Waste Collection Service*

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**PILOT PROJECT OF IMPROVEMENT OF THE INTEGRATED WASTE COLLECTION SERVICE**



Meeting with collection service contractors and managers



Waste collection route survey



Collection works (before PP, without uniforms)



Collection works (after PP, with uniforms)



Clean collection compactor truck



Residents cooperating with collection activities in areas of difficult access for compactor trucks

**PILOT PROJECT OF CITIZEN PARTICIPATION PROMOTION**



Designed and produced information materials for the pilot projects.



C/P training on resident opinion survey at Triple A



Implementation of resident opinion survey by C/P and volunteer from the Youth Dept.



Flyers distribution by volunteers of Youth Dept.



Meeting with residents (El Manguito)



Meeting with residents (Bella Vista)

*Plate 11: Pilot Project of Citizen Participation Promotion*

**Advertising signboards to promote Clean City**



Samples of signboards for advertising



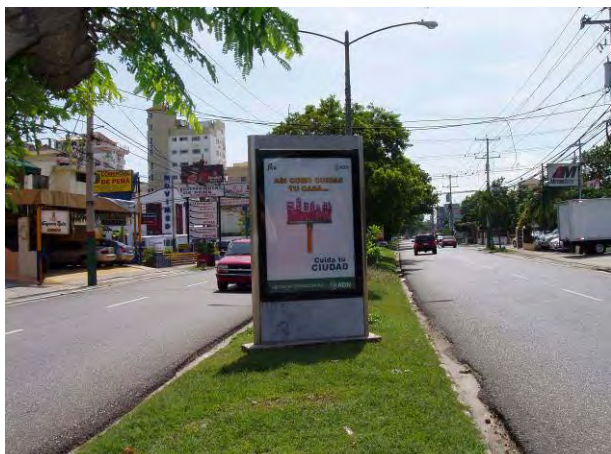
D1: "Waste problem must be solved by all" (installed in Ave, W. Churchill)



D2: "In the bag... it looks better" (installed in Ave, W. Churchill)



D3: "In the container ...it looks better"



D4: "As you take care of your house ... take care of your city" (installed in Ave. Betancourt)



D5: How beautiful is to live in a Clean City!

*Plate 12: Press Tour after the Pilot Projects*

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**Press Tour**



Exhibition of photos and signboards during the press tour



Introduction and explanation to the press



Introduction and explanation to the press



Site visit to PP area (sector of Ave. Defillo and Sagrario Diaz-Bella Vista)



Interview with residents by the press (sector of Ave. Defillo and Sagrario Diaz-Bella Vista)



Touring the area (sector of Ave. Defillo y Sagrario Diaz-Bella Vista)

**BEFORE AND AFTER THE IMPLEMENTATION OF PILOT PROJECTS**



Condition of collection compactor truck



Condition of collection compactor truck



Street in PP Sector



Street in PP Sector



San Juan Bautista de la Salle St. near military zone



San Juan Bautista de la Salle St. near military zone

### **Workshops**



Several meetings were held with the C/P to analyze the progress of the Study.



Meeting with Technical Working Group

### **Launching of SWM Regulation**



Speech of Mayor of ADN



Speech of Director of JICA

### **1<sup>st</sup>. Seminar**



Presentation of the 1<sup>st</sup>. Seminar



People invited to the Seminar

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## Abbreviations

ADN	National District Municipality ( <i>Ayuntamiento del Distrito Nacional</i> )
BOD	Biochemical Oxygen Demand
CD	Capacity Development
COD	Chemical Oxygen Demand
C/P	Counterpart
DF/R	Draft Final Report
EMUCD	Environmental Management and Urban Cleansing Directorate ( <i>Dirección de Gestión Ambiental y Aseo Urbano</i> )
DIGESA	Directorate General of Environmental Health
DN	National District ( <i>Distrito Nacional</i> )
EIA	Environmental Impact Assessment
EU	European Union
F/R	Final Report
F/S	Feasibility study
HW	Hazardous Waste
IC/R	Inception Report
IDB	Inter-American Development Bank
IEE	Initial Environmental Examination
INAPA	National Institute for Potable Water and Sewerage
INDRHI	National Institute of Hydraulic Resources
IT/R	Interim Report
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
M/M	Minutes of Meetings
M/P	Master Plan
MSWM	Municipal Solid Waste Management
MW	Medical waste
NGO	Non Governmental Organization
ONAPLAN	National Planning Office
ONE	National Statistics Office ( <i>Oficina Nacional de Estadísticas</i> )
PAHO	Pan-American Health Organization
PLD	Dominican Liberation Party ( <i>Partido de la Liberación Dominicana</i> )
POS	Public Opinión Survey
P/P	Pilot Project
PRD	Dominican Revolutionary Party ( <i>Partido Revolucionario Dominicano</i> )
R/P	Progress Report
SABAMAR	Project of Environmental Sanitation of Marginal Barrios
SEC	Secretariat of State for Culture
SECTUR	Secretariat of State for Tourism
SEE	Secretariat of State for Education
SEESCYT	Secretariat of State for Higher Education, Science and Technology
SEIC	Secretariat of State for Industry and Trade
SEMARN	Secretariat of State for Environment and Natural Resources
SEOPC	Secretariat of State for Public Works and Communications
SESPAS	Secretariat of State for Public Health and Social Assistance
St/C	Steering Committee
S/T	Study Team (JICA)
STP	Technical Secretariat of Presidency
S/W	Scope of Works
SWM	Solid Waste Management
T&M	Time & Motion Survey
TWG	Technical Working Group
UASD	Santo Domingo Autonomous University ( <i>Univ. Autónoma de Santo Domingo</i> )
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WACS	Waste Amount and Composition Survey
WB	World Bank
W/S	Workshop
WHO	World Health Organization



# Chapter 1

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*Outline of the Study*

# 1 Outline of the Study

## 1.1 Background

The Santo Domingo National District of the Dominican Republic had a population of around 950,000 in 2002. The Santo Domingo Metropolitan Area, which includes Santo Domingo National District, receives around 2,500,000 tourists per year, whereby solid waste generation was estimated at approximately 1.26 kg per capita per day, which was comparable to the generation of developed countries. At the time, the main issues in solid waste management in Santo Domingo National District were the following.

- Rules were not established for the residents on how to discharge and store solid waste. As a result, residents discharged solid waste outside their houses every day. However, since a solid waste collection plan was not well established, uncollected refuse was left scattered around for several days, thereby not only degrading the scenery but also aggravating the urban sanitation problem.
- Solid waste collection was conducted partly by private companies and partly as a direct service provided by the Municipal Government of Santo Domingo National District (ADN), but a clear delimitation did not exist between the two types of service.
- Most of the poverty groups lived along rivers or on steep slopes where solid waste collection service was not provided due to difficulties in the access of refuse collection trucks. Solid waste generated in such inaccessible places can be easily disposed of over cliffs or along riverbeds, and can easily end up in rivers when swept by rain water. Also, there are cases where solid waste is directly disposed of into river courses.
- Infectious hospital waste is not separated before collection and transport, and is mixed together with general municipal waste and disposed of in the final disposal site. Consequently, there are increased risks of infection to the solid waste management crew, as well as an adverse influence on the surrounding environment.
- Santo Domingo Metropolitan Area, composed of Santo Domingo National District, Santo Domingo North, Santo Domingo East, Santo Domingo West and Boca Chica, has only one final disposal site, Duquesa, which is privately managed and operated through a concession contract. As Duquesa is not a sanitary landfill, environmental, contamination has occurred due to leachate, smoke from spontaneous combustion and bad odor.

The interrelated influence of the issues described above provoked urban sanitation problems.

ADN had been making efforts to improve the existing situation by undertaking such activities as city beautification through enhancing street sweeping, by providing a direct solid waste collection service, and by establishing a school for cleansing crew. However, as these activities had been implemented without understanding and analyzing the waste flow, it could not be said that they had been effective.

In order to improve solid waste management in Santo Domingo National District, it became urgent to formulate a long-term plan, reflecting the actual situation and serving as a road map for the improvement of solid waste management in the National District. For this purpose, in November 2003, the Government of the Dominican Republic requested Japan to implement a development study. In response to this request, JICA dispatched a Preparatory Study Mission in March 2005, and the Scope of Works was signed on April 26, 2005. Finally, for the implementation of this Study on an Integrated Solid Waste Management Plan in Santo Domingo de Guzman, National District, JICA selected Kokusai Kogyo Co. Ltd.

### 1.2 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 status of solid waste management conducted by ADN, Dominican Republic, and to clarify the long-term measures for improvement of 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

### 1.3 Targets

#### 1.3.1 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

#### 1.3.2 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. Hazardous waste and construction debris will not be included in the Master Plan Study, but general recommendations will be made on the basis of existing information that can be collected. Radioactive waste is also excluded from this Study. The types of solid waste are defined in “Norma para la Gestión Ambiental de Residuos Sólidos No Peligrosos” of the Dominican Republic.

### 1.4 Scope of the Study

This Study will be conducted on the basis of the Scope of Work (S/W) signed and exchanged on April 26, 2005, and the Minutes of Meeting (M/M). The consultant and the counterpart jointly conducted the studies indicated in the S/W, and prepared the reports indicated in point “1.7 Reports” to submit them to the Dominican side. Meetings were held for necessary explanation and discussions of the Reports.

### 1.5 Organization of the Study

#### 1.5.1 Study Organization

The Dominican Side established a Steering Committee to make strategic decisions, a Technical Working Group to discuss technical and managerial matters related to Solid Waste Management, and a Counterpart Team consisting of officials of ADN responsible for Solid Waste Management, in order to jointly conduct this Study with the Study Team.

The Study organization had the following relationship.

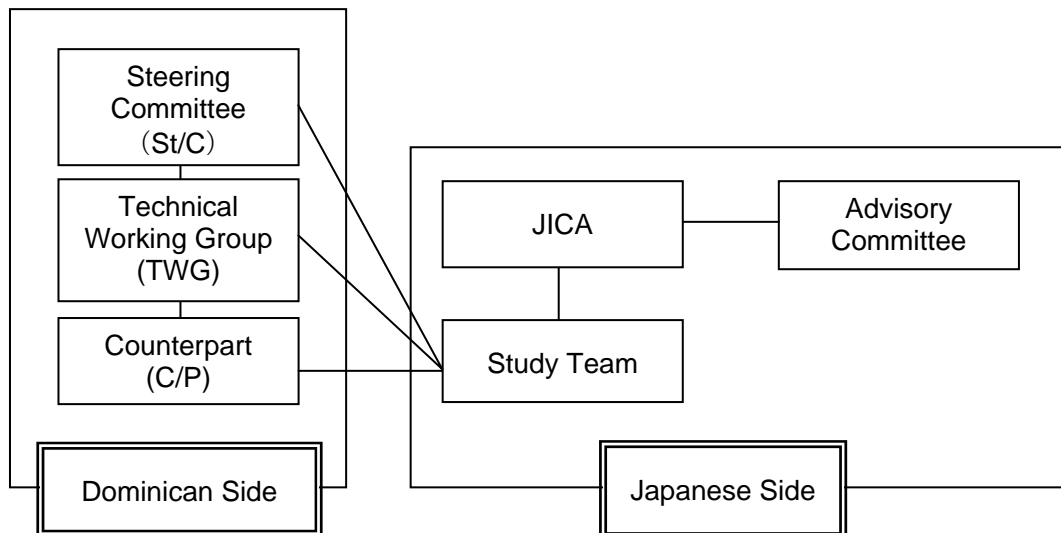


Figure 1-1: Organization Chart of the Study

### 1.5.2 Steering Committee

The Dominican side set up the Steering Committee (St/C) composed of the members below.

- Mr. Esmérito Salcedo Gavilán, Mayor of the National District, (President of the Committee)
- Mr. Max Puig, Secretary of the State for the Environment and Natural Resources
- Mr. Freddy Pérez, Secretary of the State for Public Works and Communications
- Mr. Sabino Báez, Secretary of the State for Public Health and Social Assistance
- Ms. Alejandrina Germán, Secretary of the State for Education

### 1.5.3 Technical Working Group

The Dominican side set up the Technical Working Group (TWG) composed of the members below.

- Mr. José Miguel Martínez, Director EMUCD (Coordinator)
- Mr. Luis Omar Polanco, Financial Director, ADN
- Mr. Víctor Gómez, Planning and Institutional Director, ADN
- Mr. William Espinosa, Human Development Director, ADN
- Ms. Mónica Sánchez, Master Plan Director, ADN
- Mr. Ramón Galván, Director of Transportation and Equipments, ADN
- Mr. Jaime Lockward, Secretariat of the State for Environment and Natural Resources
- Ms. Mary Grullón, Secretariat of the State for Public Works and Communications
- Mr. Sergio Castillo, Secretariat of the State for Public Health and Social Assistance
- Ms. Ángela Martínez, Adviser for the Secretariat of the State for Education

### 1.5.4 Counterpart Team

The Dominican side set up the Counterpart Team (C/P) composed of the members below.

- Mr. José Miguel Martínez, Director EMUCD
- Mr. Hugo Pérez, Manager of Programming and Control EMUCD

## 1. Outline of the Study

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- Mr. Miguel Germosén, Technical Director of Urban Cleansing EMUCD
- Mr. Oscar Guillermo García, Chief of Operations EMUCD
- Mr. Ángelo Rodríguez, Chief of Biomedical Waste Management, EMUCD
- Mr. Heisor Arias, Chief of Industrial Waste Management, EMUCD
- Ms. Anyelina Aquino, Chief of Environmental Evaluation, EMUCD
- Mr. Teodoro Lara, Chief of Environmental Education, EMUCD
- Mr. Guillermo Pérez C., Chief of Risk Management, EMUCD

### 1.5.5 Advisory Committee

In order to provide the necessary advice to the Study Team, JICA set up an Advisory Committee composed as follows.

Responsibility	Name	Position
Chairman	Hidetoshi KITAWAKI	Professor, Department of Regional Development Studies, Toyo University
Member	Masumi FURUSAWA	Deputy director-general, International Cooperation Office & Public Relation Office, Department of Planning, Japan Environmental Sanitation Center
Member	Masashi IWAKI	Chief, Waste Plant Operation Division, Komaoka Incineration Plant, Public Waste Management Department, Environmental Affairs Bureau, Municipality of Sapporo

### 1.5.6 Study Team

The members of the JICA Study Team are shown below.

Team members	Responsibility	Name
Leader / Solid Waste Management / Final Disposal		Ikuo Mori
Financial Management / Public Private Partnership		Masaru Obara
Collection and Transport / Waste Flow Analysis		Ximena Alegria
Environmental Considerations / Medical Waste Management		Akira Doi
Citizen Participation / Social Considerations		Masaharu Kina
Organization / Legal Structure / Human Resource Development		Victor Ojeda
Medical Waste Management		Yuko Aoki
Administrative Coordinator		Noriko Otsuki
Local staffs	Responsibility	Name
Data Management		Kunito Ishibashi
Translator / Administrative Coordinator		Mario Valle
Secretary		Ayesha Soto

## 1.6 Study Schedule

This Study is divided into 2 phases. A summary of the overall schedule is shown below.

Phase 1: Understanding of current situation, formulation of Draft Master Plan

Phase 2: Implementation of Pilot Projects, formulation of Master Plan

Fiscal Year	FY2005									FY2006											
Month	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Work in Dominican Rep.	[Redacted]									[Redacted]											
Japan	Preparatory work			1st work in Dominican Rep.			1st work in Japan			2nd work in Dominican Rep.						2nd work in Japan					
	← Phase 1 →									← Phase 2 →											
Report	▲ IC/R				▲ P/R				▲ IT/R							▲ DF/R		▲ F/R			
Seminar ▲ Workshop △		△			△				▲							△	▲				

Note: IC/R: Inception Report      P/R: Progress Report      IT/R: Interim Report  
 DF/R: Draft Final Report      F/R: Final Report

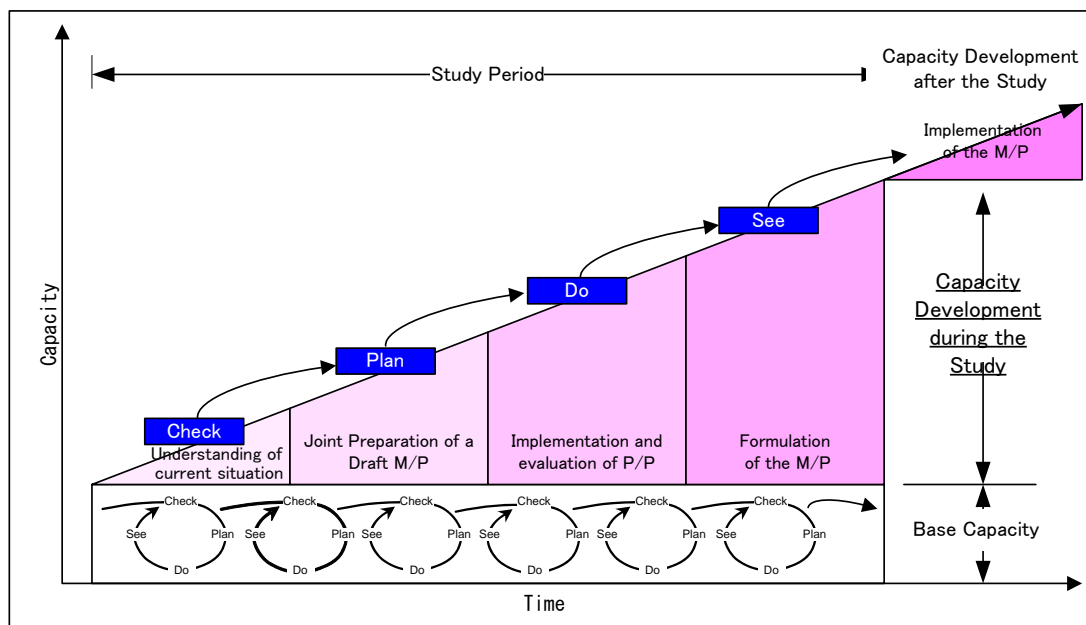
## 1.7 Reports

The reports indicated below were submitted to the Dominican side and meetings were held for necessary explanation and discussions.

Report	English	Spanish
Inception Report	5	25
Progress Report	5	25
Interim Report	5	25
Draft Final Report		
Summary	5	25
Main Report (Municipal solid waste)	5	25
Annex (Municipal solid waste)	5	25
Main Report (Healthcare waste)	5	25
Final Report		
Summary	5	45
Main Report (Municipal solid waste)	5	30
Annex (Municipal solid waste)	5	30
Main Report (Healthcare waste)	5	30

## 1.8 Technology Transfer

The concept of technology transfer in this Study was that the Dominican side and the Japanese side go through the problem solving cycle, “Check – Plan – Do – See” together. The figure below illustrates the concept.



During the Study, the following opportunities for technology transfer were given.

Opportunities	Target	Contents	Frequency
On the Job Training	C/P	<ul style="list-style-type: none"> <li>Survey method</li> <li>Analysis and evaluation method of survey results</li> <li>Extraction of problems</li> <li>Countermeasures</li> <li>Planning of a master plan</li> <li>Planning, implementation and evaluation of pilot project(s)</li> </ul>	Throughout the study.
Report explanation meeting	C/P TWG St/C	<ul style="list-style-type: none"> <li>Analysis of survey results</li> <li>Planning of countermeasures</li> </ul>	At IC/R, P/R, IT/R, DF/R
Technology transfer seminar	C/P TWG, St/C Others	<ul style="list-style-type: none"> <li>Draft Master Plan</li> <li>Master Plan</li> </ul>	During the explanation of IT/R and DF/R
Pilot Projects	C/P Residents Private sector	<ul style="list-style-type: none"> <li>Planning, monitoring and evaluation of collection service work</li> <li>Discharge manner</li> <li>Healthcare waste management</li> </ul>	During the pilot projects
Counterpart training	Counterpart	<ul style="list-style-type: none"> <li>Visit to institutions and facilities concerned with SWM in Japan, One person from ADN</li> </ul>	Once
		<ul style="list-style-type: none"> <li>Visit to institutions and facilities concerned with SWM in Chile, Three persons from ADN</li> </ul>	Once

## **1.9 Previous JICA Cooperation with Ayuntamiento de Distrito Nacional (ADN)**

### **1.9.1 Chronology**

- 2001 - Request from ADN for Senior Volunteer in Solid Waste area.
- 2002 - Creation of a new division of the City of Santo Domingo in 5 new Municipalities where the National District is the Municipality belonging to our request.
- 2002 - Arrival of the Senior Volunteer Mr. Haruyoshi Odo after election of the new Mayor (Roberto Salcedo).
- 2003 - Preparation of the request by ADN for the implementation of a Development Study for Solid Waste Management in the National District.
- 2003 - Signing of Cooperation Act between JICA and ADN with the cooperation of the Senior Volunteer Mr. Haruyoshi Odo, on the occasion of the arrival of new seniors.

(2003-2005)

Mr. Masahiro KAKUAGE, Group Coordinator  
Mr. Kenji YASUDA, Environment  
Mr. Kunio UESUGI, Urban Planning

(2005-2007)

Mr. Akio KASHIWAGI, Solid Waste

(2006-2008)

Mr. Takeshi SHIMOKAWA, Environment  
Mr. Toshiro HARA, Group Coordinator

### **1.9.2 Objective and Goal**

Senior volunteers were dispatched to ADN, in consideration that ADN is the institution responsible for planning, management and execution of maintenance works and conservation of natural resources and environmental quality, and more than 1 million inhabitants and 500 thousand daily visitors stay in DN. Therefore, JICA dispatched the above mentioned volunteers with the aim of assisting the identification and solving of major problems in the District such as solid waste, environmental problems and deficiency in urban planning of new sectors.

### **1.9.3 Conducted activities**

#### **a. Identification of priority problems in each of the areas.**

##### Solid Waste

- To design a solid waste collection and disposal system
- Analysis of the current situation of the solid waste
- Methodology for distribution of the solid waste
- Collection and distribution of healthcare waste

##### Environmental Management

- Formulation of an environmental management system
- Design and environmental diagnosis
- Preparation of proposals for Environmental Management Pilot Project



## 1. Outline of the Study

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### Urban Planning

- To prepare standards for buildings
- Study of current situation and problems
- Formulation of a municipal system of urban planning
- Formulation of project proposals

### Coordinator

- To plan, arrange and coordinate group activities
- To organize periodic meetings
- To facilitate logistic support for the volunteers group
- Follow-up and monitoring of the group activities

### **b. Conducted Activities**

- Signing of Cooperation Act between ADN and JICA
- Reconnaissance visit to several National District sectors
- Study on situation of the solid waste management and Duquesa disposal site
- Analysis of Strategic Plan of Santo Domingo 2015
- Proposals for Clean Coast Project
- Launching of the document “Ideas” for Santo Domingo
- Establishment of Environmental Information Center, Parque Mirador Sur
- Approval and implementation of the Development Study on Integrated Solid Waste Management in the National District

## **1.9.4 Cooperation from JICA**

### **a. Donation of Equipment**

- 1 vehicle
- 4 computers, audiovisual equipment (projector, screen, video, TV, digital camera)
- 2 copy machines
- 1 cabinet, 1 filing cabinet

### **b. Environmental Information Center**

This center is in charge of education and information about topics related to conservation and environmental education. It is the only center established in the District with the intention of creating an Environmental Information System for the District and is focused on the formation and awareness of citizen solidarity, responsibility and protection of the environment.

The Center will formulate and implement education and environmental information policies as well as plans and programs that may arise.

### **From the inauguration in October, 2005.**

At present they implement workshops for schools in the Pilot Project area, record and request books for institutions, visitors' record and workshops of soap and recycled paper makings.

c. **Offer of scholarships in Japan and third countries**

Name	Course	Period
Aridio Santos	Solid Waste Management	2003 SAL
Hildemaro Castro	Urban Development	2004 JP
Anyelina Aquino	Household Residual Water Management	2004 JP
Leandro Márquez	Solid Waste Management	2004 JP
Oscar García	Solid Waste Management	2005 JP
Hugo Pérez	Urban Solid Waste	2005 JP
Sina del Rosario	Urban Development	2005 JP
Enrique García	Urban Greenery	2005 JP
Monika Sánchez	Comprehensive City Planning	2005 JP
Miguel Germosén	Solid Waste in Latin America	2006 MX
José Miguel Martínez	Public-Private Company	2006 CL
Hugo Pérez	Public-Private Company	2006 CL
Joaquín López	Legal Aspects	2006 CL
Luis Omar Polanco	Administration	2006 CL
José Miguel Martínez	Supervision in the Management	2006 CL
José Rafael Almonte	Environmental Education	2006 CL
José Miguel Martínez	Solid Waste Management	2006 CL
Miguel Germosén	Reduction, Recycling and Reuse	2006 CL

\* SAL (Salvador), JP (Japan), MX (Mexico), CL (Chile)

\* A total of 18 counterparts of ADN were sent to courses and scholarships in Japan and third countries

# Chapter 2

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*Profile of the Study Area*

## 2 Profile of the Study Area

### 2.1 The Study Area

#### 2.1.1 Administrative Districts

The ADN territory is divided in three electoral districts (Circumscriptions).

##### **District (Circumscription) 1**

The district borders to the north by John F. Kennedy and San Martin Avenues, including the Kennedy Zone; to the south by the Caribbean Sea; to the east by Mexico Avenue, Mella Bridge and Ozama River; to the west by Luperon Avenue including the Costa Verde Urbanization. The estimated population in 2005 was 340,024 with an area of 43.62 km<sup>2</sup>. It includes the largest number of urban spaces and memorial places such as Centro de Los Héroes, Mirador Sur Park, Litoral Sur Park, and Colonial City.

##### **District (Circumscription) 2**

The district borders to the north by La Isabela River including the urbanization of Carretera La Isabela; south by the John F. Kennedy and San Martin Avenues; east by Maximo Gomez Avenue and west by the Duarte Highway. The estimated population in 2005 is 256,254 with an area of 38.28 km<sup>2</sup>. The special topographic feature in this area was the diverse natural ecosystems. Additionally, Jardín Botánico Nacional, Zoológico Nacional, and Mirador Sur Park are located in this district. Those are important public spaces.

##### **District (Circumscription) 3**

The district borders to north by Isabela and Ozama Rivers; south by San Martin and Mexico Avenues; east by Ozama River and west by Maximo Gomez Avenue. The estimated population in 2005 was 384,375 with an area of 11.58 km<sup>2</sup>. The area along the rivers is a densely populated area with the poor.

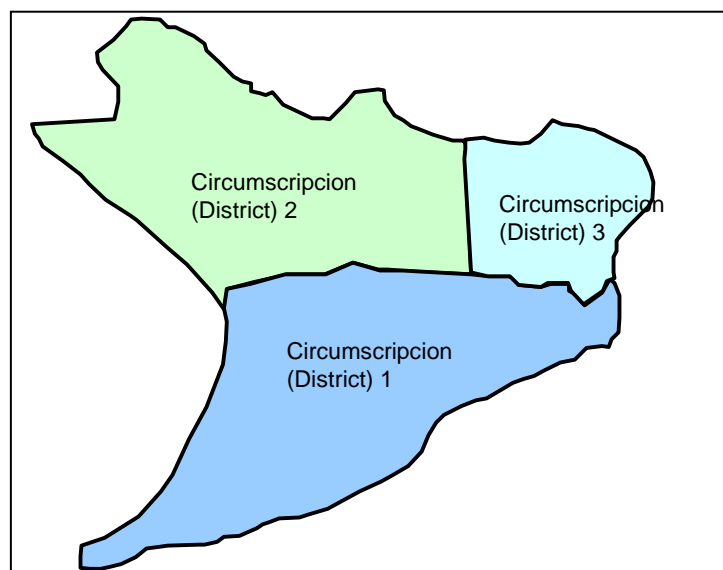


Figure 2-1: Administrative Districts

## 2. Profile of the Study Area

### 2.1.2 Other Features of the Study Area

The Colonial Zone has been declared a World Heritage site for its historical and architectural richness. Some remarkable buildings are located there, such as Catedral de Nuestra Señora de la Encarnación, Colón Park and Borguella Palace, Santo Domingo Fortress, Colon Palace-Fortress, House of Bastidas, House of Nicolas de Ovando, National Cemetery; Museum of the Royal Houses, Royal Dockyards, Church and Fort of Santa Barbara, Imperial Convent of Santo Domingo, Convent Church of the Mercedes. These buildings are important as tourist attractions.

Government offices are located in the National District such as the National Palace and most of the Ministries. Also, the main healthcare centers, educational institutions, business and service enterprises are located there. The concentration of governmental working offices causes an inflow of a considerable number of persons from other municipalities. Regarding this topic, it is said that the floating population of between 400,000 and 500,000 people who use the city services do pay their taxes in other communities.

## 2.2 Population

By 1870, the urbanization made Santo Domingo reach a population of 14,000. By 1930 the population reached 60,000 persons. A higher growth rate was experienced in the 1950's when the population went from 180,000 to 370,000. Similarly, between 1966 and 1978 the population experienced another important growth from 600,000 to 1,100,000 persons.

On the other hand, the last two censuses (1993 and 2002) show that the population in the National District, as it is currently defined plus the Santo Domingo Province, went from 2,193,046 to 2,731,294 where a growth rate 2.45%<sup>1</sup> was calculated.

### 2.2.1 Population

The National Bureau of Statistics (ONE in Spanish) had not prepared a population projection until 2015 for the study area. ONE's officers suggested using the population growth between censuses (1993 and 2002) and the projection made by the National Council for Population and Family (CONAPOFA in Spanish) for the years 2004, 2005, and 2006 for the projection in this study. Consequently, a 1.425% growth rate was established for the projection. This growth rate was defined between the projection for 2004 and 2005 produced by CONAPOFA. Furthermore, a consensus was reached between the Counterpart team and the Study team to use this growth rate and a geometric projection for this study. The results are shown in the following table.

Table 2-1: Projection Used for this Study

	2005 <sup>b</sup>	2006 <sup>c</sup>	2007	2008	2009	2010	2011	2012	2013	2014	2015
NATIONAL DISTRICT <sup>a</sup>	980,653	994,627	1,008,800	1,023,176	1,037,756	1,052,544	1,067,543	1,082,755	1,098,185	1,113,834	1,129,706
PROV. SANTO DOMINGO	1,951,295	1,979,101	2,007,303	2,035,907	2,064,919	2,094,344	2,124,188	2,154,458	2,185,159	2,216,298	2,247,880
SANTO DOMINGO CESTE	566,491	574,564	582,752	591,056	599,478	608,021	616,685	625,473	634,386	643,426	652,595
SANTO DOMINGO NORTE	395,939	401,581	407,304	413,108	418,994	424,965	431,021	437,163	443,392	449,711	456,119
SANTO DOMINGO ESTE	882,047	894,616	907,364	920,294	933,408	946,709	960,200	973,883	987,761	1,001,836	1,016,113
SANTO DOMINGO BOCA CHICA	106,818	108,340	109,884	111,450	113,038	114,649	116,282	117,939	119,620	121,325	123,054

<sup>a</sup> For the National District and Santo Domingo Province, it is estimated a growth rate of 1.425% and a geometrical projection was used

<sup>b</sup> CONAPOFA Data

<sup>c</sup> CONAPOFA Data

Additionally, CONAPOFA defined a population distribution by barrio for 2005 and 2006 as shown in Table 2-2.

<sup>1</sup> VIII Censo Población y Vivienda, 2002, Secretariado Técnico de la Presidencia, Oficina Nacional de Estadística

Table 2-2: CONAPOFA 's Projection by Barrio for the National District

	2005	2006
<b>NATIONAL DISTRICT</b>	<b>980653</b>	<b>994627</b>
LOS PERALEJOS	6475	6567
PALMA REAL	34894	35391
ARROYO MANZANO	3454	3504
ALTOS DE ARROYO HONDO I	10458	10607
LOS RIOS	40058	40629
COSTA VERDE	3718	3771
HONDURAS DEL OESTE	9550	9686
HONDURAS DEL NORTE	10515	10664
PASEO DE LOS INDIOS	299	304
LOS CACICAZGOS	7992	8106
RENACIMIENTO	10365	10513
LOS RESTAURADORES	14731	14941
SAN GERONIMO	13357	13547
LOS JARDINES	16503	16739
ALTOS DE ARROYO HONDO II (NUEVO ARROYO HONDO)	18361	18622
CERROS DE ARROYO HONDO	1457	1477
VIEJO ARROYO HONDO	22942	23269
PARAISO	4315	4377
JULIETA MORALES	16583	16819
LOS PRADOS	11206	11366
LOS MILLONES	9025	9153
MIRADOR NORTE	5991	6076
MIRADOR SUR	4144	4203
BUENOS AIRES (INDEPENDENCIA)	26393	26769
MIRAMAR	8344	8463
TROPICAL	3106	3150
LOS JARDINES DEL SUR	8705	8829
ATALA	4227	4288
BELLA VISTA	19979	20264
QUISQUEYA	24544	24893
PIANTINI	11241	11402
LA JULIA	6973	7073
NUESTRA SEÑORA DE LA PAZ	5334	5410
GENERAL ANTONIO DUVERGE	4619	4685
30 DE MAYO	5073	5145
EL CACIQUE	6993	7092
CENTRO DE LOS HEROES	87	88
MATA HAMBRE	5822	5905
CIUDAD UNIVERSITARIA	7799	7910
LA ESPERILLA	7201	7303
NACO	13286	13476
LA FE	21705	22015
LA AGUSTINA	16135	16365
CRISTO REY	62582	63474
LA ZURZA	20626	20919
VILLAS AGRICOLAS	17070	17313
VILLA JUANA	35430	35935
MIRAFLORES	1701	1726
SAN JUAN BOSCO	3467	3517
GAZCUE	15317	15536
CIUDAD NUEVA	3355	3402
SAN CARLOS	11643	11809
VILLA CONSUELO	26719	27099
LUPERON	24463	24812
CAPOTILLO	33277	33752

### 2.2.2 Density

The population projected for the National District by 2005 was 980,653 people. This population lives in an area of 93.48 km<sup>2</sup> (Junta Central Electoral, 2006). Therefore, the population density in 2005 was 10,491 persons/km<sup>2</sup>,<sup>2</sup>.

## 2.3 Natural Environment

### 2.3.1 Location

Dominican Republic shares with Haiti the island called La Hispaniola, which form jointly with Cuba, Jamaica, and Puerto Rico the so called Great Antilles. La Hispaniola has an area of approximately 77,914 km<sup>2</sup>, out of this area 48,442 km<sup>2</sup> corresponds to the Dominican Republic.

The Dominican Republic is located at 68° 30' longitude west and 18° 20' latitude north<sup>3</sup>. The National District is located between the coordinates 70° 00' and 69° 52' West and 18° 33' and 18° 25' North.

### 2.3.2 Topography

The Dominican Republic is diagonally divided from Southeast to Northeast by the Central Mountain Range; at the lowlands of this range the Vega Real Valley extends and it is limited by Septentrional Mountain Range which runs next to the coastline from Southeast to Northwest. The main heights are located precisely in the Central Range, e.g., Monte Gallo (2,500 meters), La Pelona (3,168 meters), and Pico Duarte (3,175 meters); these heights represent the highest points in the orographic features of the Antilles<sup>4</sup>.

The city is located on the coast side which is 10 km long, which runs from Haina to the embouchure of the Ozama River. This is the point where the city was founded in 1498<sup>5</sup>.

### 2.3.3 Climate

Temperature and rainfall records at the Santo Domingo Station, National District (1900-1998)<sup>6</sup> show that the months with higher rainfall are from May to November. Meanwhile, the months with lower rainfall are from December to April. Annual average rainfall was 1,416 mm/year and annual average temperature was 25.8° C.

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<sup>2</sup> VIII Censo Población y Vivienda, 2002, Secretariado Técnico de la Presidencia, Oficina Nacional de Estadística

<sup>3</sup> VIII Censo Población y Vivienda, 2002, Secretariado Técnico de la Presidencia, Oficina Nacional de Estadística

<sup>4</sup> República Dominicana en Cifras, Año 2004

<sup>5</sup> Proyecto Ciudad Santo Domingo, Documento Diagnóstico, ADN and Spaniard International Cooperation (AECI)

<sup>6</sup> Environmental Impact Assessment for Aeropuerto Internacional La Isabela, en Higuero, Santo Domingo, December, 1999

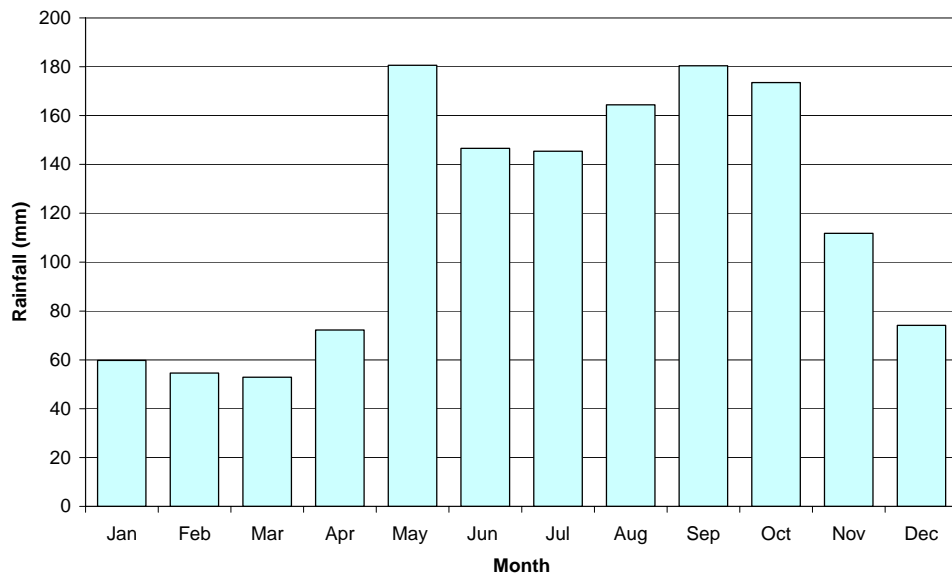


Figure 2-2: Rainfall in Santo Domingo Station, National District (1900-1998)

Furthermore, it can be observed that the months with higher temperature are from May to November. Meanwhile, the months with lower temperature are from December to April.

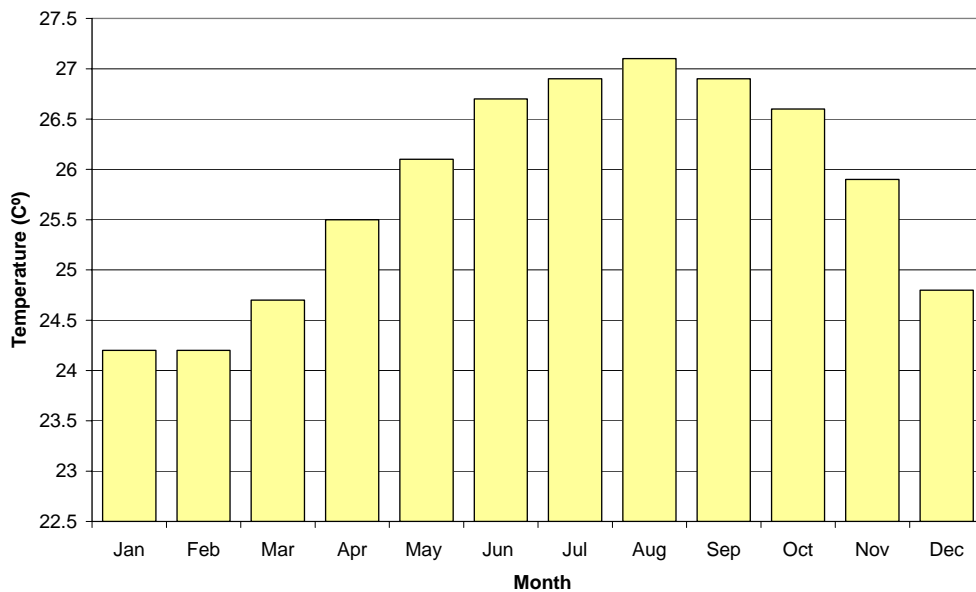


Figure 2-3: Temperature in Santo Domingo Station, National District (1900-1998)

In 100 years of cyclonic events in the Dominican Republic, approximately 20 hurricanes have landed on the coasts of the country; the five most important hurricanes in view of their effects and intensity were Lilis (1894), San Zenón (1930), Inés (1966), David (1979) and George (1998)<sup>7</sup>.

<sup>7</sup> Meteorological National Office of Dominican Republic



### 2.4 Social Environment

#### 2.4.1 Urban Society

The Dominican economy was dominated by agriculture, especially sugar cane cultivation and processing. However, the decrease on sugar prices induced the Dominican economy to manufacturing and tourism rather than agriculture. This is the reason why the World Bank denominates the Dominican Republic as a service economy. According to the estimates of the Inter-American Development Bank (IDB), the Dominican Republic is considered as a low-medium income economy.

The little availability of adequate payment and unemployment defines the life of most urban Dominicans. According to the information of the Central Bank of the Dominican Republic (2002), the unemployment rate was between 16 and 20 percent of the economically active population. In Santo Domingo, many workers receive minimum payment and are temporal workers. According to the information of the worker class of Santo Domingo, it was found that 50 percent of the heads of households do not have regular employment. Under these conditions, the people that have regular employment constitute a privileged segment of the urban population.

Rural-urban migration makes the poor urban situation more critical. Opportunities to earn a living were slightly better in the cities than in the rural areas, although urban work is hard and the cost of life and food was more expensive.

Approximately, one fourth of houses located in the marginal areas are headed by women. Even men are household heads, frequently the women contribute to the family income among the poorest residents of the city. Those women's economic activities are diverse and with low remuneration. They are dedicated to washing, ironing clothes and other domestic work and some do sewing. Some of them buy cheap or used articles and resell them. Others that have some capital setup grocery shops, cigarette and sweet stores, but their commercial impact is minimum.

An urban barrio functions as social security. People in the poor barrio share and help each other, and cooperation activities take place among neighbors and relatives. Most of the Dominicans share a general belief, that neighbors should be helped in times of necessity.

#### 2.4.2 Ethnical Groups

The Dominican Republic inhabitants present an ethnological variety. A great diversity of skin colors can be observed. The Dominican society is a result of the combination of races and cultures. Most of the population (approximately 73 percent) is mulatto, a legacy of black slavery during the colonial period.

The black race of African origin came from Haiti, some have brown native skin, and white population is rare. The Africans were introduced to the Caribbean and to the American continent by the English and the French as a labor force. On the other hand they have the brown skin native Creole, presenting different tonalities of the same color and the whites that constitute the minority.

A "mulatto" is a son of a black African with a white European. A "mestizo" is the fruit of a Caribbean Indian and a white. A "grifos" is a son of a black African with a Caribbean Indian and from a mulatto and a white a third mixture is born (a third of white blood). In Santo Domingo the mixture has continued between the indigenous and black race, and between mulatto and blacks mainly.

The Dominican racial composition in the 20th century, other human groups have been added

such as Jews, north Americans with varied ethnicity, Europeans, Asians, people from the Middle East, etc., but many of those who arrived to the Dominican Republic are Haitians and from other Caribbean islands. They came to look for job opportunities.

### **2.4.3 Customs, Language and Religion**

#### **Custom**

As was mentioned in the previous section, the Dominican Republic inhabitants are composed of a variety of ethnicity. They produced a mixture of an immense variety of different cultures.

#### **Language**

The predominant language in the Dominican Republic is Spanish.

#### **Religion**

The predominant religion is Catholic, in which approximately 90% of the population professes, although there is complete freedom of cults. In the country there are congregations and temples of several religions such as Protestant, Baptist, Adventist, Jehovah`s Witness and Judaism.

### **2.4.4 Community Structure**

#### **a. Policies and Administration Division**

The Dominican territory is divided into 31 provinces and a National District. The National District is where the capital city of the country is located. It is similar to the provinces although with its own characteristics.

The provinces are political and administrative units which are artificial creations in the national territory to facilitate the central government to delegate authority from the central government to an intermediate level. In each province, there is a Civil Governor who is appointed by the Executive Power and the province representative. Although each province has a Capital, this is only a seat for the main municipality of the province; moreover, the central government`s regional offices are located in these capitals.

The National District was confined to the current area after the territorial division was generated by the Law 163-01. The “Ayuntamiento del Distrito Nacional” of Santo Domingo is in charge of its administration.

Santo Domingo province and its municipalities, legally separated from the National District, in economic terms, are indissolubly linked to the capital city. The floating population who moves daily into the District requires services.

The government units defined in the Dominican Republic are the municipalities which have the power to approve local laws (resolutions) and to protect the environmental quality in their territories.

#### **b. Marginal Barrios**

The marginal barrios are destinations for migrants who arrive from the inland. These barrios are not prepared to receive the migrants as they are deficient in infrastructure (sanitation, waters supply, treatment, etc.). These barrios attract migrants to the capital. This situation should be stopped, because the current migration trend creates a grave problem for Santo Domingo along the margins of the Ozama River.

The marginal barrios population shows a weak social cohesion with low capacity to associate,

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scarce ability to solve internal conflicts, and unable to pose their needs through democratic and solidaristic methods. The foregoing conditions can be the result of a migrant population who has lost its rural roots, but still has not acquired urban behavior habits. The result is a situation of social disarray with low self-esteem, high crime levels, and separation/segregation of the neighborhoods from the rest of city.

The basic services offered by Dominican public entities are insufficient. Furthermore, there are no flood control actions to prevent additional disasters or adequate policies to legalize the situation of some barrios. The population of these barrios represents one fourth of the total population in the city.

### c. **Communication**

Radio is one of the most effective mass medias to reach the masses in the Dominican Republic, followed by the television and the print medias, e.g., newspapers and magazines.

In the rural area, the most effective media is the radio; although the urban area population seems to prefer television. Almost all residents in the city listen to the radio on weekends and holidays. In the Dominican Republic, there are almost 3 electronic receivers for each home. A high percentage of young people listen to the radio, and almost all vehicles have radios.

There are 400 radio stations in the country and eleven newspapers nationwide.

### d. **Neighbor Associations (Juntas de vecinos)**

In the District, there are 400 neighbor associations (juntas de vecinos) and other associations, including non-government organizations. Most of these organizations participate on religious activities, unions, and syndicalism. Additionally, these organizations focus their activities on property claims, improvement of the electricity service, discussion of neighbor's problems among residents and authorities, and respect their rights in general.

## 2.4.5 Education

### a. **Educational System Structure**

The educational system in the Dominican Republic includes 8 years of Basic education, 4 years of middle and high education in several post-secondary schools. The system is comprised of formal and non-formal education which is supplemented with informal education.

- a) Formal education is the integral process that embraces from initial education until superior education within the framework of an official curriculum and following a calendar and a defined schedule.
- b) Non formal education is the process of attaining knowledge, attitude, and skills with the same purpose and parallel to formal education and targeting special citizens; however, the calendar, schedule, and duration of each level is more flexible than with formal education.
- c) Informal education is a process of continuous and spontaneous learning that is carried out outside the framework of formal and non-formal education.

The educational system is comprised of the following levels: Initial, Basic, Middle and Superior Level.

The Initial level is the first educational level and will be imparted before the Basic Level. This level is imparted for children until six years old. The initial level is organized into 3 phases. The first phase is for children up to 2 years old; the second phase is for children from 2 to 4 years old; and the third phase is from 4 to 6 years old. In State Institutions, this

education is offered for free.

The Basic Level is the stage of the educational process considered as the minimum education that all inhabitants of the country have the right to receive. This education is compulsory and the state offers it for free. The Basic level has a duration of eight years, divided in two phases. The first phase, with a duration of 4 years, which includes from 1st to 4th grade, usually begins at six years old. The second phase, with a duration of 4 years, includes from 5th to 8th grade.

The Middle Level is the period following the basic level. It is for two years and is divided in two phases, of two years each. This level offers general formation and options to respond to the aptitudes, interests, vocations and the student's necessities with the purpose for students to be inserted in an efficient way into the labor world and/or subsequent studies. The first phase of the Middle level is for all students. The second phase of the Middle level or specialized phase offers different options and is comprised of three specialties: General, Professional Technician, and Arts. Accordingly, students that complete these specialties are granted a high school title in the corresponding specialty.

The Secretary of State of Education (SEE) supervises the Basic and Middle levels (primary and secondary education). In 2005, it was estimated that there were 164,500 students in primary schools and 61,300 in secondary schools who were studying in the National District. The school year begins in September and finishes at the beginning of June; there are vacations in December (Christmas) and in March (Spring Vacation).

Superior Education, which follows the Middle level, is the final stage in the educational system. Universities and high education institutions located in the National District are the following: Academic Foundation of the Caribbean, Technology Institute of Santo Domingo, APEC University, Autonomous University of Santo Domingo, Mother and Master Catholic University, Catholic University of Santo Domingo, O&M Dominican University, Ibero-American University, Pedro Henríquez Ureña National University.

There are also other systems like Special Education (for children and youth with physically disable or exceptional characteristics) and Adult Education that include labor vocational education, in charge of offering opportunities to people interested in acquiring capacities to practice a productive job.

#### **b. Literacy Rates**

Education is one of the decisive factors for social development process. Dominican Republic in spite of lagging behind in education, since the 80's decade, has begun a literacy campaign as part of a Decadal Educational Plan which has obtained positive results.

Nationwide, there is a high illiteracy level with 21.8% in the population aged older than 3 years. The average educational level is 4.5 grades. In the National District, the illiteracy rate decreases to 14.1%.

Table 2-3: Literacy rate in Dominica Republic and National District

Area	Population	Able to read and write		Unable to read and write	
	Total	Population	%	Population	%
Country	7,977,328	6,235,154	78.2	1,742,174	21.8
National District Region	2,541,188	2,119,920	83.4	420,268	16.6
National District	859,720	738,207	85.9	121,513	14.1

Source: VIII National Census of Population and Housing 2002, Statistic National Office (ONE)

### **c. Diagnostic of the Education Sector**

During the last decade, the activities conducted as part of the education reform in the Dominican Republic have led to an increment in the enrollment rate, a decrease on the drop-out rate in schools, and increased access to education for children with low economic resources. Nevertheless, education in the Dominican Republic is lagging compared to other countries with similar economic conditions. There is a need to stimulate commitment by the civil society through public education, increment of public and private investment, and strengthening of the social capital of families and communities in order to promote citizen participation in the educational reform.

Policies are required to improve teaching and results in education, to strengthen the administrative capacity of the educational system, to ensure the responsibilities, and to increase the participation of civil society's organizations.

The government of the Dominican Republic has made significant efforts to reform the educational system. The efforts of the educational reform have produced an enrollment increment on pre-school and primary levels, an increment of public awareness on the need to improve the education, an improvement of the teacher's capacity, and a new study plan. To materialize this progress of the educational system reform, the government of the Dominican Republic required external technical assistance to put in place a reliable system for educational evaluation and monitoring.

### **d. Environmental Education in the Education Process**

Currently, Environmental Education is not an independent subject, but a part of a block of contents, fundamentally in Natural Science and mainly at the primary phase of education. In addition, some environmental contents are taught at the middle level of the study program, with emphasis on the investigation of environmental problems of the schools and the community.

The SEE is implementing a natural resources management, education, and environmental communication program which pursues to develop different strategies and methodologies to introduce environmental education. This program began in Santo Domingo. There are pilot schools where materials have been prepared, training has been conducted, and follow up teacher training has been conducted. The former issue (follow up training) has been identified as one of the weak points in the environmental education implementation process because teachers predominantly consider environmental education as additional work and do not seem to regard the protection of the environment as a core value.

Another experience of the management of natural resources program is the educational Project "For the Life". It is executed with collaboration from UNICEF, which trained qualified teachers and directors of 1,900 centers. There are also other projects implemented by the environmental education department of SEMARN in schools and has been evaluated as an adequate mean to inculcate conservation values in the Dominican childhood.

### **e. Current Situation of the Environmental Education**

As part of the actual educational curricula, environmental education is taught across different related subjects such as natural science, social science, physical education, and human and religious formation.

In 2004, didactic guidelines on environmental education were elaborated by SEMARN jointly with German Cooperation and funded by IDB. These guidelines focused on solid waste and targeted teachers. However, few practical activities have been conducted with the exception of activities related to encourage school vegetable gardens, environmental protection, and planting trees.

SEMARN only has an educational ecological textbook regarding biodiversity in general to instruct children; this textbook has several concepts and drawings to color.

SESPAS has not provided information related to environmental issues and solid waste management. Most of the information was received through organizations such as the Pan American Health Organization (PAHO) and other NGOs.

The ADN does not have educational materials with the exception of some information compiled and the Instructive Manual for Cleansing Services (2005) in the Urban Cleansing School, which targets the city's cleansing employees.

The Economic Investigation Center for the Caribbean (CIECA) is a private institution dedicated to economic, social and political investigations in Dominican Republic, the Caribbean, and Central America. CIECA developed a pilot project in the Tourist City of Boca Chica which had the purpose to establish a Solid Waste Management Program with the participation of all those who were involved in environmental sanitation in the area. The following booklets were produced: "Solid waste, its effect on health and on the environment", "Public Cleansing Service" and "Adequate Waste Management".

Other educational materials were elaborated by NGOs with funding from external organizations, such as "Solid Waste" (February 2000, COODEZURZA), "Waste: A Never Ending History" (CEDECO), and "Environment and Solid Waste Recycle" (ESCOBA, EZAZURZA, ECOSAGUACIGUA). Recycling activities were carried out through artistic education by SEE. The USA Peace Corps also carries out an annual handicraft fair fomenting material recycling among artists and students.

#### **2.4.6 Public Health and Social Security**

##### **a. Health Sector**

The approach from the health sector to the environment health is poor. The implementation process of the new social security system, started in the year 2000, has emphasized protection and recovery for individual health over collective health actions.

The Directorate General of Environment Health (DIGESA) is in charge of making and implementing policies and regulations. However, the national environment health program is limited in its execution due to a budgetary shortage, lack of qualified personnel, and limited coverage of its actions.

The environmental threat to human health is not a priority issue in the universities' curriculum or in the medicine schools. It is the kind of topic, which is discussed upon as specific part of the content of certain subjects.

Most health centers or facilities are not spontaneously promoting environmental health in the country, but some institutions have programs that promote environmental health. For example, the Secretariat of State for the Environment has its own environmental educational program, and the ADN also has a campaign for citizen education.

##### **b. Social Security (Law 87-01)**

Social Security Law was enacted on May 9<sup>th</sup> 2001. This law is the result of economic, social and political transformations that the Dominican Republic underwent in the last decades to reduce poverty, to achieve social equality, to protect abandoned ones and the incapacities, and to increase economic and social development. The law's main objective is to regulate and develop the rights and reciprocal duties of the State and the citizens, regarding the financing for the population's protection against old age risks, incapacity, advanced age cessation, survival, sickness, maternity, labor risks and includes child protection. On the other hand, this

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law contributes to improve the productivity levels of the companies and the country's competitiveness, strengthens the labor peace and the social stability.

The system beneficiaries are all Dominican citizens, legal residents and external Dominican residents.

The affiliation to the system is obligatory, for every person can work as an employee at public or private sector, and they will be affiliated by their employer to the social security Dominican system, no matter what the salary.

### c. **Social Security (social problems)**

In the Dominican Republic, like in many countries in Latin America and the Caribbean, violence, delinquency and civil insecurity have been very critical social problems.

Low-income class and serious poverty accompanied by unequal development is breeding low efficiency of social policy. The inefficient social policies have resulted in the elevation of the violence rate and delinquency, presented today in the Dominican society.

In addition, factors like anarchical urbanizations, alcoholism, weapons proliferation and traffic/consumption of drugs cause the appearance of crimes and undesirable behaviors. This situation becomes worse, due to a high rate of unemployment and illiteracy.

Therefore to the creation of favorable conditions that guarantee civil security, being able to face poverty with energy, improving education and health in an effective way, creating more work opportunities and strengthening the mechanisms that preserve public order are urged.

### d. **Sanitary Education**

Generally, people in the communities are not aware of the importance of disposing waste in appropriate containers to avoid an un-sanitary environment and help efficient waste collection service. Some campaigns have been carried out for the communities but apparently they were not continuously supported. One of the main problems is that the deficient service supplies and lack of regular collection give distrust to the citizens toward improving their behavior.

## 2.4.7 **Institutions or Organizations in charge of developing environmental education and citizen participation**

### a. **National District Municipality (ADN)**

The municipality is interested in carrying out campaigns for public information about children's environmental health. An example is the campaign implemented by ADN "Help us live in a Clean City", where advertisement setting signboards are placed along the streets with children's faces asking them to make calls to maintain the cleanliness of the city.

Another modality that can be use is non-formal education through mimes, theatre and others, in coordination with the education ministry and the neighbor's associations (junta de vecinos).

#### a.1 **Environmental Information Center of ADN**

The Environmental Information Center of the National District is the functional structural expression of the Information System of the Environmental Management of the National District (SIGA-ADN). The main goal of this institute is for National District inhabitants to have access to the simple, truthful opportunity to the information related to the situation, the environment conditions, aspects that can affect them and to let them participate in an efficient way in the formulation and execution of the environmental policies of the city. At the

moment this Center is in the formation and establishment process and will be located in the administrative area of Mirador Sur Park.

This environmental information center (EIC) implements the environmental information policy of the local government, as well as the plans and programs derived from this policy. The EIC provides environmental information, in a physical and electronically way, to the community organizations, private companies, public institutions, universities and to the general public. In the same way, it supplies sufficient and qualified information to decision makers and policy makers.

**a.2 Customer Service Offices**

The Customer Service Offices of the Billing and Collection Directorate (AND) is making efforts to improve city cleansing through awareness projects. One of the projects is the Environmental Friends Project, which is a communal project to help the environment, where children are the main actors. This project aims to create conscience in the children on maintaining cleanliness so as not to mess and pollute the environment.

**b. Secretariat of State for Education**

The State Secretariat for Education (SEE) is implementing citizen's re-education about the management of urban solid waste since 1998. This project is part of a process implanted from the base that advances step by step and will culminate with the implementation of the recycle program, composting and waste commercialization that will begin with the residents in the historical zone, with the citizen participation promotion, the Integrated Solid Waste Management Plan through promoting the 3R project.

**c. Secretariat of State for Environment and Natural Resources (SEMARN)**

The Sub-Secretariat of Education and the Environmental Information through the Environmental Education Directorate are carrying out activities for children in schools. The activities are carried out in educational centers, both public and private sectors, associations, neighbor's associations, and clubs, in addition to different government institutions and from the private sector.

On the other hand, the Environment Management Sub-Secretariat has considered the urgent necessity to create a department that offers assistance and support to the people and institutions that have the responsibility of making decisions for good municipality environment management, specifically on the municipalities' solid waste. This department is in the process of establishment, but it is already starting to operate to strengthen the municipalities' solid waste management of the country.

**d. Non Government Organizations (NGO)**

In the Dominican Republic, there are NGOs such as HABITAT, CEDECO, PRONATURA, IDAC, CASCO, IDDI, CIAC and MOSCTHA. They specialize in environmental issues together with other elements like sanitation, latrines installation, daily cleansing, water systems and health education.

With funds from the European Union, the SABAMAR Project (marginal barrios sanitation) has been implemented and it is expected to have a positive impact on the health of the marginal barrios people in the capital city.



### 2.5 Economic Situation

#### 2.5.1 National Economy

##### a. Overview of the Dominican Economy

A World Bank document entitled “World Bank List of Economies” (April 2005), based on data prior to 2003, classified the Dominican Republic as a developing, lower middle-income and less indebted country. For comparative purposes, El Salvador was classified as a developing, lower middle-income, moderately indebted country, while Panama was classified as a developing, upper middle-income, heavily indebted country, and Mexico as a developing, upper middle-income, less indebted country.

The World Bank classified income categories, on the basis of the 2003 per capita gross national income, into *low income*: less than US\$765, *lower middle income*: US\$766-3,035, *upper middle-income*: US\$3,036-9,385, and *high income*: US\$9,386 or more.

Low income and middle-income economies together comprised the group of developing economies, with the remark that classification by income does not necessarily reflect development status.

Indebtedness was defined in terms of specified threshold values, calculated as the ratio of debt and the value of production or exports.

Another World Bank document entitled “Dominican Republic Data Profile” (1999, 2002, 2003 data) indicated that the gross national income in 2003 (Atlas method) was US\$18,600 Million, equivalent to US\$2,130 per capita, the value falling was in the range of US\$766 and US\$3,035 corresponding to lower middle-income countries. Debt service in 2003 was 8.2% of exporting goods and services, well below the threshold value of 18% set for less indebted countries.

##### b. Sector Structure and Growth

The structure of the economy in 2003 was approximately 11% in the primary sector, 30% in the secondary sector, and 59% in the tertiary sector. The growth rates by economic sectors of the Dominican Republic over the 1990-2003 period are compared with the corresponding growth rates in other regions or group of countries in the world, shown as follows.

Table 2-4: Economic Growth Rates over the 1990-2003 Period (%)

Country/Region	GDP	Agriculture	Industry	Manufacturing	Services
Dominican Republic	5.8	3.9	6.1	4.2	6.0
Latin America: Low & Middle Income	2.7	2.2	2.4	2.0	2.8
World: Lower Middle Income	3.9	2.3	4.9	7.1	3.9

Source: World Bank, World Development Indicators

It can be seen from the above Table that the economic growth rates of the Dominican Republic were vastly superior to the growth rates of other low and middle-income Latin American countries over the same 1990-2003 period. A comparison with the growth rates of the lower middle income countries of the world also showed favorable results for the Dominican Republic, except in the manufacturing sector. This was somewhat unexpected as the structure of the Dominican Republic economy has reportedly shifted emphasis from agriculture to the other two sectors, namely, manufacturing in free trade zones, and to services, mainly tourism.

### c. Recent Trends

The most recent yearly data of the Central Bank of the Dominican Republic was reviewed from the second half of the 1990s up to 2003. Although the data was preliminary for 2001, 2002, and 2003, therefore it was slightly different from those presented by international organizations like the World Bank, and they served to have a better idea on more recent trends of the Dominican economy.

The following Table shows that the overall GDP growth rate during 1996-2003 was 5.8% in real terms, and 3.9% when measured as per capita real domestic production. The growth rate was especially impressive in 1999, when it grew 8.2% in real terms, and 6.2% when measured in per capita real domestic production. After another excellent growth period in 2000, the economy began to decline, induced by the global slowdown, especially in the US economy, which accounts for the bulk of Dominican exports. The new administration has been making efforts to reverse this adverse situation, and certain macroeconomic aspects appear to be improving.

Table 2-5: Gross Domestic Product 1995-2003

Year	Population (1000)	Gross Domestic Product			
		Current (Million RD\$)	Current (per cap. RD\$)	Real (Million RD\$)	Real (per cap. RD\$)
1995	7,558.1	162,282.6	21,471.4	4,579.3	605.9
1996	7,694.0	183,361.2	23,831.6	4,907.4	637.8
1997	7,832.4	214,863.7	27,432.6	5,307.6	677.6
1998	7,973.3	241,977.1	30,348.5	5,702.0	715.1
1999	8,116.7	278,629.6	34,328.0	6,166.7	759.8
2000	8,262.7	323,430.3	39,143.6	6,644.9	804.2
2001*	8,411.3	366,205.4	43,537.5	6,910.0	821.5
2002*	8,562.5	401,883.2	46,935.0	7,206.7	841.7
2003*	8,716.5	509,965.4	58,505.5	7,175.3	823.2
Year	Rates of Growth (%)				
1996	1.80	12.99	10.99	7.17	5.27
1997	1.80	17.18	15.11	8.15	6.24
1998	1.80	12.62	10.63	7.43	5.53
1999	1.80	15.15	13.11	8.15	6.24
2000	1.80	16.08	14.03	7.76	5.85
2001*	1.80	13.23	11.23	3.99	2.15
2002*	1.80	9.74	7.80	4.29	2.45
2003*	1.80	26.89	24.65	-0.44	-2.20

Source: Central Bank of the Dominican Republic

### d. Economically Active Population Employed by Economic Sector

Out of a total population of 8,562,541 in 2002, the working age population (10 years or older) was 6,723,578, the economically active population (EAP) was 3,701,798 and the employed population was 3,105,458. Unemployed workers numbered 596,341, equivalent to 16.1% of the EAP. Unemployment has hovered around 16% since the second half of the 1990s, except in 1999 and 2000, when it improved to 13.8% and 13.9%, respectively.

The employed population was distributed, by economic sector and activity, by 16% in the primary sector, 20% in the secondary sector and 64% in the tertiary sector. Although well known for tourism, employment in hotels, bars and restaurants comprised only 5.5% of the employed EAP, well below the 21% employed in Commerce and 7.4% employed in

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Transport and Communications.

Hotel rooms in 2003 were estimated at around 56,000, and tourism was estimated to give employment to around 165,000 people, although direct employment in tourism was estimated at 47,000.

Details on EAP and employment are shown in the following Table.

Table 2-6: Distribution of the Employed EAP in the Dominican Republic in 2002

Economic Sector & Activities	Percentage
Primary Sector	15.92
Agriculture & livestock	15.92
Secondary Sector	20.33
Mining	0.23
Manufacturing	14.21
Construction	5.89
Tertiary Sector	63.75
Wholesale & retail commerce	21.17
Hotels, bars & restaurants	5.53
Transport & communications	7.41
Electricity, gas, water	0.78
Financial services & insurance	2.01
Public administration & defense	5.05
Other services	21.81

Source: Central Bank of the Dominican Republic

Table 2-7: Composition of GDP and employed population in 2002

Economic Sector	GDP (%)	Employed Population (%)
Primary Sector	11	16
Secondary Sector	30	20
Tertiary Sector	59	64

### e. Public Debt

The Dominican Republic is classified as a less indebted country. Public debt is carefully managed. Public debt figures are made available every six months, and the yearly growth rates of public debt were somewhat different depending on data of the end of year or middle of year, being 5.2% between December 1995 and December 2003, and 6.3% between June 1996 and June 2004. A large increase in public debt could be observed in 2003, when public debt reached around 33% of GDP according to the American Chamber of Commerce, other remaining years were at around 20% of GDP. Details are shown in the following Table.

Table 2-8: Public Debt of the Dominican Republic

Month & Year	Public Debt (Million US\$)
December 1995	3,994.27
December 1996	3,807.31
December 1997	3,572.18
December 1998	3,545.36
December 1999	3,660.90
December 2000	3,682.12
December 2001	4,176.84
December 2002	4,534.95
December 2003	5,971.43

Source: Central Bank of the Dominican Republic

The composition of the budget of the Central Government for the year 2005 was as follows. Total income, domestic debt and foreign debt make up 5% and 20% respectively. Budget expenditure, interest payment and debt repayments make up 11% and 20% respectively. According to the Finance Ministry, payment of public debt increased from 1.9% of GDP in 2000, to 2.5% in 2001 and 2.8% in 2002. Payment of foreign debt comprised of 70% to 80% of total public debt payment between 2000 and 2002.

## f. Foreign Trade

### f.1 Exports

The export value of the Dominican Republic increased from US\$4,614 Million in 1997 to US\$5,447 Million in 2003, although the peak was reached in 2000 with US\$5,737 Million. From 1997-2003, the total export value grew by 2.4%/year, while exports from free trade zones grew by 2.9%/year, and most traditional export products had negative growth rates.

Around 80% of exports came from free trade zones, among which textile products comprised around half, although with a slightly declining trend during the period. Other products of the free trade zones (electronics, jewelry, pharmaceuticals) were relatively more important than the traditional export products, such as minerals, sugar and cocoa.

Table 2-9: Composition of the Dominican Exports 1997-2002 (%)

Export Products	1997	1998	1999	2000	2001	2002	2003
I. Free trade zones	78.0	82.3	84.3	83.2	84.9	83.6	80.9
Textiles	47.4	47.2	46.6	44.5	43.9	43.1	40.3
Electronics	6.5	7.6	8.8	9.9	8.7	9.7	10.6
Jewelry	4.2	4.7	6.4	6.2	7.6	8.5	8.6
Pharmaceuticals	5.2	4.5	6.0	5.6	5.8	6.2	5.9
Shoes	6.8	5.8	5.6	4.6	5.3	3.9	3.7
Tobacco	4.3	4.9	5.7	5.7	6.2	5.9	5.3
Others	3.5	7.7	5.1	6.6	7.6	6.4	6.5
II. Sugar & byproducts	4.4	2.9	1.7	1.6	1.7	1.9	1.8
III. Coffee & byproducts	1.5	1.3	0.5	0.6	0.2	0.2	0.3
IV. Cocoa & byproducts	1.3	1.7	0.5	0.5	0.8	1.3	1.4
V. Tobacco & byproducts	2.0	1.3	1.0	0.8	0.6	0.5	0.5
VI. Minerals	5.3	3.0	2.9	4.1	2.8	3.0	4.4
VII. Products in port	2.9	2.8	3.5	3.2	2.7	2.2	2.8
VIII. Minor products	4.7	4.7	5.5	6.1	6.3	7.2	7.9
IX. Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Central Bank of the Dominican Republic

### f.2 Imports

Total Imports of the Dominican Republic also increased from US\$4,192 Million in 1997 to US\$5,266 Million in 2003, although the peak was reached in 2000 with US\$6,416 Million. From the 1997-2003, total imports grew by 3.3%/year, while imports of consumption goods grew by 3.2%/year, imports of raw materials grew by 3.1%/year, and capital imports grew by 4.0%/year.

Of the imported products of the Dominican Republic, slightly less than 50% were consumption goods, about 30% were raw materials, and around 20% were capital goods, as shown in the following Table.

## 2. Profile of the Study Area

Table 2-10: Composition of the Dominican Imports 1997-2003 (%)

Import Products	1997	1998	1999	2000	2001	2002	2003
I. Consumption goods	48.3	44.5	45.5	49.7	48.3	49.8	48.1
II. Raw materials	35.1	33.4	34.3	31.7	30.1	29.9	34.5
III. Capital goods	16.6	22.1	20.2	18.7	21.6	20.3	17.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Central Bank of the Dominican Republic

### f.3 Trade Balance and Remittance

The trade balance was positive in three out of seven years between 1997 and 2003, but it was negative in the consecutive years between 1999 and 2002, especially in 2002 when the trade deficit reached US\$1,072 Million, which can be seen in the following Table.

Table 2-11: Dominican Trade Balance 1997-2003 (Million US)

Exports & Imports	1997	1998	1999	2000	2001	2002	2003
Total Exports	4,613.7	4,980.4	5,136.6	5,736.7	5,276.3	5,165.0	5,447.3
Total Imports	4,192.0	4,896.6	5,206.8	6,416.0	5,952.9	6,237.3	5,265.8
Trade Balance	421.7	83.8	-70.2	-679.3	-676.6	-1,072.3	181.5

Source: Central Bank of the Dominican Republic

Remittance from Dominican residents abroad increased steadily from US\$1,326 Million in 1998 to US\$2,060 Million in 2003. The remittance in 2003 amounted to nearly as much as the exports of textile products from the free trade zones, and equivalent to 38% of total exports.

### g. Inflation, Exchange and Interest Rates

Since the second half of the 1990s, the inflation rate moved in the same direction as the exchange rate between the Dominican currency RD\$ and the US Dollar. The Consumer Price Index (CPI) remained below 10% between 1996 and 2002, but jumped to 27.5% in 2003 and shot up to 51.5% at the national level in 2004. The following Table shows that inflation differed depending on the geographic area where the data were collected: the National District, the rest of urban areas and rural areas, in addition to the country as a whole. It appears that inflation in 2005 has abated significantly with respect to 2004.

Table 2-12: Consumer Price Index by Geographic Area 1996-2004

Year	Dominican Rep.	National District	Other Urban	Rural
1996	5.40	n.a	n.a	n.a
1997	8.30	n.a	n.a	n.a
1998	4.83	n.a	n.a	n.a
1999	6.47	n.a	n.a	n.a
2000	7.72	10.51	9.05	7.73
2001	8.88	5.30	4.34	2.98
2002	5.22	10.82	10.66	9.42
2003	27.45	42.88	41.45	45.48
2004	51.46	27.86	28.42	30.98

Source: Central Bank of the Dominican Republic

The exchange rate between the Dominican currency RD\$ and the US\$ has changed gradually from 12.9 RD\$ per US\$1.00 in 1996 to around 17.5 RD\$ per US\$1.00 in 2002, when divergent rates began to be reported for the sellers and buyers of foreign currency. In 2003, the exchange rate of the RD\$ worsened drastically to around 29 RD\$ per US\$, and to about

41 RD\$ per US\$ in 2004. The exchange rate strengthened in 2005, and appears to have achieved a relative stability at around 30 RD\$ per US\$, as shown in the following Table.

Table 2-13: Exchange Rate between RD\$ and US\$ 1996-2004

Year	Buy & Sell	Buy	Sell
1996	12.90	-	-
1997	14.01	-	-
1998	14.70	-	-
1999	15.83	-	-
2000	16.18	-	-
2001	16.69	-	-
2002	-	17.45	17.59
2003	-	29.06	29.37
2004	-	41.25	41.93
Jan-Aug 2005	-	28.84	29.11

Source: Central Bank of the Dominican Republic

The interest rates increased by around 6 percentage points between 1998 and 2004, from around 21% yearly rate in 1998 to around 27% in 2004 in the case of active interest rates. Likewise, passive interest rates increased from around 16% in 1998 to around 22% in 2004, as shown in the following Table.

Table 2-14: Interest Rates 1998-2004

Year	Active Interest Rate (%)	Passive Interest Rate (%)
1998	20.82	16.09
1999	20.60	16.21
2000	20.88	17.41
2001	21.21	16.00
2002	20.26	16.96
2003	24.54	20.98
2004	27.43	22.82

Source: Central Bank of the Dominican Republic

## 2.5.2 Regional Economy

### a. National District

Available macroeconomic data was restricted to the national level, thereby it required an estimation of the gross regional product (GRP) of the National District on the basis of data on gross domestic product (GDP).

### b. Data Sources for the Estimation of GRP

In order to define the structure and size of the regional economy corresponding to the Study Area, the National District, estimation was made on the available national level data on the basis of a few data that were broken down for regions of the country, including the National District. These broken down data were the following.

- (1) Directory of Manufacturing Firms in 2004, listing the number of manufacturing firms and the number of employees in manufacturing by specific geographic areas, including the National District,

## 2. Profile of the Study Area

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- (2) Tourism in Figures 1999-2002, containing data on the number of tourist arrivals by entry points, the time and money spent by tourists, the number of hotel rooms by tourist area, and the number of employment generated by tourism in different tourist areas,
- (3) Free Trade Zones and companies operating in there, listed by the Secretariat of Industry and Trade.

### c. Estimation of GRP

The following estimations were made concerning the share of the National District with respect to the gross domestic product.

- (1) In the primary sector, it was estimated that the National District produced nothing in the primary sector activities, extensive to mining.
- (2) In the secondary sector, the share of the National District was estimated to be 42%, the same as the percentage of employment in the manufacturing industry located in the National District. Exceptions were made for the sugar industry, which was assumed to be zero in the National District. In addition, 20% of the production in the free trade zones was also assumed as being produced in the National District despite the small number of companies in the territory, since they were presumed to be high value added industries.
- (3) In the tertiary sector, 30% of tourists who arrived in Las Americas are foreigners. In addition, aprox. 30% of employment generated by tourism was reported to be in and around the National District. Therefore, 30% of services (Bars, Hotels and Restaurants. Concerning Commerce, etc) are assumed to be produced in the district. The share of the National District for commerce was assumed to comprise of 60%, while the share of other services like Transportation, Finance and Insurance, Communications, public utilities (electricity, gas, water), Government and Housing were assumed to be 70%.

### d. Results of GRP Estimation

The resulting gross regional product (GRP) corresponding to the National District in 2003 was estimated at 3,931.6 Million RD\$ at 1970 prices, which was equivalent to 55% of the gross domestic product (GDP) of 7,175.3 Million RD\$. The equivalent current value of per capita GRP in the National District was around US\$9,800 as compared to the US\$2,130 per capita GDP in 2003.

The estimated structure of the economy in the National District would be composed of around 31% secondary sector and 69% tertiary sector.

## **2.6 Government and Politics**

### **2.6.1 The System of Government**

The Dominicans constitute a Nation organized as an independent state, by the name of the Dominican Republic (Republica Dominicana). (Art.1 Constitution of the Dominican Republic.)

The government of the Nation is essentially civil, republican, democratic and representative; it is divided in three powers: Legislative, Executive and Judicial. The Borderline Treaty of 1929 and its Revision Protocol of 1936 set its land limits.

It is politically divided into a National District (Distrito Nacional), which includes the capital of the Republic, and the provinces and municipalities determined by law.

The Legislative Power is exercised by the Congress of the Republic, consisting of a Senate and a House of Representatives (Camara de Diputados). The Senate consists of a member per province and one for the National District. The mandate is four years long.

The House of Representatives consists of members elected by the people of the provinces and the National District, at the rate of one representative per fifty thousand (50,000) inhabitants or fraction exceeding twenty five thousand. The mandate also lasts four years.

The Executive Power is exercised by the President of the Republic, who is elected every four years by direct voting. He can run as a candidate for only a second consecutive constitutional period. He is not able to run for the same position or for the Republic's Vice-presidency again.

The Judicial Power is exercised by the Supreme Court of Justice and the other tribunals of the judicial order created by the Constitution and laws. This power enjoys administrative and budgetary autonomy. Judges of the Supreme Court are appointed by the National Council of the Judgeship. The Ministry before the Supreme Court of Justice is represented by the Attorney General of the Republic.

### **2.6.2 Public Administration**

The Public Administration matters are handled by the State Secretariats. There are 17 Secretariats: Agriculture; Education and Culture; Industry and Commerce; Armed Forces; Environment and Natural Resources; Public Works and Communications; Foreign Relations; Public Health and Social Assistance; Tourism; Work; Interior and Police; Finance; Higher Learning, Science and Technology; Youth; Women; Sports; Physical Education and Recreation; Culture.

The Presidency of the Republic has an Administrative Secretariat and a Technical Secretariat, The Presidency Secretariat. The juridical matters of the State are taken care of by the Office of the Attorney General of the Republic while the General Comptrollership of the Republic exercises its control function over the use of public funds. To facilitate the performance of governmental activities, de-centralized specialized entities have been created: OPI, CEDOPEX, INESPRE, INDOTEC, INDRHI, CREP.

The management overlooking monetary policy and financial sector control is assigned to the Central Bank of the Dominican Republic.

The Office of Civil Defense and the National Emergency Commission is in charge of preventing and mitigating disasters (Law 147-02).



### 2.6.3 Local Government

The National District governing and those of the municipalities' will each be in charge of a municipality, whose Councils as well as their deputies, in numbers determined by law in proportion to the number of their inhabitants but in no case being less than five, shall be elected, just like the National District Mayor and the Municipal Mayors and their deputies, by the people of the District and the municipalities, respectively, every four years, in the same way as determined by the Constitution and laws, by means of candidacies which may be postulated by political parties or by regional, provincial or municipal political groups.

**The Municipality**, as well as the Mayors, is independent in exercising their functions, with the restrictions and limits established by the Constitution and laws, which shall determine their attributions, powers and duties.

Whether formulating or executing their budgets, the Municipality shall be obliged to keeping its expropriations and earnings destined to each class of goods and services. With the probation required by law, the Municipality may establish tariff charges as long as they are not associated with national taxes, inter-municipal or export trades or the Constitution or laws.

(Political Constitution of the Dominican State Art. 82, 83 and 85)

According to the Law of Municipal Organization, the Municipality Council has the sufficient authority to decide over the constitution of municipal enterprises, contracting services with the private sector, establishing rulings and giving itself the administrative structure it considers necessary, among others.

### 2.6.4 Electoral System

The Central Electoral Council (Junta Central Electoral—JCE) is responsible for preparing and conducting the Executive, Legislative and Municipal Power level of electoral actions.

The JCE consists of a titular Chairman and deputy and eight titular judges with their respective deputies.

To become chairman, titular member or deputy of the Electoral Central Council members are required to be Dominican by birth or origin, be over 35 years old, be in full exercise of the civil and political rights and must hold a bachelor's or doctor's law degree with a minimum of twelve years' practice.

### 2.6.5 Other Organizations Important in Politics

Political parties are of important relevance in the country's political life. The three main parties are the Party of the Dominican Liberation (Partido de la Liberacion Dominicana—PLD), currently in power, the Dominican Revolutionary Party (Partido Revolucionario Dominicano—PRD) and the Social Christian Reformist Party (Partido Reformista Social Cristiano—PRSC).

Election year	Winning political party
1962	Dominican Revolutionary Party
1966	Social Christian Reformist Party
1970	Social Christian Reformist Party
1974	Social Christian Reformist Party
1978	Dominican Revolutionary Party
1982	Dominican Revolutionary Party
1986	Social Christian Reformist Party
1990	Party of the Dominican Liberation
1994	Social Christian Reformist Party
1996	Party of the Dominican Liberation
2000	Dominican Revolutionary Party
2004	Party of the Dominican Liberation

### 2.6.6 Universities

Listed below are the main educational centers of higher learning:

Technological Institute of Santo Domingo, Pontifical Catholic University Mother and Teacher, APEC University, Autonomous University of Santo Domingo, Catholic University of Santo Domingo, Central East University, O&M Dominican University, Iberoamerican University, National University Pedro Henriquez Ureña, Technological University of Santiago, and University of the Caribbean (Instituto Tecnológico de Santo Domingo, Pontificia Universidad Católica Madre y Maestra, Universidad APEC, Universidad Autónoma de Santo Domingo, Universidad Católica de Santo Domingo, Universidad Central del Este, Universidad Dominicana O&M, Universidad Iberoamericana, Universidad Nacional Pedro Henriquez Ureña, Universidad Tecnológica de Santiago, and Universidad del Caribe, respectively).

### 2.6.7 National Policies Relevant in SWM

No specific policy on solid waste management has been formulated. However, through existing disposals of a ruling nature policy guidelines which led legislators into writing and solving the General Law of the Environment and Natural Resources (Ley General de Medio ambiente y Recursos Naturales 64-00) and the General Law of Health (Ley General de Salud 42-01) and in the environmental norms issued by SEMARN: Standard for the Environmental Administration of the Solid Waste, Standard for the Environmental Administration of Radioactive Waste and the Environmental Standard for the Integral Administration of Infectious Waste (Norma para la Gestión ambiental de Residuos Sólidos, Norma para la Gestión Ambiental de Desechos Radioactivos and Norma Ambiental para la Gestión Integral de Desechos Infecciosos, respectively), might be established.

# Chapter 3

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*Current Situation of the Municipal  
Solid Waste Management*

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

This section describes; 1) the current situation of the Municipal Solid Waste Management in the National District based on observations, interviews, literature reviews and site surveys, of which detailed results are found in Annex; 2) evaluation of the current situation; and 3) challenges to address clarified from the evaluation.

#### 3.1 History

The Executive Power was in charge of solid waste management services in the National District until 2003. The Presidency of the Republic let the private sector take charge of the service and subscribed the corresponding contract.

During the last administration, the financial crisis limited the payment to the waste-collecting contractors, and thus, the service was not sufficiently provided. The City's sanitation problems arose and caused considerable unease among the residents.

Later on, the service became the Municipality responsibility. ADN decided to contract the waste collection and part of the street sweeping to two enterprises. The ten-year period of contracts were subscribed to in April 2003.

#### 3.2 Current Waste Stream

##### 3.2.1 Waste Generation Rate and Amount

###### a. Waste Generation Rate

The Dominican Republic has established a law for non-hazardous waste, "Law for the Environmental Management of Non-hazardous Waste, 2003." According to the law, Municipal Waste is defined as follows.

*Municipal waste is generated from general urban activities. It comes from households, commercials, institutions, small industries, streets, markets, public areas and others.*

Taking into account the definition, the Waste Amount and Composition Survey obtained waste generation rates by the sources below.

Table 3-1: Waste Generation Rate

Generation Source	Generation Rate
Households	780 g/person/day
Commerce Restaurant	1,270 g/seat/day
Others	1,060 g/employee/day
Institutions	200 g/employee/day
Market	15,080 g/stall/day
Street sweeping	220 g/m/day

Note: The waste generation rates were obtained by rounding the results of WACS off to the nearest ten.

### 3. Current Situation of the Municipal Solid Waste Management

#### b. Waste Amount

The current waste amount was estimated analyzing the data obtained by WACS and the weighbridge at Duquesa. The results are shown below. What ICI means here is Institution, Commerce and Industry, i.e., waste generated from business activity.

Table 3-2: Estimated Waste Amount in 2005

Source	Waste amount (ton/day)
Households	765
ICI	686
Sweeping	78

#### 3.2.2 Waste Stream

##### a. Information Sources for Estimating the Current Waste Stream

The principal information source for estimating the current waste stream was the weighbridge data at the Duquesa landfill. The weighbridge data for one year, between 1 January 2005 and 31 December 2005, was used for the purpose. The current waste stream was established based on the average for that period.

The Waste Amount and Composition Survey also provided important information. The results of the survey enabled the estimation of waste generation amounts at various sources.

In addition to the two information sources, the results of the Public Opinion Survey and the Recycle Market Survey helped to establish the waste stream.

##### b. Waste Stream Terminology

The table below describes the terms of the waste stream.

Table 3-3: Waste Stream Terminology

Term	Definition/Explanation
1. Generation	Production of all waste at source.
2. Discharge	Part or all of the waste generated is put out for collection either within the property of the source itself (e.g. hotels, some institutions and industries), outside the property (e.g. in bins or in plastic bags at the roadside) or at an approved collection point (e.g. concrete storages located in the city).
3. Self disposal	Waste is disposed by the generator within their property, usually by burial in a pit, burning of the waste, feeding to animals and/or composting
4. Recycling	Recyclable materials such as bottles, cans, papers, etc. are separated at generation sources, and somebody comes to pick up them or generators bring them to where those materials are bought up.
5. Collection	Waste collected by the municipal trucks or the private companies' trucks and brought to the transfer station/points or directly hauled to the Duquesa landfill
6. Direct Haul	Part or all of the waste generated by different sources is transported directly by them to the Duquesa landfill.
7. Clandestine dumping	Part or all of the generated waste is dumped outside the generator's property in an area where such behavior is prohibited (e.g. open spaces, drains, canals, etc.).
8. Transfer station /point	Facilities or places where waste collected by small trucks are transferred to bigger trucks for transportation to the Duquesa landfill
9. Haulage into Duquesa	Sum of waste amounts carried by collection trucks, transferred by big trucks and direct haul into the Duquesa landfill
10. Recycling at Duquesa	Waste pickers at the Duquesa landfill collect recyclable materials.
11. Final Disposal	Waste amount disposed of in the Duquesa landfill

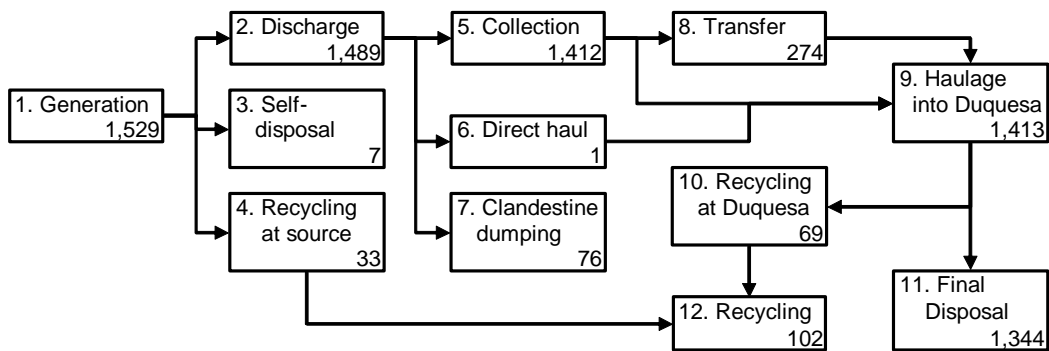
c. Waste Stream

The table and the figure below present the current waste stream in the National District in 2005.

Table 3-4: Current Waste Stream

Unit: ton/day

	Flow	Total
1	Generation	1,529
2	Discharge	1,489
3	Self-disposal	7
4	Recycling at source	33
5	Collection	1,412
6	Direct haul	1
7	Clandestine dumping	76
8	Transfer	274
9	Haulage into Duquesa	1,413
10	Recycling at Duquesa	69
11	Final Disposal	1,344
12	Recycling	109



Unit: ton/day

Figure 3-1: Current Waste Stream

The table below shows the important indicators for evaluating and preparing the plan for the SWM.

Table 3-5: Waste Amount Indicators

Indicators	
Waste Amount per Person 1	
Generation	1.56 kg/person
Discharge	1.44 kg/person
Disposal	1.37 kg/person
Collection rate by amount 2	95 %
Collection rate by population 3	90 %
Recycling rate 4	7 %
Waste minimization rate	7 %

1: divided by the population of 980,653

2: collection / (discharge – direct haul)

3: This data obtained from the Census 2002.

4: (recycling + recycling at Duquesa) / generation

5: (self-disposal + recycling+ recycling at Duquesa) / generation

### 3. Current Situation of the Municipal Solid Waste Management

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#### d. Change in Collected Waste Amount in 2005

The waste amount collected in the National District drastically increased by 41% in 2005. An increase in the waste amount collected by small trucks rented by ADN was the principal cause of this growth.

Table 3-6: Change in Collected Waste Amount in 2005

Month	Accumulated ton	Daily ton/day
Jan	35,773	1,154
Feb	33,109	1,182
Mar	37,193	1,199
Apr	39,143	1,306
May	40,756	1,315
Jun	43,298	1,442
Jul	45,793	1,478
Aug	47,696	1,539
Sep	45,115	1,504
Oct	47,927	1,545
Nov	49,445	1,648
Dec	50,363	1,624
Total	515,611	1,413

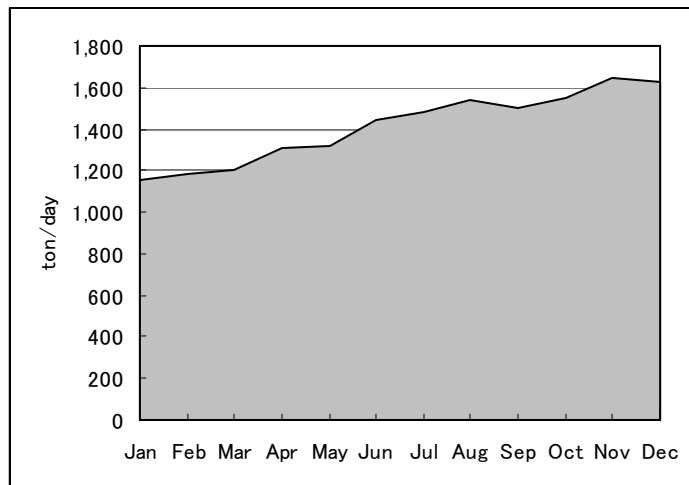


Figure 3-2: Change in Collected Waste Amount in 2005 (ton/day)

### 3.3 Evaluation of the Current MSWM

#### 3.3.1 Technical System

##### a. Discharge and Storage

Household waste is stored in plastic bags, metallic, wood or cardboard containers randomly, which are usually located on the exits of the narrow streets or in the avenues between the sidewalk and the roadway, causing piles of waste to accumulate. In some sectors booths in concrete have been built. The smaller ones are from 0.5 x 0.5 x 0.5m and the bigger ones exceed 2.0 x 2.5 x 2.5 m (height x width x length respectively). In some cases the bigger ones have doors. In these structures the waste is stored in plastic bags.

The waste stored in these booths causes bad odor problems and proliferation of flies and mice and also considerable delays in the collection works, in some cases, more than one hour at a collection point.



Figure 3-3: Discharged and Storage

The service users do not conduct any type of waste separation. All types of waste are inside the bags or the containers, even waste in the hazardous category.

The inadequate storage of the waste and the fact that most of the people take out their waste at any time, causes particularly waste scattering problems by dogs or people. The people (scavengers) collect valuables or recyclable materials and this results in disfigurement and unsanitary conditions in the city.

A situation that is frequently observed in places where waste storing points are located is the accumulation of large volumes of waste like home appliances and apparatuses, construction material remains, etc. Also around the booths a large amount of waste scattered is observed.

In sectors of high topography where urbanization is very precarious, and there is no access for collection vehicles, ducts made of 50 gallon drums have been installed, discharging the waste by these ducts toward the main avenues, generating serious sanitary conditions and affecting the quality of life of the whole sector. In the marginal neighborhoods located in District 3, people discharge waste directly in the shores of Ozama River, causing a high level of contamination.



### 3. Current Situation of the Municipal Solid Waste Management

#### b. Collection and Transport

##### b.1 Service organization and Coverage Area

The responsibility of all the solid waste generated in the National District falls to the Municipality. The Environmental Management and Urban Cleansing Directorate is in charge of planning, organizing, coordinating, programming, informing, inspecting and checking both the private companies operation and their direct operation such as collection, transport, transfer and sweeping.

The collection and transport consists of a mixed service, in which private companies, micro-companies and the Municipality are participating. The services carried out by each one and the covered areas are shown in the following table.

Table 3-7: Service carried out by each operator and areas covered

Operator Type	Operator	Activity	Districts Covered
Private company	ADN SERVICE	Solid waste collection from households, public, medical, garden, etc.	1 and 3
	DSC	Solid waste collection from households, public, medical, garden, etc.	2
	KLINETEC and LAU	Waste collection of voluminous materials, debris and waste from buildings and condominiums.	1, 2 and 3
	SERTEX	Market waste collection.	1, 2, 3
	SOINCA ADN TRANSFER	Transfer transport to Duquesa	2, 3
Micro Company	ECOSAGUACIGUA ESAZURZA ESCOBA	Collection from households, public, medical, garden, etc..	3, marginal barrios
Municipality	ADN	Collection from households, public, medical, garden, etc.	1, 2 and 3
	ADNAU	Housing waste collection in big avenues.	1, 2, 3
		Transport vehicles for the transfer points.	1

The following figure shows the territorial distribution of the service made by each operator.

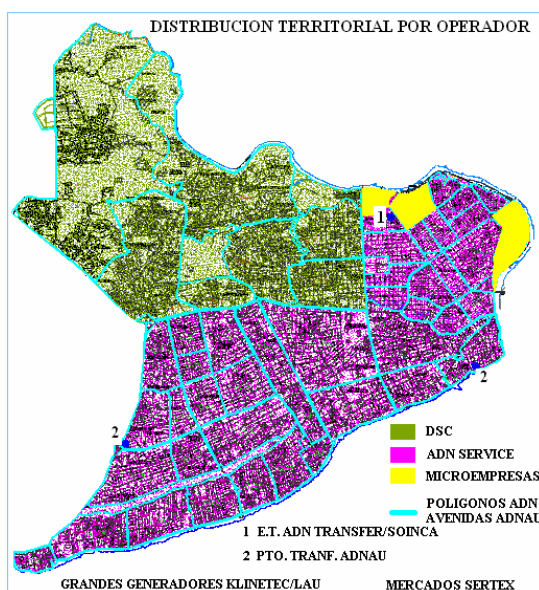


Figure 3-4: Territorial Distribution of the Service by Operator

The private companies are providing the services in the assigned areas, however, the service areas are not covered 100%, mainly because of the lack of vehicles. The Municipality through ADN and ADN AU support the private services by collecting waste from the areas covered and not covered with the collection service, and this causes overlapping of services. ADN's collection service is based on a territorial distribution by polygons, where the work is organized daily and the resources are distributed, giving priority to the narrow streets or sectors that are not covered by the private companies. However, this program is interrupted frequently, letting unassisted areas considered, applying the resources to other areas where the private companies were not able to carry out the collection due to failure of collection trucks.

In the case of District 1, the collection depends on the availability of the ADN AU's transfer trucks, if these are not available; then collection is not carried out.

The service operated by ADN is managed by four people in charge of the District, who coordinate the daily works with the supervisors of the private companies (ADN Service and DSC), not having coordination with the companies that carried out the service of the big generators and the markets.

Both the private companies and micro-companies keep a contract with the Municipality for the services executed.

**b.2 Personnel**

The total number of personnel that work for the collection service is 943, from which 673 belong to the Municipality, 234 to the private companies and 36 to the micro-companies, the work position details is shown as follow:

Table 3-8: Details of the collection service personnel

Operator		Manager	Supervisor	Transference	Collector	Dump driver	Compactor driver	Administrative others	Total
Municipality	C1	1	6	4	73	40		6	130
	C2	1	5	2	30	17		9	64
	C3A	1	7	2	51	18		6	85
	C3B	1	13	2	50	15		6	87
	ADNAU	1	6		142		68	54	271
	E.T.	1	4					31	36
	SUBTOTAL	6	41	10	346	90	68	112	673
Private Companies	ADN Service	2	5		84		40	20	151
	DSC	2	3		43		20	15	83
	SUBTOTAL	4	8	0	127	0	60	35	234
Micro-companies	Ecosaguacigua	1			4	2		5	12
	Esazurza	1			4	2		5	12
	Escoba	1			4	2		5	12
	SUBTOTAL	3	0	0	12	6	0	15	36
TOTAL		13	49	10	485	96	128	162	943

The previous table does not include the personnel of the Environmental Management and Urban Cleansing Directorate, nor the companies that carried out the collection of markets and big generators.

### 3. Current Situation of the Municipal Solid Waste Management

A collection indicator, habitants/helpers, can be calculated based on a number of the collection helpers (collectors) and the total population assisted is supposed to be 100%, even though there are sectors where the service is very irregular, their waste is not collected for longer than one week,. This index allows determining if the number of the collection helpers keeps adequate in relation with the quantity of waste generated in the collection areas.

Table 3-9: Comparative table of the collection indicator habitants/helper

Total habitants	980,653
Total Helpers	4851
Habitants/helper	2.022
Recommended value CEPIS2	3.000 a 4.000 habitants/Collector

As can be observed, the service is over measured regarding the personnel, having a performance of approximately 67% of the minimum value recommended.

Also it is possible to calculate the daily average performance of a collection helper, with the quantity of kilograms collected. The indicator is given by:

$$\text{Tons/helper/day} = \frac{\text{Quantity of waste collected monthly (t)}}{(\text{Quantity of helpers effective monthly}) * (\text{effective days on the month})}$$

The tons collected by each operator correspond to:

Table 3-10: Waste Amount collected by the Municipality and the Private Companies

Period	Municipality		Private Companies	
	ADN	ADN AU	ADN SERVICE	DSC
	Ton	Ton	Ton	Ton
Jan-2005	2,543	5,091	14,192	4,974
Feb-2005	2,250	5,280	12,799	5,293
Mar-2005	3,024	6,735	14,650	5,875
Apr-2005	3,304	6,949	15,686	5,128
May-2005	2,724	6,913	18,399	5,128
Jun-2005	4,326	7,383	18,950	5,963
Jul-2005	4,310	7,592	19,763	6,351
Totals	22,481	45,943	114,438	38,712
Averages	3,212	6,563	16,348	5,530

The following are considered in order to calculate the indicator:

- The total average of days worked during the month was 26
- The waste amount assigned to ADN was the one received in the transfer station, and the collection helpers correspond to Electoral District 2, 3A, 3B and the Micro-companies discharge in these facilities.
- The ADN AU collection personnel is composed by the collectors of the compactor trucks, personnel that collect by small trucks in Electoral District 1 and those that discharge their waste in these compactors.
- The private company personnel are the collectors shown in the previous table.

<sup>1</sup> Only considered as the personnel dedicated exclusively to the waste collection.

<sup>2</sup> Indicators for the Public Cleansing Service Management, CEPIS

Table 3-11: Indicator Ton/Helper/day Calculation

Variables	Municipality		Private Company	
	ADN	ADNAU	AND SERVICE	DSC
Ton/month average	3,212	6,563	16,348	5,530
Nº Helpers	143	215	84	43
Month days	26	26	26	26
Ton/Help/day	0.86	1.17	7.49	4.95
Range recommended by CEPIS3			4.5 a 5.0 t/helper/day4	

The collection workers' performance of ADN and ADN AU, both are operated by the Municipality, show a much lower value than that recommended by CEPIS. What is considered in the case of ADN, is that vehicles do not have a compacting system, therefore the load by trip is reduced considerably. In addition, the time dedicated to the collection represents 47% of the total time of day, which make it a non-efficient system operation. The ADN AU's low performance is mainly due to the small vehicle collectors' performances. Those small vehicles discharge their waste to the compactor trucks, in general only 33% of daily work hour is dedicated to collection, on the other hand, 54% of the time is consumed by waiting for the compactors to discharge waste, from which 40% is associated with awaiting for the discharging shift or compactors arrivals and the other 14% is the time for transferring of waste to compactors.

Another factor that affects the ADN AU performance is that the compactor trucks carry out direct collection, since the collection routes are main avenues, and these routes overlap with the services provided by the private companies, therefore, the amount of waste collected by traveled kilometer is reduced. In the performance it is also reflected on the effect that it has on the inadequate accumulation of waste, since the service carried out by DNA AU, generally includes the collection of large waste stores that are not collected by the private companies because of the time that it demands.

For the private companies, the indicator shows over the recommended maximum value, and that is because most parts of the routes consider the transference of small dump trucks, and the personnel who work in these trucks are not included in the totally quantity of helpers. Some important aspects to mention that impact the yields achieved by the private companies have a relation with the work day, which in most of the cases exceed 10 hours daily not respecting the Work Law or the remuneration conditions, which are fixed based on the production.

Most personnel do not have clothes or security equipment necessities to carry out the work, and the work conditions are very unstable not having the minimum benefits established by the law.

### **b.3 Work System**

#### **b.3.1 System description**

The collection service is provided to household, commercial, institutional, medical, garden wastes and debris, etc. and the service is carried out daily, covering most of the National District.

The service is carried out by the private companies and the Municipality, there is not a route schedule, but generally the trips are repeated because the same personnel carry it out. The

<sup>3</sup> In this index is considered in an implicit way the collection method (lane or corner), storing waste type, age and physical contexture of the worker, vehicle type and quantity of trips made.

<sup>4</sup> Lane method, compactor of 14 m<sup>3</sup>, 2 trips/day.

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collection frequency is daily in the main avenues, from Monday to Sunday and provided by the private companies and the Municipality. The easy access residential sectors are generally provided daily from Monday through Saturday and they are covered by the same operators as in the previous case. In the sectors which are difficult to access, the service is carried out according to the vehicles availability, considerably reducing the frequency, and is preferably assisted by the Municipality from Monday through Saturday. The marginal areas are covered by the micro-companies and the frequency is daily or every other day, there are sectors where the assistance is very precarious. Generally on Sunday operatives are carried out and the workday is only until noon.

The collection service provided by the Municipality is designed based on a workday that is extended from approximately 07:00 until 17:00. In the private companies the day is longer with workers being able to finish after 20:00.

In general the collection vehicles work in only one shift and in various occasions the compactor trucks stay loaded with waste at the end of the day.

Each day, each vehicle has assigned personnel composed of normally one driver and two collectors.

#### **b.3.2 Routes Definition**

The route is defined as the trip which is carried out by the collection truck to assist 100% of the area assigned in the day, being able to comprise more than one trip to the final disposal site. Strictly the route must be defined by a specific truck trip, with a starting and ending point of the service, including some control points to verify its operation.

In the case of the collection of the National District, the route is only defined by sectors or polygon to assist, not identifying the specific journey, which generally is defined by the truck driver and is modified constantly, which makes it difficult control the service if this sector contemplates more than one trip to the sanitary landfill.

#### **b.3.3 Collection Method**

The collection method is door to door, and the waste is lifted from the public road, the workers do not enter the properties, except in the case of commercial or industrial waste. In many cases, as result of a great number of waste storing, it could be possible to conduct a point-to-point system, but the lifting method is completely manual.

There are no containers or other types of large receptacles that allow mechanical storing or discharging of waste.

Collection is carried out in compactor trucks and in small dump and bed trucks, which transfer the waste to compactor trucks or to the transfer station located in District 3.



Dump Vehicle

Transfer Point

Compactor

**b.3.4 Operation**

The main objective of the persons in charge of the District as well as those in the micro-companies, during the year program special cleaning operations is to eliminate illegal dump sites, drainage cleanings, waste lots, public roads, junk removal, pruning and debris waste.

The program of these operations generally is carried out jointly with the community organizations and is conducted on Sundays.

Through these operations the cleaning of specific areas, generally sectors of low income and marginal areas, is achieved.

**b.3.5 Registration and Information Control**

The control of the quantity of waste collected is carried out through weighing trucks when they enter the Duquesa final disposal site, which is operated by a private company. At the weighbridge, the Municipality maintains inspection personnel in order to verify the correct process. The daily consolidated data of the weighing is removed and transferred to the Environmental Sanitation and Urban Cleansing Directorate for its entry into the information record system. The information registered includes the date, entrance and exit hours, identification of the vehicle (card and operator N°), waste weight, and discount % (if it is not transferred household waste). This system allows the control of the tons collected by the private companies and the payment service is carried out based on this.

There are set routes for the small leased vehicles and for the micro-companies, which are modified in the transfer station in the event that the vehicles discharge in this installation, the document is prepared by the Municipality Audits, and it consigns the entrance hour of the vehicles with which the number of trips per day is determined, and that must fulfill the minimum demand. At the transfer points, the procedure is the same. At the end of the month, Audit submits a summary of days worked by each vehicle to the person in charge of the Districts for its verification. The payment is conducted based on the database of this document.

**b.4 Collection Vehicles**

In the following table, the number of vehicles planned for collection and the number which are actually in operation is shown.

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Table 3-12: Details of the vehicles programmed for the service

Operator	Quantity	Capacity (ton)	Types of trucks	Operative Units Average
ADNAU	6	25	Compactor	20
	24	31	Compactor	
	3		Roll on	
ADN	40	1	bed	90
	50	1	dump	
ADN SERVICE	11	31	Compactor	38
	1	32	Compactor	
	18	20	Compactor	
	11	25	Compactor	
	3	25	Compactor	
	4	25	Compactor	
	1	2	Compactor	
DSC	8	20	Compactor	17
	6	25	Compactor	
	8	27	Compactor	
	1	40	Compactor	
	18	1	Bed truck	
	5		Roll Off	

A total of 102 compactor trucks are considered for the service, from which approximately 74% are actually in operation; the DSC Company shows the least number of units in operation, 41% of which is offered.

It is possible to calculate the indicator “inhabitants/collection vehicles”, this index enables the determination of whether a vehicles quantity of the operator entity will be able to cover the waste collection generated in its action area. In this index the type and capacity of the vehicle, waste generated per habitants, quantity of the flow population, shift and number of trips executed, percentage of reserved vehicles, coverage and service quality are implicitly considered.

To evaluate it we will have the following suppositions:

- The coverage area covers 100% of the population.
- The average number of trips per day per truck is 2.
- The capacity average of the compactor trucks is 19 m<sup>3</sup>
- It is considered exclusively for the compactor trucks.

Table 3-13: Comparative table of the indicator habitant/collection vehicle

Total habitants	980.653
Total vehicle	101
Habitant/Helper	9,709 hab./collection vehicle
Value recommended by CEPIS	29,000 hab./ collection vehicle 5

<sup>5</sup> Compactor of 14 m<sup>3</sup>, 2 shifts/day, 4,8 trips/vehicle/day, 19% of vehicles reserved, 95% of coverage area.

As it can be seen, the number of inhabitants served by collection vehicles is approximately 33% of the value recommended, which shows an over dimension of the fleet and inadequate collection routes.

On the other hand the indicator “ton/trip” is also calculated, taking the data of the average values of the period between January and July of 2005 from which the following values were obtained:

Table 3-14: Comparative table of Indicator “Tons/trip”

Period	Municipality		Private Companies			
	ADNAU		ADNSERVICE		DSC	
	Ton	Trips	Ton	Trips	Ton	Trips
Jan-2005	5.090,70	661	14.191,90	1.515,00	4.973,90	420
Feb-2005	5.280,30	762	12.798,80	1.436,00	5.292,90	488
Mar-2005	6.735,30	1.038,00	14.649,90	1.509,00	5.874,60	532
Apr-2005	6.948,70	1.036,00	15.685,90	1.590,00	5.128,40	450
May-2005	6.912,80	1.048,00	18.399,10	1.771,00	5.128,30	445
Jun-2005	7.383,40	1.090,00	18.949,50	1.764,00	5.962,50	825
Jul-2005	7.591,50	1.002,00	19.762,70	1.815,00	6.351,10	721
Totals	45.942,70	6.637,00	114.437,60	11.400,00	38.711,60	3.881,00
Averages	6.563,20	948,1	16.348,20	1.628,60	5.530,20	554,4
Indicator Ton/trip	6,9		10,04		9,98	
Fleet average capacity	10		8,6		8,6	

The indicator for the vehicles operated by ADNAU shows that in average the vehicles go to the landfill with a load lower than the vehicle capacity, instead for the private companies, the indicator shows that the vehicles are overloaded which affects the vehicle usage life.

Comparing both indicators draws the attention that the indicator habitants/collection vehicle is very low regarding the value recommended, instead the indicator “ton/trip” is higher than the real capacity of one truck, which is the reason why it the quantity average of the trips carried out daily by the compactor trucks was determined, obtaining the following results:

Table 3-15: Trips carries out daily per vehicle

Item	ADNAU	ADN SERVICE	DSC
Trip/day	35.1	60.3	20.5
Operative Vehicles	20.0	38.0	17.0
Trips/vehicles	1.8	1.6	1.2

It can be noted that the number of trips per day is less than 2, even though the landfill is located at a medium distance of 16 km, and the trip time is about 30 minutes. It can be said that the usage of the resources is not efficient.

**b.4.1 Operability of the Collection Vehicles**

Most of the vehicles are in very bad condition, and do not receive regular maintenance. The vehicles are only waiting to be broken. The situation is more critical for the vehicles belonging to the private companies.

**b.5 Comments and recommendations**

From the results of the rising and analysis of the collection service it can be concluded that it is necessary to carry out a series of actions to improve its quality and service. The most



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important things include:

To define by the Municipality, which collection system should be taken, that is to say, municipal, private or mixed, and according to it, structure the service.

If it is decided to continue exclusively with a private system, it is indispensable that the Municipality demands the private companies execute the contract, especially related to:

- The presentation of the work service program, where the routes, frequencies, hours, quantity and characteristics of the equipment, personnel and the person in charge of the service are clearly indicated. Based on this program it could be possible to supervise the routes and demand adequate conditions of the vehicles and 10% of a reserved fleet and force this way so that the company contemplates the renovation of the vehicles.
- At the moment when the company presents the program it should verify if its design and the resources assigned allow the maintenance of the quality that the Municipality estimates pertinent, if it is not, the program should be rejected until it is adjusted to the necessities, especially the ones related to the vehicle features, which must be capable of collecting the waste in areas with narrow streets.
- Specify aspects that form part of the contract such as fulfilling the coverage areas as well as demand the cleaning and sweeping of the public roads and the obligation to inform users in the event that the service is modified.
- It is indispensable to establish areas that will be provided by the private companies according to the contract.
- It is recommended that in the future contracts of the collection and cleansing services, the quality of the service will be clearly established, and that it must be fixed based on the frequency, collection days, hours, number and vehicle features, personnel number, fleet and backup personnel, sectors and route schedules, defining control points to verify the hours, as well as the cleaning levels. The periods of the contract should not be longer than the life span of the vehicles unless the reposition for antiquity is contemplated. In the case that the contracts are long term and/or the population's growth rate is high, an increase of the fleet in function should be considered in response to a population increase. Before accepting any proposal, the offer should be reviewed and verified to confirm whether it fulfills the minimum requirements established (during the whole period of the contract), the use of CEPIS indicators as evaluation reference values is recommended.

If the current collection system remains the following are recommended in order to improve its quality:

- The areas to be provided by each private company based on the contract should be reassigned.
- In the event that one of the private companies cannot execute the service in the corresponding area, the contract should be renegotiated or concluded. The renegotiation of the contracts can consider a diminution of the covered area, on the other hand during this process additional demands that allow inspecting the service and achievement of adequate quality should be incorporated. If even after the renegotiation, there are still areas "without service", the service can be provided directly by the Municipality or by other private company (s). If it is decided to privatize the provision of the service in the area without service, it must be taken into account that the company ADN Service currently holds a high percentage of participation in the market and therefore the concentration of the service in only one operator should be avoided, avoiding a monopoly.

- Inspect the contracts with the private companies according to what is indicated on them, demanding the work program be indicated.
- Define clearly the areas that will be assisted by the Municipality and ensure that these do not overlap with the ones of the private companies. Then, design the service considering security factors due to the bad conditions of the vehicles and verify its design through the quality indicators of CEPIS.
- It is recommended that the Municipality's collection service be evaluated by different organizations, taking into account that this is a basic, dynamic service and that it requires quick response and therefore the structure selected should have a high autonomy grade.
- In any case the Municipality should carry out the service to respond to the case of emergencies or to support the private companies.
- Eliminate the operation of the transfer points and flat bed vehicle type.
- Change the vehicles gradually; from small dump trucks to compactor vehicles with a maximum capacity of 2 tons that are adequate to serve areas with narrow streets.
- Eliminate the boots located in the public roads for waste storage and install containers. Equally identify the places where the piled-up waste is located and install containers.
- In sectors of high topography and low income areas where the waste is discharged through ducts containers of large capacity should be installed to store the waste, and collected later through a mechanical lift system.
- To educate and then inspect the users, regarding the waste discharge, regulating the storing disposal characteristics. It is indispensable to have a brief Cleansing Ordinance to regulate the cleansing service.
- To design the special waste collection service for pruning and debris, this can be billed directly to the user. The garden waste should be used for composting.
- To investigate the contract of market waste collection, especially with respect to the sanitary measures indicated in the contract and the type of waste collected.
- Separate the household waste collection and waste from street sweeping.
- Implement the improvement of the transfer station that is located in District 3 and improve the access roads.
- Study the technical-economic viability of constructing a transfer station in District 1.
- Implement the Work Law, increasing attention to risk prevention.
- It is recommended that collection at night be evaluated, especially in areas with narrow streets that during the day have a high flow of vehicles, which considerably delays the collection tasks and generate important traffic jam in the peak hours.

**c. Treatment and Recycle**

Actually in the National District there is no intermediate treatment or formal recycling. The collected waste is taken to the Duquesa final disposal site; however, there is an informal system of material recovery. The scavengers collect recyclable materials in the streets and in the Duquesa landfill.

It is important to mention that recycling which is carried out at Duquesa, where more than 150 people are dedicated to this work, is done so without any sanitary control, causing serious social problems. The materials collected are mainly papers and plastics (PET), however, there are no records regarding the quantity of waste collected.



Figure 3-5: Scavenging at Duquesa

#### **d. Sweeping**

With the purpose of keeping the streets and avenues of the National District clean, the Environmental Management and Urban Cleansing Directorate carries out a sweeping manual program.

The responsibility to develop the sweeping manual corresponds to the persons in charge of the Districts. The functions of the people in charge of the Districts basically comprise of the execution of sweeping activities and keeping the streets and avenues in the city clean.

To develop the manual sweeping, the persons in charge of the Districts have organized the works between 07:00 and 16:00 from Monday to Saturday. On Sundays, the sweeping works are carried out in the main avenues or the personnel are used for the cleansing operation. In the same way as in the collection case, the territory has been divided in districts and then into polygons and the works are distributed based on this.

##### **d.1 Form to execute the service**

At the beginning of the shift, each sweeper is given a set of tools, which generally include a broom or push broom and/or a shovel. Bags to store the waste in are given directly by the brigade coordinators.

The sweepers do not have cars to install and move the waste bags thus they must do it manually. The personnel go daily to their work place in the flat bed or dump trucks.

Once in the area, each worker is assigned street meters or an area that they should sweep. Most of the street sweeping routes cover the areas between the building line and the roadway, also workers are sweeping parking areas and the areas nearby the waste storing points located in their trip. In the event that they meet the collection trucks and their workers who are doing waste collection, sweepers will help collection activity.

The sweepers continue working and storing the bags, which they then close and leave at the border of the roadway to be picked up by the flat bed truck or preferably by the dump truck, even though the work is carried out in the afternoon by the ADNAN trucks.

There is no control of the meters swept or a record of performance achieved.

The personnel are mainly women aged over 49 years old. The sweeping work is slow because a large volume of waste is scattered on the roads, because users have not stored the waste correctly or because it have not been taken out at the hour that the collection is carried out and dogs have scattered the waste.

The personnel concentrates in the main avenues, squares, civic and cultural centers, in some areas there are fixed personnel exclusively dedicated to the cleaning of the area, cases such as the Historical Zone and La Feria

In many cases sweeping does not coincide with the waste collection carried out by the small trucks, and it has been observed that in areas immediately after the collection truck passes, sweepers leave bags on the border of the roadway, leaving this for a long time, and on reiterative occasions these are destroyed by dogs, scattering the contents.

Inside the service modalities there exist sweeping without maintenance, sweeping with maintenance and trash litter pick up.

In the sweeping without maintenance, the workers in the assigned areas sweep the avenues, streets, empty out the wastebaskets, etc., keep them clean, free of arid materials, stony materials, leaves, branches, weeds, jars, bottles, papers or other type of waste located between the shoulders, with emphasis on the curves, in addition they include cleansing of the tree jars, public wastebaskets, drain water drills and center dividers.

Sweeping with maintenance: the workers carry out the same activities mentioned previously but also repeat the activity once or twice during the workday.

Butterfly type sweeping: the worker collects the largest sized waste found in the assigned area, such as papers, plastics, etc.



Figure 3-6: Sweeping Activities

**d.2 Comments and recommendations**

The sweeping service is operated most days to keep big avenues and important places clean, however, its quality declines on Sundays due to a lack of personnel.

People of lower incomes are dedicated sporadically to the service and a significant percentage of streets with a low level of cleaning is observed.

It would be convenient to equip personnel with small carts to store the bags and minimize the number of bags left on the roads.

It is necessary to evaluate the collection routes, to determine the efficiency and the volume of waste swept.

It is recommended that in the future recruiting of personnel, a maximum age limit be considered and the recruitment of enough male manpower to allow the coverage the work positions associated with more physical efforts, such as cutting trees, debris pick up and green waste pick up, should be given priority.

In order to provide the service at least twice a week, it is recommended to operate with groups in the peripheral sectors, especially where there are a high percentage of commercial areas.

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To reduce sweeping waste regulation of waste storing made by the users is recommended, implementing in a short term a Cleansing Ordinance, educating the population and applying sanctions if is necessary.

#### e. Final Disposal

##### <Operation>

- The National District only has the Duquesas' landfill as a final disposal site. Also, the municipalities of Santo Domingo Este, Santo Domingo Oeste and Santo Domingo Norte discharge their waste in the same landfill.
- The Duquesas' landfill is located in Santo Domingo Norte. The Duquesas' Consortium operates under a contract with the Municipality of Santo Domingo Norte.
- Most of the waste is covered with soil from the same place; which represents an advantage for the operation.
- The collector "scavengers" looks for recyclable materials in the operation area; this situation causes accidents and health risks, also the operation is hindered due to this activity.
- The operation is carried out appropriately taking into account the low fee paid (3.5 US\$/ton of waste).

##### <Installations>

- The Duquesas' landfill has several facilities, for example, two scales, workshops, grates, drainages, access roads to the work place, a hazardous lagoon of leachate that support the daily operation of the site. Many of the facilities were donated by Japan in 1998, including the scales.
- The landfill does not have waterproof sheets to prevent the infiltration of leachate underground. Therefore, the most appropriate way to prevent the generation of leachate consists of covering the compacted waste with soil.

##### <Monitoring of the Environment>

- A way to monitoring the environment has not been settled. It is advisable that the Secretary of State for Environment and Natural Resources, the municipality of Santo Domingo Norte, the concessionary company, and the other actors involved, meet to define the requirements for the environmental monitoring.

##### <Data management>

- A registration is kept of the quantity of waste that enters the site. Also, the times that the vehicles take for discharging their waste in the site are also taken.
- The registered data are used to carry out daily and future operations.

### 3.3.2 Institutional System

#### a. Laws and Institutions

There is sufficient legislation to order solid waste management; unfortunately this standard is not being observed by the majority of the parties, both competent authorities and ADN, service lenders and users, large generators of containers, residents and floating population.

The legal basis resides in the General Law of the Environment and Natural Resources, General Law of Health, Law No. 120-99 of 31 December 1999, Standard for the Environmental Management of Solid Waste NA-RS-001-03, Environmental Standard for the Integral Management of Infectious Waste, and in the Municipal Resolutions dictated by the National District through its competent agencies.

Regulating relationships between ADN, private lenders of the service and users, all within specific service quality standards is an ADN requirement. Issuing an urban Sanitation ruling guaranteeing the environmental preservation and recovery and public health protection can fill this legal void.

There is a need for generating an integral management of solid waste public policy to guide the process of management improvement at the national, municipal and private enterprise levels.

CAFTA-RD can lead sustained economic growth, which will in turn, increase the amount and variety of solid waste. Being ready for this eventuality is a necessity.

#### **b. Organizations**

There is an evident lack of coordination among competent entities in handling solid waste, both at the Executive Power level itself and in its relationships with ADN. Generation of the public policy shall point towards the role and specific function of each entity and this will consequently require coordinating all sector policies.

Communication among ADN/Social Capital/Clients that impedes the group synergy and is necessary to achieve the good quality of service is missing. The participation of the Social Capital in the effort of planning and address has become evident.

The contract's content and text subscribed with enterprises lending the collection service limits the application of sanctions due to unfulfilled service quality. It is necessary to renegotiate the contract terms incorporating the current standards.

A new administrative structure making effective participation of Social Capital and ensuring lending the service at the quality level and cost according to the importance of the capital of the Republic must be taken into consideration. Organizing a *municipal public enterprise to take care of the integral handling of non-hazardous solid waste* taking as a reference municipal enterprise of the Curitiba Municipality in Brasil, and Colombian municipal enterprises of public services should be considered.

In regards to medical waste management, a proposal is made for structuring an administrative unit in the SESPAS Environmental Health Direction. This unit would have as its main function advising the health assistance establishments at the national level in matters of integral management of medical waste.

At the general level, it is considered that in the future, SEMARN will be the entity exercising with greater competency upon the generation of public policy and conduct of programs related with common and hazardous waste management.

#### **3.3.3 Financial System**

An attempt was made to evaluate the financial system of the current SWM from the perspectives of income and cost of SWM. However, the financial system of the current SWM could only be evaluated partially, at best, because of the scarcity of information.

Income data was provided by the Triple A billing and collection company, starting in June 2004, the month in which the firm began operating. Questions were quickly answered and

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they promptly complied with information requested.

On the other hand, the data related to SWM cost was provided by ADN, only as the partial execution of the 2005 budget of EMUCD, the ADN office in charge of SWM. It would have been useful to have a clear idea of the trend in SWM cost in the past three years, but the requested data was not available as of the time of writing this.

The budget execution of EMUCD in the first three quarters of 2005 did not include expense items such as fuel, insurance, basic services, and minor repairs, communications, which are all necessary for SWM. This suggests that some SWM expenses may be partly included in the budgets of other ADN offices; thereby implying a higher SWM cost than the EMUCD budget. Accordingly, SWM cost estimation would be even more difficult, especially without the full cooperation of the ADN finance office.

Even recognizing the dramatic improvement in SWM income brought about by Triple A, the improved SWM income appears to be insufficient to balance the cost of the SWM service as it is provided at present.

It is presumed that further income improvements need to go hand in hand with improvements in SWM service quality as perceived by the users of the service. On the other hand, a reliable cost registration method needs to be implemented, in order to complement income improvements. The cost of the SWM service before quality improvement should be compared with the SWM cost after improvement. It is anticipated that when service users notice the improved quality in SWM, favorable changes will occur in the payment pattern of SWM users. If there is no comparison basis for cost reduction and/or quality improvement in SWM, improvements or changes will be less convincing to the service users, and the effect on their willingness to pay can be expected to be limited.

The financial system of the current SWM can be evaluated on the following aspects.

#### **a. Financial Information and Improvement**

The apparent lack of data for cost estimation in SWM precludes a series of benefits, or causes a series of difficulties. On the side of possible benefits, public disclosure of financial information on the cost of SWM service would be important to earn the confidence and trust of the service users, which in turn can contribute to improving their willingness to pay for the SWM service. Needless to say, the disclosed financial information should reflect a cost-effective service, and is expected to induce a cooperative attitude and improve the users' willingness to pay for the SWM service, through a better understanding of the service. Perhaps the cooperative attitude of SWM service users can be enhanced by finding ways for service users to participate in the monitoring of the SWM service quality. Without this cooperation from the users for the SWM service, it would be quite difficult to improve the financial situation of SWM.

On the side of causing possible difficulties, when the requested financial information is not made available in a timely manner, it hampers the progress of the Study, and analysis becomes restricted. Under these circumstances, recommendation of improvement measures becomes quite difficult to make. Therefore, the issue is the possible lack of registered cost information, or, if it was available, scarce cooperation in the provision of the data necessary for the financial analysis.

The scarcity of financial information suggests, among other reasons, an insufficient accounting system for the specific need of SWM. Reliable information is needed to make correct decisions leading to sound management, able to provide a SWM service that users can find satisfactory from the viewpoint of quality and cost. Affordable, cost-effective service and appropriate income from SWM are essential for the sustainability of SWM services. The quality of service and cost-effectiveness can only be improved if performance indicators are

continuously monitored. Such performance measures depend on the existence of data generated by appropriate management and accounting systems.

**b. Income Improvement**

Financial improvement should be faced on two fronts: income improvement and cost reduction. As already presented in the Chapter on Financial Analysis, income improvements have moved in the correct direction since the signing of a contract with a private billing and collection firm.

As a result of this commercial service under contract, the bill collection amount increased many times over (from 1.7 Million RD\$ in June 2004 to 11.6 Million RD\$ in June 2005), and the collection/billing ratio increased from 6.7% to 42.6% during the same period. However, the collected amount is not nearly enough to cover the costs of SWM. Thus, in order to move towards financial equilibrium first and then to financial surplus, income improvements from now on will probably have to entail prior or simultaneous improvements in other aspects, such as in the quality of service, and further expansion of the paying customers.

Late accounts have a grace period of 6 months. This means that Triple A can only take actions to pursue payments after six or more SWM bills have gone unpaid. Triple A has devised a series of measures to induce payments and reduce late accounts, but if these measures can only be applied after six months or more without payment, it appears to be too long.

**c. Cost Reduction**

Cost reduction will probably have to depend on operational and organizational improvements, including a reassessment of the participation of private companies. Reportedly, the present operation system of SWM came about in the recent past as a result of a crisis situation. The operation of the SWM service as crisis management instead of SW management is, unfortunately, quite common in many countries. Cost reduction will necessarily have to include a better control and monitoring of the quality of service provided by private companies, in order to achieve a cost-effective SWM service.

The improvements in operation and organization are expected to change the perception of users of the SWM service with respect to quality, thereby inducing them to improve their willingness to pay for the service. Expected improvements refer to operation efficiency and service quality, as well as cost-effective SWM. In order to fully exploit the benefits of these improvements, a cost comparison is necessary before and after introducing the improvement measures, so as to clearly and convincingly show the quality improvement and/or cost reduction that may be achieved for SWM.

**3.3.4 Public-Private Partnership**

**a. Collection and Transport**

**a.1 Modalities**

Participation of the private sector in SWM takes place in collection and final disposal, although only the SW collection service by private companies falls under the jurisdiction of ADN. The final disposal site used by ADN is privately operated, but on the basis of a contract signed between a consortium and another municipality (Santo Domingo Norte) where the final disposal site has been located for 20 years.

Private companies in charge of SW collection in ADN operate under the following modalities.

- (1) Two large contractors are assigned specific areas known as a "District", and ADN pays



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US\$24.00 per ton.

**ADN Services:** 38 trucks and 151 employees, District 1 and 3

**DSC:** 17 trucks and 83 employees, District 2

- (2) Small trucks: 70, whom ADN pays RD\$1,466.00 per day, in addition to providing two workers per truck, on the basis of six trips per day, adding up to an estimated transportation of 5 tons per day. When the truck scales are set up, the plan is to pay 300 RD\$ per ton, with a bonus for those truckers transporting more than 5 tons per day.
- (3) Micro enterprises: 3 micro enterprises in charge of a SW collection service in marginal areas, with 6 trucks and 18 employees, whom ADN pay US\$13.5 per ton, for the collection and transportation up to the transfer points. Two more micro enterprises will be soon added to District 3.
- (4) Special Service: three companies which are in charge of SW collection as special service (for instance, large objects or large generators) and are supposed to pay ADN a fraction of their bill collection

**LAU:** attends large generators such as office buildings and business entities.

**Klinetec:** ditto

**SERTEX:** is in charge of market waste, ADN pays US\$27 per ton as premium for the nature of waste collected. **SERTEX** has changed its company name, having started as **MADRAS**, and its owner is the same as **LAU**.

- (5) Transfer and transportation

**SOINCA** used to operate compactor trucks to complement the compactor trucks belonging to ADN, for the transportation of SW from the transfer station or transfer point to the final disposal site. Now, however, the contract with ADN is for two large dump trucks of 27 ton capacity, for which ADN pays 10,000 RD\$ per trip.

**ADN Transfer** operates with one dump truck, which is supposed to transport 28 tons per trip, but the Duquesa truck scale can register only up to 20 tons. They are paid US\$13.50 per ton.

ADN contracts, when necessary, one dump truck of 15 m<sup>3</sup> on the basis of four trips per day, paying RD\$3,266 plus 25 gallons of diesel fuel per day (valued at about RD\$2,500), resulting in a total payment of around RD\$5,766 per day. The estimated daily tonnage is 24 tons (6 tons per trip).

#### a.2 Contract Terms and Conditions

The two large companies, ADN Services and DSC, signed contracts for collection, transport and street sweeping, with a duration of ten years, without specifying the quality of service or other technical requirements, the contractor having the freedom to prepare the work plan with the only condition of having a 10% reserve fleet, and having obligations to ADN only if payments from ADN are on time. No penalties or fines are applied as sanctions, and when the service is not satisfactory, ADN goes in with its own equipment and personnel to provide the service. Since these companies are paid according to the tonnage measured in the final

disposal site, the penalty on the private company is the income lost, equivalent to the tonnage that they should have taken to the final disposal site.

The role of ADN is to supervise the service, but without specifications of quality standards and without sanctions to apply, not much can be done.

Although the areas assigned were under exclusivity, the two companies exchanged the areas where they originally provided services, having DSC changed from District 2 to Electoral District 2. ADN Services has kept Electoral District 3 and has taken over Electoral District 1 from DSC in exchange of Electoral District 2.

### **a.3 Improvements in Contract Terms and Conditions**

A directive document issued by the Secretariat of the Environment and Natural Resources in June 2003 (“Norma para la Gestión Ambiental de Residuos Sólidos No Peligrosos” or Norm for the Environmental Management of Non-hazardous Solid Waste) establishes in Point 4.6 that in contracting private companies for the provision of different services, the Municipality should take measures to guarantee three fundamental conditions: a clear definition of the type and scope of the contracted services, analysis of tenders to choose the most viable offer technically and financially, and control of the compliance with contract conditions.

Compared with the above provisions, the contracts that have been signed between ADN and the private companies do not explicitly contain the usual rights and obligations of each of the parties signing the contracts, concerning description of the service to be provided, the quality of service and ways to ensure compliance with quality provisions. As the contracts at present appear to be weak to attain a quality SWM service, ways must be sought to correct the weakness.

### **b. Final Disposal**

The final disposal of all waste collected in the National District is carried out at Duquesa landfill. This landfill was in the National District territory until 2002, later and due to a new territorial distribution it passed to Santo Domingo North jurisdiction. This Municipality keeps a contract since 2004 with the private company Duquesa’s Consortium for its administration, operation, maintenance of the biogas controls, the leakages, the equipments and the physical plant property. Through the same contract, Santo Domingo North Municipality authorizes the concessionaire to use the gas in its valid period, forcing the concessionaire to pay the 5% of the net benefits obtained.

Considering that the new territorial division conferred to Duquesa landfill the quality of the inter-municipal landfill, in May of 2004 an Inter-institutional Collaboration Agreement for the Sustainable Management of Duquesa’s Sanitary Landfill was signed, participating the municipalities of Santo Domingo East, Santo Domingo West, Santo Domingo North, Boca Chica, Guerra and the National District, the Secretariat of State for Environment and Natural Resources, Secretariat of State for Public Works and Communications, Airport Department, Liga Municipal Dominicana, and Aeronautic Civil Directorate.

In this agreement the signatories recognized the operation and administration of Duquesa Sanitary landfill, by the Consortium of the same name, and decided to conform an Inter-Institutional Technical Unit, whose responsibility will be supervise and advice Duquesa sanitary landfill management. In this same agreement the payments that must be given to the municipalities for the final disposal service were fixed as:

- National District Municipality: RD\$ 4,000,000.00 monthly
- Santo Domingo North Municipality: RD\$ 400,000.00 monthly

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- Santo Domingo East Municipality: RD\$ 1,300,000.00 monthly
- Santo Domingo West Municipality: RD\$ 500,000.00 monthly
- Guerra Municipality: RD\$ 300,000.00 monthly

Additionally the Secretariat of State for Public Works and Communications (SEOPC), will contribute with the amount of RD\$ 2,000,000.00 monthly, not specifying the time of this contribution and once this stops, the Municipalities of Santo Domingo county and the National District, will assume the budget in proportion to the tons deposit at Duquesa. Until now only one of the contributions from SEOPC have been carried out, only the municipalities have paid the amounts agreed.

At the time when the agreement was signed, an average of 60,000 tons/month entered Duquesa, which gives a rate of 4.72 US\$/Ton, the average waste which has entered since the agreement was signed has increased to an average of 92,000 tons/month and as the rate value has not increased, the unit cost corresponds to 3.08 US\$/Tons. Nevertheless, as previously indicated, only the municipalities have fulfilled their economic obligations, excluding Guerra Municipality, therefore the monthly value collected reach the amount of RD\$6,200,000 and if the total amount collected is considered, the unit rate will be 2.25 US\$/tons., value that only covers the cost of the fuel and personnel, preventing any type of investment or improvement works in the landfill, and therefore is impossible that Duquesa will fulfill the national standards of the environment quality.

Within the activities that the Technical Unit must conduct in the first year of the agreement are:

- Determination of the cost structure of the sanitary landfill operation, based on the daily tons accepted.
- The recruitment of an environmental auditor by Duquesa's Consortium, to verify the environmental impact levels of the actual operation and the gap with the environmental standards valid in the Dominican Republic, to determine the minimum investment level that will make landfill operation feasible in both economic and environmental terms.
- Formulation of a management plan and an environmental adaptation of the administrative, technical and physical operations of the final disposal for its implementation in order to mitigate the environmental impacts.
- Duquesa's Consortium must send to the Municipalities of Santo Domingo county, National District, SEOPC and SEMARENA, a quarterly report regarding the financial, technical environment and physical balance (tons deposited) of their operations and a constancy of the contributions of the Liga Municipal Dominicana and/or the Municipalities and those that come from other sources.
- On the other hand SEOPC and SEMARENA have a responsibility to advise and supervise in the areas of their respective competences the operations and complete execution of Duquesa's sanitary landfill.
- SEOPC acquire the commitment of the reconstruction of the Casabes road and collaborate lending the equipment necessary to improve and keep the access to the Duquesa landfill.

Additionally, a period of 90 days is fixed so that the Technical Unit together with Duquesa's Consortium, will determine the cost structure of the sanitary landfill operations, count with the results of the Environmental Audit that is under the supervision of SEMARENA and prepare a proposal of the management and environmental adaptation plan, contributing with the necessary contributions based on the participation in the final disposal of the urban solid

waste. On the other hand the Airport Department, commits to cover all the waste discovered until now and rehabilitate the recovery gas and leakage system and the pluvial drainage.

From all the points previously indicated, and to a few days before completing a year of the signature of the agreement, only the Quarterly Report of Duquesa's Consortium has been submitted to the entities indicated and part of the responsibilities of the Airport Department related with the waste coverage.

Although it is certain that the environmental legislation allows inspection of the development of Duquesa's operation, until now environmental permission has not been demanded for the existing facilities at the time when the Environmental Norm was promulgated and therefore they do not have a monitoring program, environmental pursuit or mitigation measures and contingency plans.

**c. Customer Service**

The Municipality has contracted out customer management to a private company, Triple A Dominicana S.A., which maintains a customer list, issues invoices, receives payments and handles complaints from customers (citizens).

The company started operating in the National District Municipality on May 31 of 2004 under the Technical Assistance and Technology Transference Contract. This contract established a duration time of four years, automatically extendable for the same period if at by sixty (60) days that proceeds to the finalization of the term, none of the parts expresses their will for not continuing it.

The rates are originals and regulated by ADN, even though improvements have been suggested such as the regrouping of activities and the possibility to make rising over the waste production level as a parameter for the rate assignment.

The collection rate, the relation among the collection and billing amounts, has increased from 7% in June 2004 to 43% in June 2005. Regarding the marginal areas where the communitarian companies are assisted through SABAMAR, the invoices are not distributed. Furthermore, big generators of solid waste such as buildings and trades, which are served by KLINETEC and LAU, are billed directly by them. The company foresees that gradual light increment until 60% of the billing can be produced in the second year of management.

As mentioned above, the rate of fee collection/billing has significantly improved for one year by contracting out the work to a private company. This has to be appreciated. However, the company forecasts a low attainment rate, 60%, in the second year, which will not cover the cost of the service. Measures to attain a high fee collection/billing rate and to raise the amount of payment will review the tariff and direct charge to large waste generators.

The company has developed some important information for SWM, such as lists of clients, maps and records of claims. That information has not been utilized well. It is recommendable to exchange such information between the municipality and the company to monitor and continuously improve the SWM.

**3.3.5 Public Participation**

A great quantity of extraordinary cleansing days has been carried out by the ADN to support churches, schools and neighbors' associations. However, these days have had momentary results because the residents have not been incorporated in a more participative and committed way with the SWM problems.

Until now there have been no integral programs that involved educational tasks with community experiences. The public entities lack specific and continuous programs and their

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activities have been precise and eventual.

Generally, in the National District, the citizens' participation in solid waste management is weak because this concept still does not have a strong foundation neither with its institutional territory nor with the citizens. Since the waste management is considered as a problem that concerns the municipalities, there is no people's representative when the solutions decisions are made. Their participation is limited, in most cases, they give the waste to the collection system and pay the corresponding fee, from a part of the population.

There are demands from the population, especially from the urban marginal areas, to obtain drinking water, a sewer system, electricity, pavement of roads and even telephones services, but there is little demand for urban cleaning services because on one side they think that the municipality is responsible for solving the problems, and on the other side the community thinks that public waste management does not have transcendence nor priority. Regarding the behavior related with the service payment, the communities' perception is negative, because the majority considers it to be a municipal obligation. However, it must cite as a good experience the one that has been developed by the Tariff and Collection Directorate through the Customer Service Office in the National District, encouraging the community to partake in the "payment culture" on cleansing fees.

The solid waste component through the SABAMAR Project seeks the establishment of effective mechanisms for domestic solid waste collection and disposal in areas of difficult access, through three complementary activities: creation of micro companies waste, users' sensitization and strengthening of the institutional management capacity for the urban solid waste management. This project is being carried out in an effective way with participation of the micro companies integrated by people of the same barrios, strengthening the management capacity by its members and increasing the sensitization of the population. However, actual citizen participation related to SWM still has a long way to go before being achieved.

#### 3.3.6 Medical Waste Management

##### a. Institutional Framework

The General Law of Health and the Environmental Standard for the Integral Management of Infectious Waste has the sufficient provisions to continue writing the *Medical Waste Ruling in the Dominican Republic* and whose coordination corresponds to SESPAS.

Results and findings obtained in the survey and diagnostic led by the C/P and the Study Team shall contribute in setting the qualitative and quantitative elements to be considered in the ruling.

Through its competent agencies, the government shall formulate the public policy regarding medical waste handling.

To ensure adoption and fulfillment of ruling disposals, it will be necessary to validate it through the execution of a pilot project.

##### b. Organization

The State has no specialized entity in charge of handling medical solid waste and advising the network of health assistance establishments at the national level.

SESPAS is a competent specialized entity to conduct handling of medical waste. In this sense, structuring a *specialized technical unit* within the Environmental Health Management, having as its main objective training staff in health assistance establishments in matters of medical solid waste management is necessary.

Likewise, it is vital to prepare an *Action Plan* responding to the solution to the important problem faced with the inadequate handling of medical solid waste.

This *Action Plan* shall include the national hospital network staff training program, the budget of acquisition of necessary goods and services and the procedure for controlling and monitoring the Plan.

### 3.3.7 Hazardous Waste/ Construction Waste

The State must make an effort in having approved the regulatory norms in the matter of the hazardous waste management at the beginning of 2006; this is, with the entrance in validity of the CAFTA-DR.

SEMARN is working on the preparation of the normative mentioned but it is necessary to reinforce the professional equipment in charge of that mission.

With the validity of the regulatory normative it will be precise to count the organization and the qualified personnel to monitor and control the application of the law.

SEMARN will have to summon the manufacturing sector to establish an alliance that assures a sustainable economic growth from the environmental perspective like a policy lineament of the sector. It will facilitate international trade, of the goods produced in the country, within the environmental considerations of the CAFTA-DR.

Regarding construction waste management we affirmed that adequate legislation exists to regulate the management of this waste.

The Urban Planning Directorate, that issues the permission to carry out construction and demolitions, can demand a special service contract with ADN and has several inspectors with the capacity to close a construction down in the event of a violation of the effective norms in the matter of the waste management.

ADN can organize the special service by utilizing the vehicles that actually participate in the collection service. The service can be extended to pruning trees and garden waste management.

After having organized the market, i some recycle alternatives and reusability of the construction waste can be considered.

### 3.3.8 Waste due to Disaster

#### a. Current Situation

The National District is located on a platform of limestone reef with three marine terraces and alluvial sediments, with an average height of 20 m above the sea level, and it corresponds to the life area of subtropical humid forest, in which flora and fauna has adapted to these environmental conditions.

The territory has suffered a deep transformation to a landscape of antropic characteristic where part of the native vegetation has been replaced by exotic species.

Opposite to the danger that represents the hydro-meteorological phenomena, of frequency and growing dimension, it is necessary to encourage the establishment of a program for the substitution of exotic species for endemic and native species, like part of the mitigation process that should be formulated.

It is properly documented that around 80% of the waste derived by hurricanes correspond to the remains of fallen trees due to the force of the winds. The violent mobilization of the trees

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causes great destruction in the electricity wires and communications, in constructions, vehicles and other, as well as, in the physical integrity of people and especially in the closing of streets and avenues.

This last issue will impede free and quick access to hospitals and other health centers, firemen's barracks, housings, plants of water and other public service premises. This situation should be avoided due to the risk that it presents to unprotected people from health care, and thus, a program should begin mitigate this risk.

#### **b. Regulation**

Through the Resolution 152 of 2004 of the Municipal Council the Regulation of Tree Urban Planting of the National District was approved. The regulation on tree-planting establishes a technical framework to regulate the planting, prunes and cutting works of arboreal species in the public space.

Among other dispositions this regulation established the following:

- The prevention of risk and damage to civic security and urban infrastructures;
- To promote tree planting because its phenological and ecological characteristics help to prevent risks to the people and the infrastructure;
- Only species with morphological and environmental characteristics that adapt easily without causing risks of material and economic damages, such as: Guayuyo, Ceiba, Yagrumo and Guayiga will be allowed.
- Prior to the start of the cyclonal season, preventive pruning will be reinforced of all arboreal species in public or private spaces that can present a potential risk to the citizenship;
- During the cyclonal season, pruning that is carried out will be moved away immediately, to avoid such waste to congest the pluvial drainages of the city or cause damage in the event of strong winds.

#### **c. Organization**

The following figure shows the structure of functional organization of the National System for the Prevention, Mitigation and Answer in the event of Disasters; all the competent organizations at the national level are part of the system.

The ADN is part of the system in the Municipal Committee of Prevention, Mitigation and Answer in the event of Disasters. They carry out several activities with the Defensa Nacional of the National District, Cuerpo de Bomberos N.D. and the Cruz Roja of the Dominican Republic through the Risks Management Department (OFIGER) of the Environmental Management and Urban Cleansing Directorate.

#### **d. Technical material available**

The ADN has emitted a guide to foresee, in the most effective way, the necessary attendance for the protection of the municipality before, during and after a hydrometeor and antropropic phenomenon.

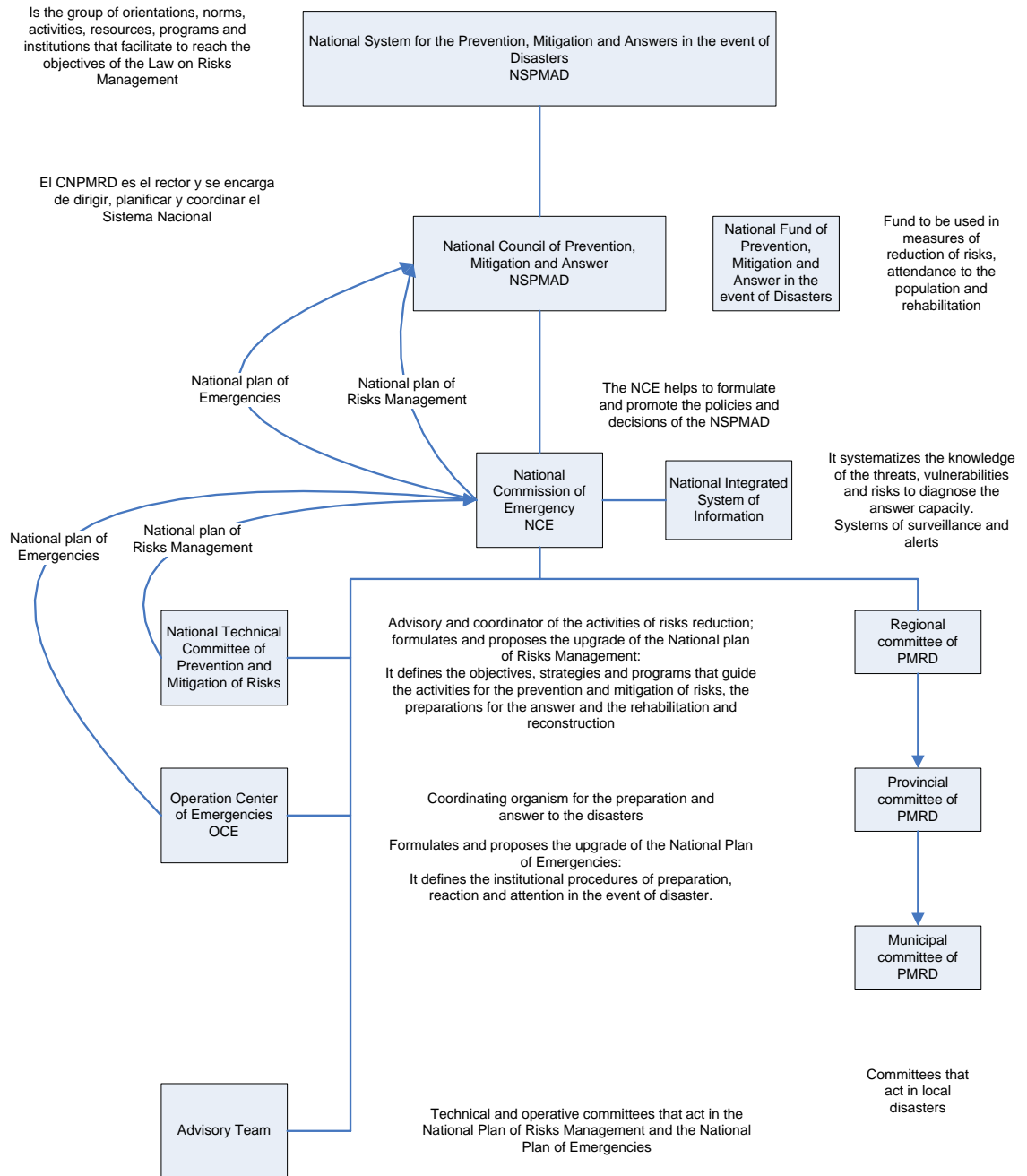
The Municipality assures that they are prepared to face any calamity of natural origin or caused by human action.

The Pan-American Health Organization has published a manual on "Solid Waste Management in Disaster Situations". It covers among other the following aspects:

- Domestic solid waste management after a natural disaster;

- Debris and demolition remains management;
- Hazardous solid waste management in situations of disasters.

**ORGANIZATION, COORDINATION AND FUNCTIONS**



**3.3.9 Environmental and Social Considerations**

There are some issues to be taken into consideration for SWM from the perspectives of environmental and social aspects.



#### **a. Hygiene Condition in the City**

The hygiene condition of the city is not necessarily good due to problems with drainage and waste. Especially, low income areas are adversely affected by such unsanitary conditions. Adverse impacts on the health of citizens shall be evaluated quantitatively and investment shall be conducted on required measures such as rehabilitation/construction/maintenance of drainage and improvement of waste collection service. In addition, an improvement of the waste supply system is expected.

#### **b. Solid Waste Management Facilities**

Collection vehicles themselves cause environmental impacts such as noise, leakage and bad odor. The incorporation of environmental considerations in an operation standard and education of workers is recommendable.

A transfer station and transfer points are where waste is transferred from small trucks to large transportation vehicles. The transfer station is under reconstruction with cooperation from the European Union. Although it causes some adverse environmental impacts on the surrounding community, such conditions are expected to be improved through the EU project. Transfer points in public spaces do not have any facilities such as fences, drainage, etc., thus they will adversely affect the neighborhoods. In addition, it can often be seen in the city that private collection companies transfer waste from small trucks to compactor trucks. It causes unfavorable impacts on the surrounding. It is recommendable to eliminate activities of transferring waste on the streets.

Although the current landfill, Duquesa, has put effort into environmental protection measures, it causes environmental impacts such as leakage, landfill gas emission and proliferation of birds. A large number of waste-pickers take recyclable materials from the waste. They are causing themselves to face health risks and hamper landfill operation work. It should be mentioned that a new airport has been constructed close to the landfill. The distance between them is estimated to be around two (2) km. This signifies that the distance does not comply with the national law, Law for Environmental Management of Non Hazardous Waste (Norma para la Gestion Ambiental de Residuos Solidos No Peligrosos). This situation causes doubt on the continuity of the landfill operation.

In future, a transfer station may be necessary depending on the location of a future disposal site. Such a facility will cause adverse environmental impacts to a greater or lesser extent. Consultation with the established procedure of EIA in the country will be required.

#### **c. Consume-driven Culture**

The country has rapidly developed economically since the 1990'. The consumer-driven culture of the citizens may have grown in this period. Use of throwaway containers and plastic bags are widespread in the city. Recycling activities are not common. Taking into account the large waste generation per capita, dissemination of waste minimization and encouragement of recycling activities are expected in the near future.

#### **d. Income disparity**

Inequality is relatively high in the Dominican Republic as reflected by a Gini coefficient of 0.49 in 1992. The richest 20 percent of the population received about 57 percent of total income in 1992, while the poorest 20 percent received only 4.4 percent. The share of income received by the extreme rich and extreme poor increased during the 1986-92 period, but the share of the poor increased by a somewhat higher proportion. Middle-income groups seem to have been the losers. The Gini coefficient deteriorated markedly in 1989 but improved substantially in 1992 (World Bank, "Growth with Equity: An Agenda for Reform").

The required monthly minimum income for living in February 2004 was RD\$14,377 (Central Bank). The Public Opinion Survey said that about 60% of citizens' household income did not reach this level.

Anyhow, there is an income disparity among citizens. This should be taken into account when considering tariff setting and communication with communities.

**e. Waste-pickers**

Waste-pickers are found on the streets and the Duquesa landfill. Most of them are from outside the metropolitan area, including Haiti. They are contributing to recycling however, they often damage the urban environment by scattering waste and hampering the operation work at the Duquesa landfill. In addition, they cause themselves to face health risks. In particular, contact with hazardous waste such as toxic and infectious waste is serious.

Neither one municipality nor a private company can solve this problem. Only the society can confront this issue. It is expected that competent authorities will work together on this issue.

**f. Marginal Communities**

Poor communities extend along the Ozama River. The communities do not have a basic social infrastructure such as electricity, water supply, sewage and waste service, as the areas are not legally residential areas. In addition, the areas are very vulnerable to natural disasters such as hurricanes, heavy rain, strong winds and floods.

As the areas do not have basic social services, hygiene conditions are terrible in some parts. Urgent measures from the viewpoint of humanity as well as measures to solve the problem fundamentally based on a long-term perspective are expected.

3.3.10 Overall Evaluation and Problem Analysis

a. Overall Evaluation

The Table below describes the overall evaluation of the current solid waste management in the National District.

Table 3-16: Overall Evaluation of the Current Solid Waste Management

SWM Component	Evaluation
<p>I. General Condition</p> <p>1 Collection</p>	<p>Waste collection service is supposed to be provided in whole area of the city by the private contractor companies. However, the municipality by itself also operates its own service where the service seems to be insufficient.</p> <p>According to the Census 2002, 90% of the citizens have some kind of waste collection service. However, POS's result shows that 24% of the citizens do not have the service. The reason why such a large population answers so seems to be that the collection trucks do not pass in front of their houses (31% has to take their waste to a collection point; POS) and irregular collection frequency.</p> <p>Although most of the city is covered with the collection service, it is not kept clean (68% feels that the city is dirty; POS). The citizens suffer from the unsanitary environment.</p> <p>Contrary to the citizens' perception about the esthetic of the city. Most of the citizens appreciate the current collection works (73% of the interviewees answered they are satisfied with the service). This may imply appreciation of the citizens to the ADN efforts in this field.</p> <p>Anyway, improvement of the collection system should be given first priority among the SWM in the National District.</p>
<p>2 Disposal</p>	<p>All waste collected in the National District is brought to the Duquesa landfill. A private company, Duquesa Consortium, from June 2004 under the contract with the municipality of Santo Domingo Norte for 20 years, operates the landfill.</p> <p>Waste amount disposed is recorded by the weighbridge installed at the entrance of the landfill. The access road for collection vehicles to waste dumping area is kept in fairly good condition.</p> <p>Although the landfill does not have an impermeable liner and appropriate leachate treatment facility, the waste is covered with soil and gas extraction pipes are equipped.</p> <p>A new airport has been constructed and is ready to operate. This airport may influence the existence or the operation of the landfill due to its proximity (Less than 2 km).</p> <p>The contracted private company has a future operation plan. However, the indecisive situation regarding the airport and low tipping fee (2.5US\$/ton) makes the company hesitate to invest.</p> <p>Final disposal is indispensable for SWM. A consensus on the use or non-use of the Duquesa landfill among institutions concerned should be established in order to secure stable SWM in the future not only for the National District but also for other concerned municipalities.</p>
<p>3 Minimization</p>	<p>Official waste minimization activities have not been seen in the National District. However, informal recycling activities are seen in the city and in the landfill. The waste picking in the city causes waste scattering on the</p>

SWM Component	Evaluation
	<p>streets and that in the landfill causes the waste-pickers face to health risks.</p> <p>Environmental education regarding waste minimization is not widespread among the citizens so far. It is recommendable to establish an official manner of environmental education in schools and communities to encourage waste minimization.</p>
4 Efficiency	<p>Financial information of ADN does not allow accurate estimating of the cost of the SWM. Preliminary estimation made based on information available resulted in 40 – 50 US\$ per ton of waste.</p> <p>Actually, the collection works carried out by the private companies and the municipality overlap. This implies inefficiency of the collection work. In addition, a large number of sweepers are working on the streets.</p> <p>Although observations and technical data imply inefficient use of resources, the present data keeping system does not allow detailed diagnosis of efficiency of the SWM. Therefore, it is recommendable to establish a manner of technical and financial data management together with improvement of the operation.</p>
<p>II. Technical System</p> <p>1 Discharge and Storage</p> <p>&lt;Rules&gt;</p> <hr/> <p>&lt;Storage facility&gt;</p> <hr/> <p>&lt;Communication with the citizens&gt;</p> <hr/> <p>&lt;Data Management&gt;</p>	<ul style="list-style-type: none"> <li>• Municipal Law No.120-99 describes the general manner of waste discharge.</li> <li>• The citizens are not informed of the waste discharging manner, i.e., when and how they should discharge waste, as well as collection routes and frequencies have not been established.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Many concrete made storage facilities are found along the streets. As the storage facilities are located in public spaces, everyone can access and throw garbage in an inappropriate manner. Frequency of the collection service is irregular, and waste is often left in the storage facilities for a long period. This situation gives animals and waste-pickers a chance to scavenge waste, then waste is scattered in the end. It can be said that the storage facilities work as small dumping sites and considerably deteriorate the esthetic of the city.</li> <li>• As the storage facilities are located in public spaces, many of them are not paid attention to by the residents who use them. Street sweepers often take care of scattered waste around the storage facilities.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Importance of proper discharge and storage is not disseminated to the citizens. Establishment of rules for discharge and storage and dissemination of them is expected. However, collection routes and frequencies shall be established first.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Discharge amount by generation sources has not been known. It is recommendable to establish a manner to keep such data for many purposes in the SWM.</li> </ul>
2 Collection and Transport	<p>&lt;Collection Service Quality&gt;</p> <ul style="list-style-type: none"> <li>• Collection routes and frequencies have not been established. The citizens do not know when their waste is collected.</li> <li>• Collection service quality has not been established. As the private companies are paid by weight of waste that they collect, they tend to collect as much as waste in a short period without taking care of the waste left behind and around collection points.</li> <li>• Small trucks that ADN hires directly are not suitable for loading waste; the position of loading platform of the trucks is high. Then, often the small trucks pick up only waste in bags that are easy to load up to the</li> </ul>

### 3. Current Situation of the Municipal Solid Waste Management

SWM Component	Evaluation
	platform. In a result, waste at bottom of the storage facilities is left for a long time, erodes, attracts rats and insects and emits malodor.
<Street Sweeping>	<ul style="list-style-type: none"> <li>• Considerable numbers of sweepers are working on the streets over the city like covering the defect of the collection service and inappropriate waste-handling manner of the citizens.</li> <li>• Most of the sweepers are taking care of their communities. This seems to give them an incentive to clean up the areas rather than being assigned to areas where they do not live in.</li> </ul>
<Collection Vehicle>	<ul style="list-style-type: none"> <li>• Assignment of collection vehicles is not logically designed taking into account waste amount discharged from assigned areas.</li> <li>• Generally, the streets in the eastern part of the city are narrow and many cars park on those. Large capacity container trucks cannot pass. Taking this situation into account, small trucks are assigned to those streets. However, those small trucks are not designed for waste collections, then causing problems such as spilt of leachate, drop of garbage and giving off malodor. Assignment of small size compactor trucks is recommendable.</li> <li>• Capacity of maintaining vehicles is different operator by operator; the private companies, small trucks and ADN. Maintenance is not necessarily carried out well. It is often seen that the collection vehicles have mechanical troubles during operation.</li> </ul>
<Transport>	<ul style="list-style-type: none"> <li>• There is one transfer station and two transfer points. The transfer system is not necessarily efficient. Especially, works at the transfer points are inefficient (the Time and Motion Survey says that waiting time of collection vehicles at the transfer points occupies considerable part of their working time). Improvement of operation at those transfer points is recommendable.</li> <li>• Meanwhile, the transfer station located in Villa Agricola is under reconstruction by a project of European Union. Improvement by the project is expected.</li> </ul>
<Investment to vehicles>	<ul style="list-style-type: none"> <li>• Neither the private companies nor ADN have replaced collection and transport vehicles periodically.</li> <li>• Neither the private companies nor ADN have a plan to replace vehicles.</li> <li>• Most of the vehicles working for collection and transport are old. It is recommendable to replace old vehicles to new ones in order to stably provide the service.</li> </ul>
<Personal management>	<ul style="list-style-type: none"> <li>• ADN has a training program, "School for Urban Cleansing (Escuela de aseo de urbano)" for cleansing workers. Sweepers wear uniforms in order to be paid attention by cars on the streets. Those are appreciated and recommended to be continued and strengthened.</li> </ul>
<Data Management>	<ul style="list-style-type: none"> <li>• Data of the amount of waste by area are not able to be collected, since the collection routes have not been established and amount of waste collected by small trucks is not be weighed in each area.</li> <li>• A new weighbridge has been equipped to the transfer station in Villa Agricola. It will allow the municipality to know waste amount by collection area. Effective use of the facility is recommendable.</li> <li>• Communication of data on collection works such as collection routes and collected waste amount between the private companies and the municipality has not been established. It is strongly recommendable to require the private collection companies to submit collection plans</li> </ul>

SWM Component	Evaluation
	and records of daily operation in order to monitor and to conduct continuous improvement of the works.
<p>3 Final Disposal &lt;Operation&gt;</p>	<ul style="list-style-type: none"> <li>• Only the Duquesa landfill is utilized as a final disposal site for the National District. In addition, three other municipalities, Sto. Domingo Este, Sto. Domingo Oeste and Sto. Domingo Norte, dispose of their waste in the site.</li> <li>• The Duquesa landfill is located in and belongs to Sto. Domingo Norte. Duquesa Consortium operates under the contract with the municipality of Sto. Domingo Norte</li> <li>• Most of the waste is covered with soil that is obtained in the site. This is a good point of the site.</li> <li>• Waste-pickers are scavenging recyclable materials in the operation area. This situation causes accidents and health risks, meanwhile, operation is hampered by their activity.</li> <li>• Operation is conducted at a fairly good manner considering the low tipping fee (2.5 US\$/ton of waste).</li> </ul>
<p>&lt;Facilities&gt;</p>	<ul style="list-style-type: none"> <li>• The Duquesa landfill has facilities; two weighbridges, workshop, fence, a gate, gas extraction pipes, access road to the working face, lights for night operation, a leachate pond, etc. that secure the daily operation. Some of important facilities such as weighbridges were donated by Japan in 1998.</li> <li>• The landfill does not have an impermeable sheet to prevent leachate from infiltrating into the ground. Then, secure soil cover is the effective manner to prevent large amount of leachate.</li> </ul>
<p>&lt;Environmental Monitoring&gt;</p>	<ul style="list-style-type: none"> <li>• The manner of environmental monitoring has not yet established. It is recommendable that the Secretariat of State for Environment and Natural Resources, Santo Domingo Norte and the private company sit at a round table to define environmental monitoring requirements.</li> </ul>
<p>&lt;Data Management&gt;</p>	<ul style="list-style-type: none"> <li>• Amount of incoming waste is well recorded. Also, time spent by vehicles for discharging waste on the site is recorded.</li> <li>• The data recorded is well utilized for the current and future operations.</li> </ul>
<p>4 Recycle and Minimization &lt;Recycling&gt;</p>	<ul style="list-style-type: none"> <li>• Informal recycling activities are found on the streets and the Duquesa landfill. Number of waste-pickers on the streets is unknown, while approximately 100 - 200 waste-pickers can be observed at the landfill.</li> <li>• Paper, glass bottle and PET are principal recycling materials in the municipal waste stream. Also, a large amount of steel is recycled, but it does not appear in the municipal waste stream.</li> </ul>
<p>&lt;Minimization&gt;</p>	<ul style="list-style-type: none"> <li>• Activity of minimization has been found in the Study Area. Considering the large waste amount, minimization is an important challenge in the National District.</li> </ul>
<p>III. Institution and Organization</p>	
<p>1 Legal system</p>	<ul style="list-style-type: none"> <li>• There are sufficient legislations to order the SWM. Unfortunately those are not observed by the majority of persons/institutions concerned. Those legislations shall be acquainted to them through various manners.</li> <li>• A legal tool to regulate relationships between the municipality, the private sector and the citizens is necessary to harmonize the SWM. Establishment of a municipal ordinance on the SWM that clarifies</li> </ul>

### 3. Current Situation of the Municipal Solid Waste Management

SWM Component	Evaluation
	responsibilities and roles of those actors is recommendable.
2 Organization	<ul style="list-style-type: none"> <li>• The municipality has been making enormous efforts in SWM. However, it is a fact that further strengthening of the administration is necessary for providing better quality and stable service to the citizens.</li> <li>• It is common custom in the region of Central America and the Caribbean that most municipal personnel are replaced after elections. This situation makes municipalities in the region difficult to accumulate knowledge and experiences. ADN is not exception from the custom.</li> <li>• Consequently, it is recommendable to create a section dedicating itself to SWM, such as a municipal company, in which knowledge and experiences can be accumulated and can be away from political interference.</li> <li>• Also, involvement of the citizens in SWM is recommendable. It gives transparency and accountability to SWM.</li> </ul>
3 Public-private partnership	<ul style="list-style-type: none"> <li>• Although the contracts with the private collection companies stipulates that they are obliged to submit an operation plan (collection routes and frequencies) to the municipality, such plan has not been shown so far. It makes the municipality difficult to monitor their works and to assure a good quality of service to the citizens.</li> <li>• Payment to the private companies is based on waste amount collected. This contract condition makes the private companies towards waste-oriented attitude.</li> <li>• It is recommendable to have periodical meetings between the municipality and the private companies to monitor their service and to reconsider the contents of the contracts.</li> </ul>
4 Citizen participation	<ul style="list-style-type: none"> <li>• The citizens are not informed of collection schedule. So, they do not know what day of the week and what time they should discharge waste. It is strongly recommended to establish the collection program and to let the citizens know.</li> <li>• People are able to claim the collection service, though it is available only to those that pay for the service. To understand the actual situation of the service, it is not recommendable to accept complaints only from those who pay. Also, the claim receiving system can be utilized for implementing the collection program and delivering other information to the citizens.</li> </ul>
5 Coordination with the central government and other municipalities	<ul style="list-style-type: none"> <li>• The municipality has a good relationship with the Secretariat of State for Education in the field of environmental education. To continue and to strengthen this relationship is recommendable, especially, dissemination of waste minimization to children in school.</li> <li>• The jurisdiction area of the municipality does not have space for a landfill. Keeping good relationship with the Secretariat of State for Environment and Natural Resources and neighbor municipalities regarding use of the Duquesa landfill and a future landfill is recommendable.</li> </ul>
6 Access to international organizations and other countries	<ul style="list-style-type: none"> <li>• The municipality keeps good accesses to international organizations such as European Union and JICA. It is recommendable to maintain and strengthen this accessibility to acquire their resources, knowledge and experiences.</li> </ul>

SWM Component	Evaluation
IV. Finance	<ul style="list-style-type: none"> <li>• Commonly municipal accounting systems do not separate income and costs of SWM from other activities. The accounting system of ADN does not seem to be exceptional.</li> <li>• Dominican households save around 14% of income. However, the situation was different when households were examined by quintiles, since those in quintile 1 (the lowest 20% income population) and quintile 2 (the second lowest 20% income population) showed negative savings. This indicates a big income gap among the citizens.</li> <li>• Willingness to pay for the collection service of the citizens is low. That of 60% of population ranges between RD\$ 50 and 100.</li> <li>• Income improvements have moved in the correct direction since the signing of a contract with a private billing and collection firm. As a result of this commercial service under contract, the bill collection amount increased many times over (from 1.7 Million RD\$ in June 2004 to 11.6 Million RD\$ in June 2005), and the collection/billing ratio increased from 6.7% to 42.6% during the same period. However, the collected amount is not nearly enough to cover the costs of SWM. Thus, in order to move towards financial equilibrium first and then to financial surplus, income improvements from now on will probably have to entail prior or simultaneous improvements in other aspects, such as in the quality of service, and further expansion of the paying customers.</li> </ul>
V. Medical Waste Management	<ul style="list-style-type: none"> <li>• There is the General Law of Health and the Environmental Standard for the Integral Management of Infectious Waste. It stipulates the responsibilities of actors and manners of handling the infectious waste, etc.</li> <li>• Actual medical waste management does not comply with the law. Infectious waste is collected mixed with general waste and disposed of in the Duquesa landfill. It gives health risks to collection workers, waste pickers and persons who are exposed to the waste.</li> <li>• It is recommendable to collect, treat and dispose of the medical waste separately from general waste.</li> </ul>
VI. Disaster Waste Management	This part will appear in the Interim Report.

#### b. Problem Analysis

The investigation of the current SWM clarified problems to be solved in order to establish a sustainable SWM. Those are the following.

- Problem 1: The city is not necessarily kept clean.
- Problem 2: The current accounting system does not enable to measure 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.



#### b.1 Problem 1: The city is not necessarily kept clean.

The figure below shows the correlation of current problems that leads to the principal problem that the city is not necessarily kept clean.

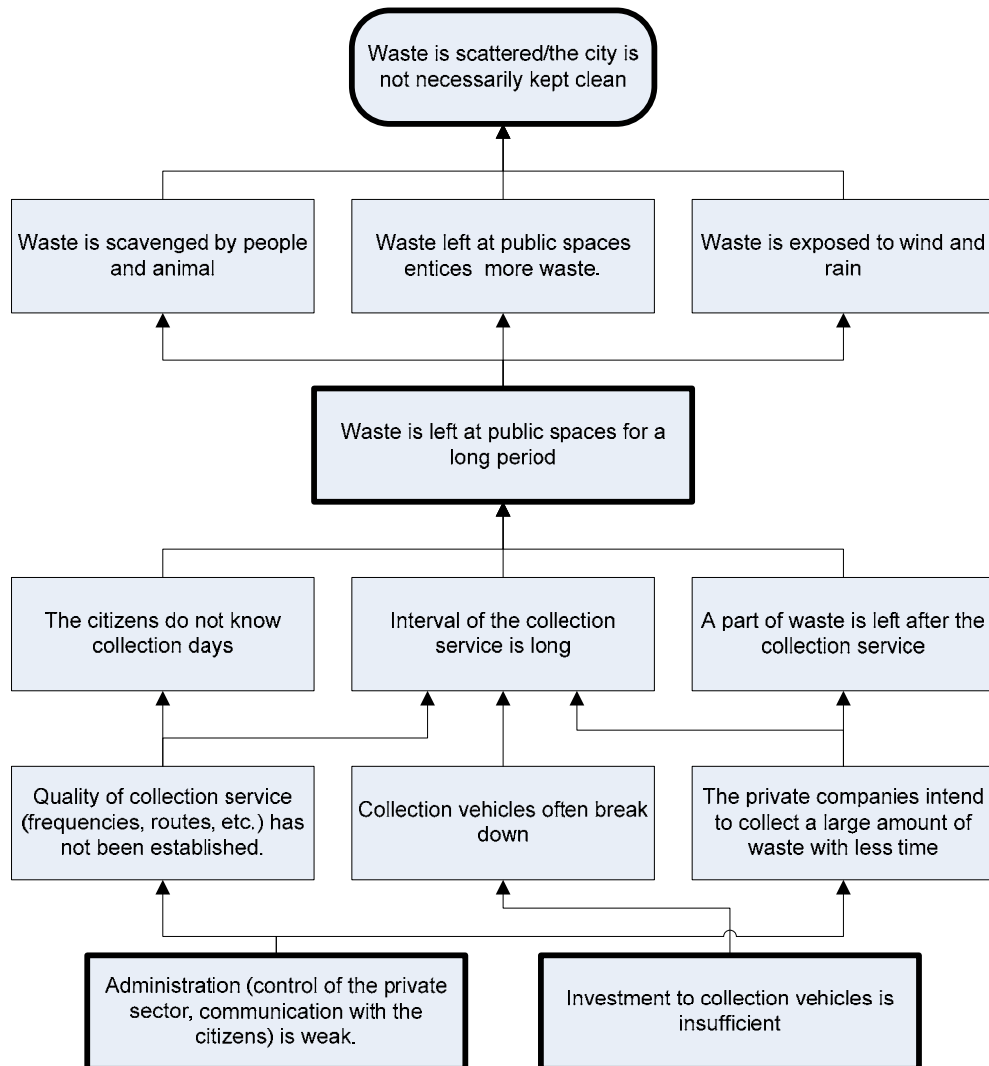


Figure 3-7: Problem Analysis

As the figure shows, the principal technical problem is that waste is left at public spaces for long periods. One of the causes of the problem originates from the weakness of the administration, i.e., control of the private sector and communication with the citizens. Another cause is lack of investment for procurement of collection and transport vehicles in the private sector.

Poor continuity of administration due to political power shifts is thought to be a principal cause of its weakness. Administrative bodies should accumulate knowledge and experiences of SWM.

Insufficient investment in the private sector needs to be further analyzed. Such analysis can be conducted together with enhancement of sound participation of the private sector, such as review of contracts, review of bidding process, participation of the citizens in the monitoring system of the private sector, etc.

The following figure shows the situation after the problems are solved.

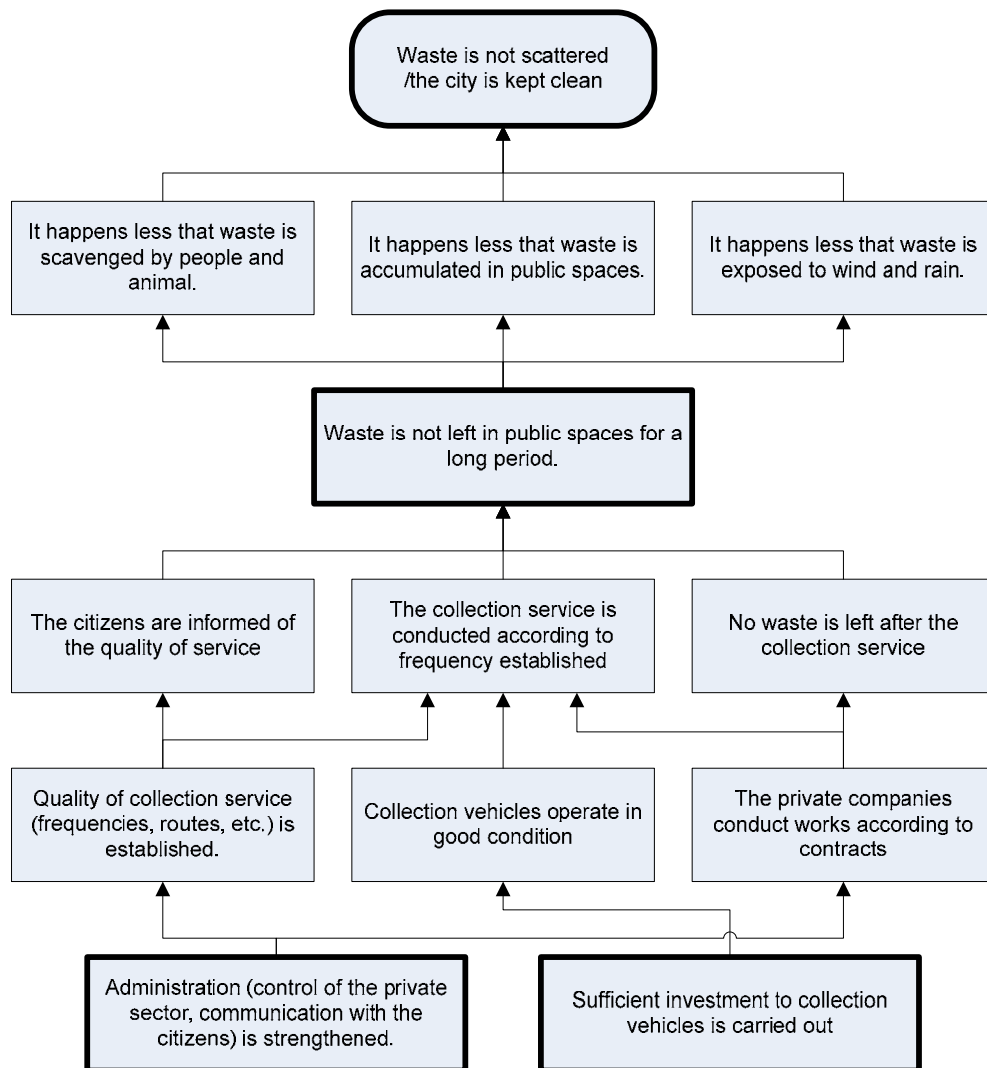


Figure 3-8: After Problem-solving

## b.2 Other Problems

The conventional accounting system of the municipality does not allow for estimating SWM costs, then, which leads to **Problem 2** (The current accounting system does not enable to measure efficiency of the SWM). Furthermore, nonexistence of data regarding efficiency makes it difficult to establish the quality of service and to estimate required investment to sustain the operation.

Although the collection/billing rate of the solid waste service fee has been considerably improved, the amount of fee collected is still low to cover the service cost (**Problem 3**). It can be thought that the next two points are principal causes: the citizens perceive that quality of the collection service is low to be paid; the citizens are not accustomed to pay for the collection service as it was paid by the central government until recently.

The new airport has been constructed close to the Duquesa landfill, within 2 km, although the law for environmental management of non hazardous waste (Norma para la Gestion Ambiental de Residuos Solidos No Peligrosos) clearly stipulates that the minimum distance from airports operating turbine motor airplanes is 3 km. Even if the airport was constructed

### 3. Current Situation of the Municipal Solid Waste Management

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after the landfill, continuity of operation of the landfill is in question due to the huge investment of the airport. Meanwhile, no action has been taken to construct another landfill. Consequently, the final disposal is in an unstable situation not only to the National District but also to other municipalities disposing of waste in the Duquesa landfill (**Problem 4**). This situation makes the contractor who operates the landfill reluctant to invest in necessities for operation in the future.

In the 1990's the city as well as the country experienced rapid economic growth, it is regarded that this boosted the amount of waste generated in the city. In addition, a large number of people visit the city and generate a considerable amount of waste, as commercial facilities, government agencies, educational institutions, etc. are concentrated in the city. A culture of waste minimization has not been educated to the citizens, the fluid population and the business entities. Consequently, the city generates a huge amount of waste (**Problem 5**).

Most hospitals in the National District do not have appropriate treatment facilities and do not conduct appropriate in-house separation of medical waste. In the event that in-house separation is conducted, no collection system for medical waste has been established. Consequently, medical waste is collected and disposed of with municipal waste (**Problem 6**).

Abundant trees planted along avenues and public spaces make the city environment favorable. However, experiences of hurricanes in the past indicate those trees are vulnerable to strong winds. Thus, the city has a high possibility of generating huge amount of waste due to hurricanes (**Problem 7**). This issue is under further investigation at this moment.

#### c. Issues to Challenge

The next five points are issues to be challenged to solve the problems.

##### 1. Strengthening of the governance of the SWM (for Problem 1, 2 and 3)

Fundamental causes of "the city is not kept clean" are judged as weak administration and insufficient investment to collection and transport equipment. These causes can be eliminated through strengthening of the governance of SWM in the National District, which shall include the following.

- Strengthening of the relation with the citizens
- Improvement of the control of the private sector
- Improvement of the cost accounting system
- Improvement of the fee payment
- Establishment of a new administrative body
- Establishment of a new legal framework

To appropriately deliver information of waste discharge manner (when, where and how to discharge waste) to the citizens it is crucial to obtain their trust in the solid waste service. Furthermore, incorporation of the citizens in monitoring and administration will make SWM efficient and transparent.

Establishment of service quality and incorporating it in the contracts with the private collection companies are important measures to strengthen the control of them. In order to assure sound participation of the private sector in the collection service, the municipality should develop their capability. To directly provide sound collection service to a part of the city will give the municipality opportunities to develop their capability as well as be a good practice to the private sector.

Accurate knowledge of the costs of SWM is indispensable for improving its efficiency and sustainability. The current accounting system of the municipality should be reformed so that

the costs of the SWM can be understood. Meanwhile, the tariff for the solid waste service shall be reviewed considering waste amount by generation source. Furthermore, the service fee payment shall be improved together with improvement of quality of the service.

Knowledge and experiences of the SWM shall be accumulated in an administrative body. The current municipal administration structure does not allow such knowledge management due to periodical political power shifts. Creation of an individual administrative body of the SWM, like municipal company, will realize the accumulation of knowledge and experiences and will enhance sustainability of the SWM.

To guarantee realization of the issues above, establishment of a new legal framework will be effective, which clarify quality of service, roles and responsibilities of persons/institutions concerned, and support creation and operation of the new administrative body.

## **2. Consensus building about the final disposal (for Problem 4)**

Continuity of the operation of the Duquesa landfill is uncertain due to the proximity of the new airport. The private company that operates the landfill is reluctant to invest in necessities for future operation and environmental mitigation measures due to such an indecisive situation. Consensus building among institutions concerned is crucial to assure sound SWM of the municipalities that dispose of their waste in the Duquesa landfill.

The Secretariat of State for Environment and Natural Resources will be the authority to take initiative of this issue. ADN, as the most important user of the landfill, is expected to contribute to the consensus building.

## **3. Enhancement of waste minimization (for Problem 5)**

The waste amount generated in the city is huge as well as the waste amount per capita. Environmental education regarding waste minimization will give the citizens benefits such as decreased SWM costs, reduction of environmental adverse impacts and conservation of natural materials. In addition to such environmental education, encouragement of recycling is recommendable. However, such recycling should be planned taking into account financial feasibility. Participation of the private sector will make the recycling financially sustainable. Glass bottles, papers, plastics and PET are principal recyclable materials in the National District at this moment.

## **4. Establishment of a system of medical waste management (for Problem 6)**

Mixing of medical waste and municipal waste shall be avoided in order to protect the health of hospital employees, collection workers, workers at landfill, waste-pickers and the citizens. Separation of medical (hazardous) waste in hospitals is indispensable for sound medical waste management. Only the Secretariat of State for Public Health and Social Assistance is the authority that has a power to solve this problem. ADN may be able to contribute to solve this problem by establishing a special collection system of medical waste. Also, a manner of final disposal shall be established that secure separate disposal from non hazardous waste.

## **5. Disaster waste (for Problem 7)**

The city has a high possibility of being hit by a strong hurricane, which can cause tons of waste. The principal waste will be trees and branches that are planted along avenues and public spaces. Routine maintenance of trees and/or planting native species instead of planting imported plants will be an effective preventive measure to such hurricanes.