社会開発調査部報告書

THE STUDY
ON
SOLID WASTE MANAGEMENT
OF
THE URBAN AREA
OF
TEGUCIGALPA'S CENTRAL DISTRICT

FINAL REPORT
VOLUME II

MAIN REPORT

MARCH 1999

KOKUSAI KOGYO CO., LTD.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE MUNICIPALITY OF THE CENTRAL DISTRICT
THE REPUBLIC OF HONDURAS

THE STUDY
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PREFACE

In response to a request from the Government of the Republic of Honduras, the Government of Japan decided to conduct The Study on Solid Waste Management of the Urban Area of Tegucigalpa's Central District in the Republic of Honduras and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Honduras a study team headed by Mr. Takeshi Tomiyasu, KOKUSAI KOGYO CO. LTD., four times between December 1997 to March 1999. In addition, JICA set up an advisory committee headed by Dr. Hidetoshi Kitawaki, a professor of Toyo University, which examined the study from specialist and technical points of view.

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

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

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

March, 1999

Kimio Fujita
President
Japan Internatinal Cooperation Agency

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Letter of Transmittal

Dear Mr. Fujita,

We are pleased to submit to you the report on The Study on Solid Waste Management of the Urban Area of Tegucigalpa's Central District in the Republic of Honduras.

This report consists of three main components, a study on the present waste management situation, a solid waste management master plan until the year 2010, and a feasibility study on the priority projects for the urban area of Tegucigalpa's Central District.

Just before the termination of this Study, Honduras was hit by Hurricane Mitch, which caused severe damage to the country. Due to this damage, an additional study was carried out and revisions were made to the original premises on which the master plan was based, and subsequently the original master plan for solid waste management, and the original feasibility study on the priority projects.

The study on the present waste management situation assesses the present waste management situation of the urban area of Tegucigalpa's Central District after carrying out eleven basic surveys.

The master plan comprises a forecast of waste generation amounts; a planning framework with phased goals, targets, and strategies; the best technical system; the financial system; and the organizational and institutional system. Since improvement of the organizational and institutional system is necessary to materialize the master plan and to establish a sustainable solid waste management system, it was given the highest priority. To this end, several recommendations were made, they being, the establishment of an independent solid waste management authority and the introduction of the new waste fee collection system.

The feasibility study was conducted on the priority projects proposed to be undertaken between the years 1999 and 2002. These consist of improvements of the organizational and institutional system, the waste collection and haulage system, and the construction of new final disposal site. These projects were evaluated from financial, economic, technical, social and environmental aspects and were found to be feasible in all aspects.

During the study, four pilot projects were carried out. Two of these, the "Campaign for Raising Awareness on Solid Waste Issues" and the "Experiment on the Implementation of the Best Collection System for Marginal Areas", promoted the active participation of the counterparts and residents, provoking a strong positive response.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs and the Ministry of Health and Welfare. We also wish to extend our sincere gratitude to the Government of the Republic of Honduras, the Municipality of the Central District, the Embassy of Japan and the JICA office in the Republic of Honduras.

Finally, we hope that this report will help improve and enhance solid waste management and urban environment sanitation in Tegucigalpa's Central District in Honduras.

Respectfully,

Takeshi Tomiyasu
Team Leader
The Study on Solid Waste Management of the
Urban Area of Tegucigalpa's Central District in
the Republic of Honduras

The Study on the Solid Waste Management of the Urban Area
of Tegucigalpa's Central District in the Republic of Honduras

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List of Volumes

Volume I	Summary
Volume I(S)	Summary (Spanish Version)
Volume II	Main Report
Volume II(S)	Main Report (Spanish Version)
Volume III	Revised Main Report
Volume III(S)	Revised Main Report (Spanish Version)
Volume IV	Annex
Volume V	Data Book

Note:

The revised main reports (English and Spanish) are being made taking into account the effect of Hurricane Mitch on solid waste management works.

Since the other reports were made before Hurricane Mitch hit Honduras, its effect on solid waste management works was not taken into account.

Although the revised main reports (English and Spanish) best illustrate the current conditions, the other reports should also be referred to for detail.

This is the Main Report.

In this report, the project cost is estimated using the July 1998 prices and at an exchange rate of 1US$ = 143.85 Japanese Yen = 13.4892 Lempiras.
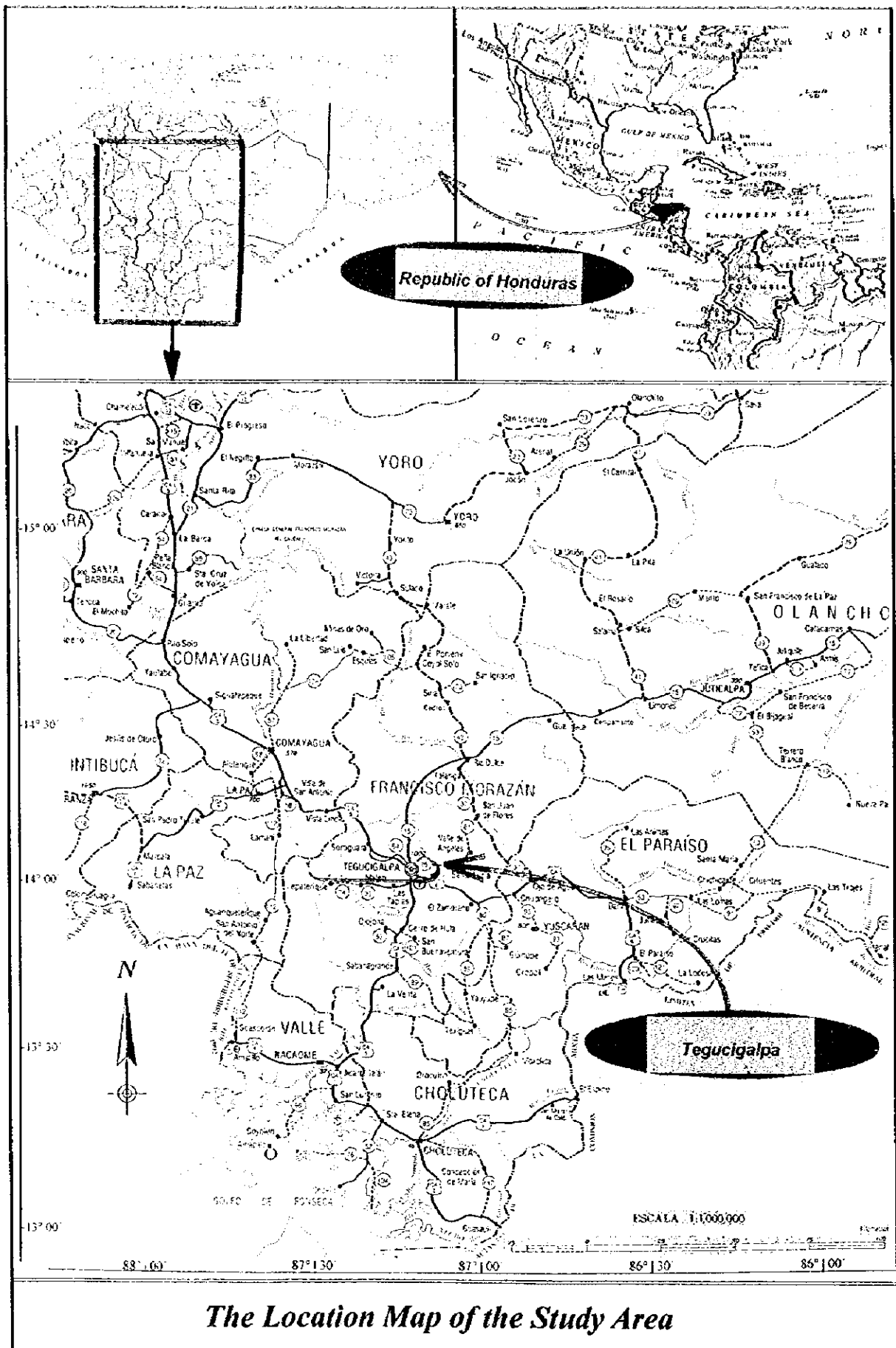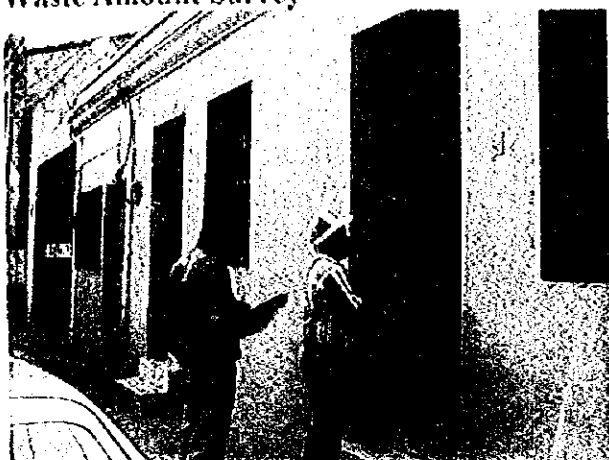
Republic of Honduras

Tegucigalpa

ESCALA 1:1000,000

The Location Map of the Study Area

Waste Amount Survey

Collection of household waste samples

Weighing of waste samples

Waste Composition Survey

Waste samples were brought into the survey site

Thorough mixing of collected waste samples

After proper mixing, the waste was divided into four segments of approximately the same size

Two segments of diagonally opposite waste were removed and the remaining waste was mixed again until the volume was reduced to the desired volume.

Waste samples were put into a calibrated plastic bucket to record volume and weight

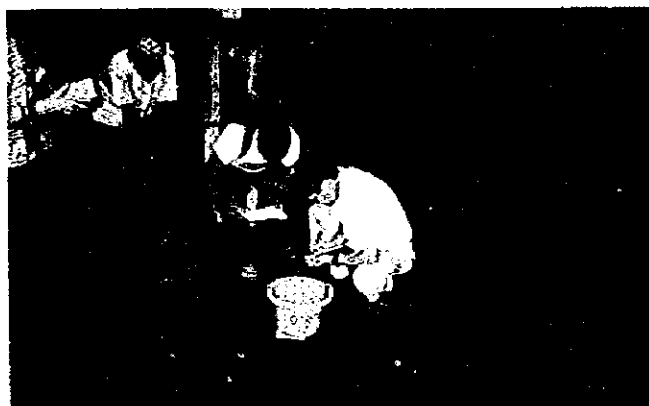Analysis of physical composition of waste samples

Samples were divided into 10 components

Waste samples were categorized into paper, fiber, grass & wood, plastics, rubber, leather & metal, bottles & glass, stones, food wastes, and others.

Analysis of the three components of mixed samples

The samples divided into 10 components were measured individually.

The samples were dried, incinerated and subjected to the three components analysis.
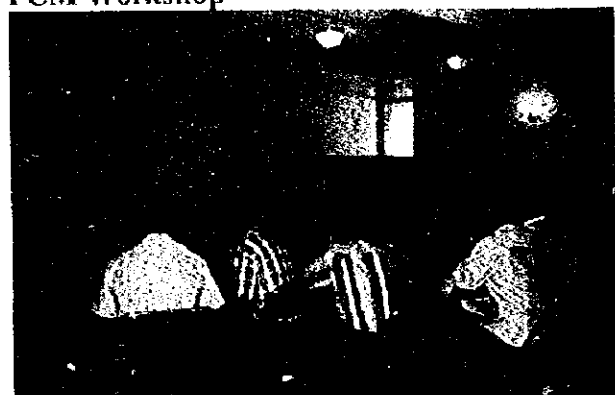
Disposal Amount Survey

Determining the waste load and loading capacity of municipal and private collection vehicles

Public Opinion Survey

Interview of 300 households from the high, middle, and low-income areas on waste discharge and collection services
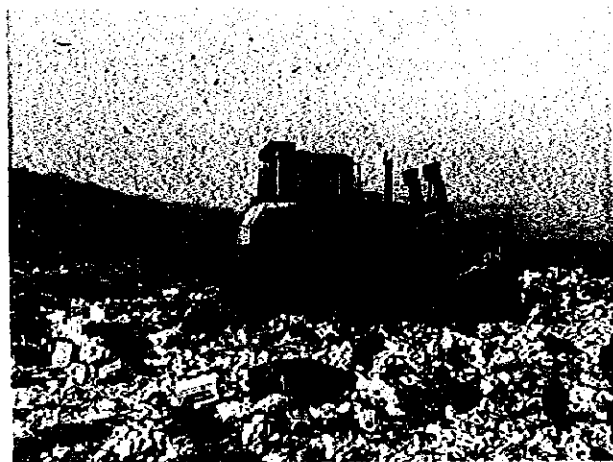
PCM Workshop

A workshop was held to discuss the different ways the final disposal site could be improved, inviting a total of 15 people representing the residents, the AMDC, scavengers and the JICA study team.

Present Final Disposal Site Conditions

Scavengers' burning of copper wire in their aim to recover copper occasionally sets fire to the wastes.

The final disposal site is equipped with 3 bulldozers.

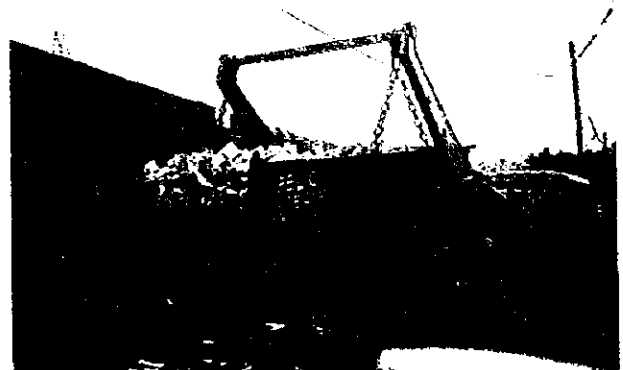About 100 scavengers are always on the lookout for recoverable materials.

Waste collection vehicle: 15m³ compactor truck

Waste collection vehicle: 15m³ compactor truck

Waste collection vehicle: 12m³ dump truck

Waste collection vehicle: hoist truck

A 15m³ roll-on roll-off truck
(private company vehicle)

A 15m³ compactor truck loading waste from a 4.6m³
container (private company vehicle)

Plate 5: Pilot Project (1) Campaign for Raising Awareness on Solid Waste Issues
Pilot Project (2) Experimental Implementation of the Best Collection system for
Marginal Areas

(1) Campaign for Raising Awareness on Solid Waste Issues

Logotype contest :
The 1st, 2nd, 3rd prize winners of the logotype contest, held by a local newspaper, and the campaign mascot

Campaign goods :
Banners (30), posters (3,000), stickers (large: 5,000, small: 10,000) were made for the campaign.

(2)Experimental Implementation of the Best Collection System for Marginal Areas

Educational programs on solid waste issues:
The educational texts and panels produced by the counterpart and the study team were used to conduct an educational program.

Illegal dumpsite in San Martin/Ayestas
(Before the clean-up operation)

The illegal dumpsite at San Martin/Ayestas (After the clean-up operation). The breeding of flies and generation of foul smell were controlled.

The suitability of the container collection system in marginal areas where collection is unsatisfactory was studied. The clean-up operation of the illegal dumpsite was carried out to encourage the residents to dump waste into the containers and to be proud of their area.

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(3) Experimental Improvement of the Final Disposal Site

1) Facility Improvement

a)Improvement of security facilities (gates, fences)

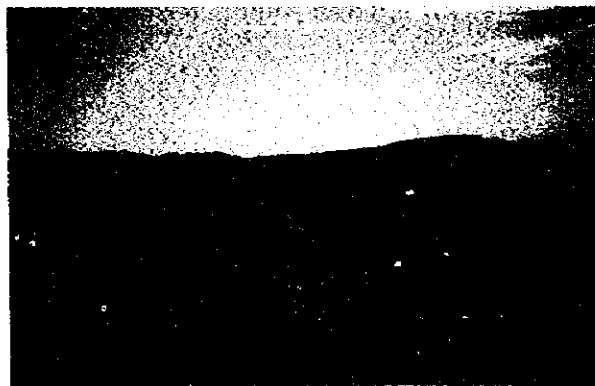Entrance to the final disposal site (Before)

The gate constructed at the entrance to the final disposal site (After)
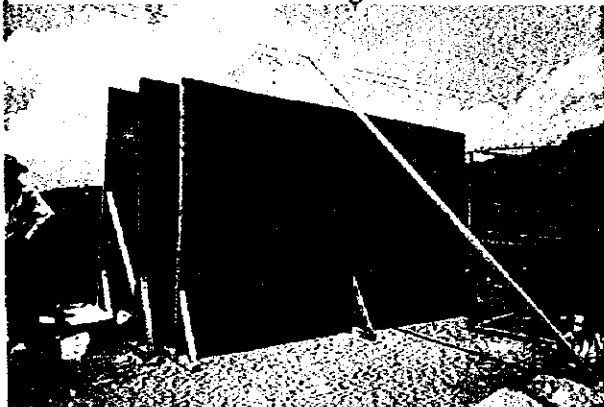
b) Installation of the stationary net fence

Shoulder of the final disposal site slope (Before)

Shoulder of the final disposal site slope (After)

c) Manufacture and use of a movable net fence to prevent waste from scattering

To minimize waste scattering at the landfill section, net fences that can be moved from one landfill section to another, depending on which section is being used, were made and installed.

d) Installation of gas removal facilities

To speedily remove, dissolve, and stabilize gases generated by the covered wastes, and to prevent explosions at the site, gas removal facilities were installed.

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2) Demonstration of landfill techniques & hands-on-training on sanitary landfill techniques

Guidance on sanitary landfill techniques was extended using municipal owned machinery.

54 trucks of waste were hauled to the sanitary landfill experiment yard.

Waste was leveled and immediately covered.

3) Sanitary Improvement through Scavenger Participation

Completed first sanitary landfill layer

Formulation of final disposal site operation regulations with scavenger participation

(4) Improvement of the Managerial Capability of the Cleansing Department

Methods to effectively use various data were introduced and the staff were made to recognize the importance of proper management methods, to upgrade their managerial capabilities.

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Plate 3:	Field Investigations (3) Disposal Amount Survey, Public Opinion Survey, Workshop (PCM), Present Final Disposal Conditions
Plate 4:	Current Condition of Waste Collection Services
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Glossary

AMDC's Solid Waste   A provisional waste management authority under the current
Executing Unit (SWEU)   AMDC administrative structure.

Municipal Cleansing   An autonomous waste management agency that will be
Corporation   established by 2001.

Municipal Corporation   The legislative council of the AMDC.

Non-Residential Waste   Municipal solid wastes that are generated from sources other
                          than residences. For the purpose of this study, non-
                          residential waste is divided into business waste, waste from
                          large dischargers, and waste hauled directly (direct haulage)
                          to the final disposal site.

Residential Waste   Municipal solid wastes that are generated from only
                          residential sources. For the purpose of this study, residential
                          waste is divided into wastes from high income residences,
                          middle income residences, and low income residences.

List of Abbreviations

Abbreviation	English	Español	Abbreviation
AMDC	Municipality of the Central District	Alcaldía Municipal del Distrito Central	AMDC
BCH	Central Bank of Honduras	Banco Central de Honduras	BCH
BSC	Billing Service Company	Compañía Facturadora	CF
CBO	Community Based Organization	Comunidades de Base	CB
CESCCO	Center of Studies on Control of Polluting Agents	Centro de Estudios sobre Control de Contaminantes	CESCCO
CPI	Consumer Price Index	Indice de Precios al Consumidor	IPC
DAS	Disposal Amount Survey	Estudio de Cantidad de Disposición	ECD
DC	Central District	Distrito Central	DC
DEI	Executive Bureau of Revenue	Dirección Ejecutiva de Ingresos	DEI
DF/R	Draft Final Report	Borrador de Informe Final	BI/F
EIA	Environmental Impact Assessment	Evaluación de Impacto Ambiental	EIA
EIRR	Economic Internal Rate of Return	Tasa Interna de Retorno Económica	TIRE
ENEE	National Company of Electricity	Empresa Nacional de Energía Eléctrica	ENEE
FENAFUTH	Honduras National Soccer Federation	Federación Nacional Autonoma de Futbol de Honduras	FENAFUTH
FIRR	Financial Internal Rate of Return	Tasa Interna de Retorno Financiera	TIRF
GDP	Gross Domestic Product	Producto Interno Bruto	PIB
GRDP	Gross Regional Domestic Product	Producto Regional Interno Bruto	PRIB
IC/R	Inception Report	Informe Inicial	I/IN
IDB	Inter-American Development Bank	Banco Interamericano de Desarrollo	BID
ISW	Industrial Solid Waste	Residuo Sólido Industrial	RSI
IT/R	Interim Report	Informe Intermedio	I/IT
JICA	Japan International Cooperation Agency	Agencia de Cooperación Internacional del Japón	JICA
MCC	Municipal Cleansing Corporation	Empresa Municipal de Limpieza	EML
METROPLAN	Urban Planning Office of AMDC	Oficina de Planificación Urbana de la AMDC	METRO-PLAN
M/M	Minutes of Meeting	Minuta de Reunión	M/R
M/P	Master Plan	Plan Maestro	P/M
MSW	Municipal Solid Waste	Residuo Sólido Municipal	RSM
OCS	Optimal Collection System	Sistema Optimo de Recolección	SOR
O & M	Operation and Maintenance	Operación y Mantenimiento	O y M
PAHO	Pan American Health Organization	Organización Panamericana de la Salud	OPS
PCM	Project Cycle Management	Manejo de Ciclo de Proyecto	MCP
POS	Public Opinion Survey	Encuesta de Opinión Pública	EOP
P/R	Progress Report	Informe de Avance	I/A
PS	Public Sector	Sector Público No Financiero	SPNF
RAC	Residual Ash Content	Residuo de Ceniza	RC
SANAA	National Autonomous Service of Water and Sewerage	Servicio Nacional Autónomo de Acueductos y Alcantarillados	SANAA
SAS	Scavenger Attendance Survey	Muestreo sobre la Asistencia de los Recuperadores	MAR
SECPLAN	Secretariat of Planning, Coordination and Budget	Secretaría de Planificación, Coordinación y Presupuesto	SECPLAN (antes)

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Abbreviation	English	Español	Abbreviation
SEDA	Secretariat of Environment	Secretaría del Ambiente	SEDA (antes)
SEP	Secretariat of Public Education	Secretaría de Educación Pública	SEP
SERNA	Secretariat of Natural Resources and Environment	Secretaría de Recursos Natural y del Ambiente	SERNA
SETCO	Technical Secretariat of International Cooperation	Secretaría Técnica de Cooperación Internacional	SETCO
SHCP	Secretariat of Finance and Public Credit	Secretaria de Hacienda y Crédito Público	SHCP
SIS	Scavenger Interview Survey	Encuesta a Recuperadores	ER
SOPTRAVI	Secretariat of Public Works, Transport and Housing	Secretaría de Obras Públicas, Transporte y Vivienda	SOPTRAVI (antes SECOPT)
SW	Solid Waste	Residuos Sólidos	RS
S/W	Scope of Work	Alcance de Trabajo	A/T
SWAS	Scavenger Waste Amount Survey	Muestro Sobre la Cantidad de Residuo Recuperado	MSCRR
SWEU	Solid Waste Management Executing Unit	Unidad Ejecutora de los Residuos Sólidos	UERS
SWM	Solid Waste Management	Manejo de Residuos Sólidos	MRS
UDAPE	Unit of Economic Policies' Analysis	Unidad de Análisis de Políticas Económicas	UDAPE
UNAH	National Autonomous University of Honduras	Universidad Nacional Autónoma de Honduras	UNAH
UNPF	United Nations Population Fund	Fondo de Población de las Naciones Unidas	FNUAP
USCS	Unified Soil Classification System	Sistema de Clasificación de Unificada de Suelos	USCS
USD	US Dollars	Dólares Americanos	USD
USW	Uncompacted Specific Weight	Peso Específico No Compactado	PENC
WACS	Waste Amount & Composition Survey	Estudio de Cantidad y Composición de Residuos	ECCR
WAGR	Waste Amount Generation Rate	Encuesta de Cantidad y Generación de Residuos	ECGR
WCF	Waste Collection Fee	Tarifa por Recolección de la Basura	TRB
WHO	World Health Organization	Organización Mundial de la Salud	OMS
WTP	Willingness to Pay	Voluntad de Pago	VP

Part 1

Current Situation of the Municipal Solid Waste Management

Chapter 1

Introduction

The Study on the Solid Waste Management of the Urban Area
of Tegucigalpa's Central District in the Republic of Honduras

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1 Introduction

1.1 Background

As of 1998, the population in the urban area of the Central District in the Republic of Honduras is approximately 850 thousand. However, with the remarkable population increase, coupled with urban migration, the population is estimated to reach 1.35 million in 2010.

At present, approximately 64% of the urban population is provided with regular waste collection services. However, the services offered by the municipality of the Central District (AMDC) could not cope with the rapid increase in illegal settlements, consequently resulting in illegal waste dumping or burning in the open by residents of these areas. It is also difficult to collect the waste from these districts as most are located on steep terrain.

No environmental protection measures except waste covering is being carried out in the present final disposal site. Although there are soil and heavy equipment for coverage, it is not being carried out on time, due to the shortage in supply of diesel fuel for heavy equipment. Therefore, problems such as offensive odors, waste scattering, unsightly view and the increase in scavengers are intensifying and, furthermore, the number of critics to the disposal site is on the rise.

These problems can be attributed to the following: 1) an insufficient waste fee collection system and financial system for solid waste management (SWM), 2) the administrative agency's defective organizational structure and implementation system, and 3) lack of administrators and engineers for the formulation and implementation of an appropriate SWM plan.

Currently, the Central District's critical solid waste management system is providing its services mostly with the collection vehicles, equipment for final disposal sites, and spare parts that were provided under the Japanese Grant Aid Program in 1993. Although four years has passed since then and these equipment will soon need to be renewed, there is no replacement plan because the financial situation of the AMDC is extremely critical. It can be expected that the solid waste management works will collapse with the expiration of the equipment's lifespan.

Under these circumstances, the Government of Honduras officially requested the Government of Japan, to carry out a study on the solid waste management (SWM) of the urban area of Tegucigalpa's Central District in order to improve environmental and sanitary conditions. In response to the request, the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, employed Kokusai Kogyo Co. Ltd., as a consulting company for this study.

The Study on the Solid Waste Management of the Urban Area
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1.2 Scope of the Study

1.2.1 Objectives of the Study

The Study aims to:

- Formulate a Master Plan on SWM by focusing on the main issues identified in the Preparatory Study.

- Carry out the Feasibility Study of the priority projects.

- Technology transfer to counterpart personnel regarding SWM study and planning methods.

1.2.2 Study Area

This Study covered the urban area of the Central District as of 1998 and the forecast urban areas as of 2010 as shown in Figure 1-1.

1.2.3 Wastes Targeted

This Study targets residential waste, market waste, commercial waste, street waste, and institutional waste. As for medical and industrial waste, the study proposes general recommendations on how to properly handle such waste types based on existing information.

1.2.4 Target Year

The Master Plan covers the period between 1999 and 2010.

Legend
········· Study Area

Figure 1-1: Study Area
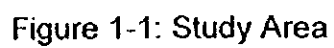
1.2.5   Main Contents included in the Final Report

The Final Report includes the following contents.

SWM Master Plan

- Evaluation of the Present Situation of Solid Waste Management
- Planning Framework until the year 2010 for the Master Plan
- Collection and Haulage Plan
- Process, Treatment, and Recycling Plan
- Final Disposal Plan
- Organizational and Institutional Plan
- Sanitary Education Plan
- Financial Plan
- Phased Implementation Plan
- Project Evaluation of the Master Plan

Feasibility Study of the Priority Projects

- Evaluation of the Pilot Projects
- Project Plan for the Priority Projects
- Financial Planning
- Project Implementation Plan
- Project Evaluation of the Priority Projects
- Recommendations

1.3   Policies of the Study

1.3.1   Characteristics of an SWM Study

The prominent characteristics of an SWM Study were as follows:

- Because a treatment system was already established in the Study Area, the study focused on the improvement of this existing system.

- SWM has a direct impact on the daily lives of the residents. Therefore, if only the intentions of administrators, local authorities, or the Cleansing Department are considered, an effective SWM system cannot be established.

- An SWM Plan cannot be realized without taking into consideration the natural, social (e.g., historic and cultural background, traditions and current lifestyle), and economic conditions of the Study Area.

- It is difficult to use a standard method for SWM planning, as intrinsic factors, i.e. natural, social and economic conditions, that significantly affect current conditions vary by Study Area. Hence the role of pilot projects such as collection and sanitary landfill experiments are extremely important and vital in this regard.

- Designing the SWM technical system, which is generally required for solid waste projects in Japan, for developing countries is not as significant compared with the SWM implementation itself.

The Study on the Solid Waste Management of the Urban Area
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1.3.2 Policies of the Study

Based on the understanding of the present situation and SWM issues in the urban area of the Central District, the following were established as basic policies of this Study.

a. Formulation of a Practical Plan

The improvement of technical standards, administrative and operational capabilities of the AMDC and the Cleansing Department were prerequisites to ensure an effective conduct of the SWM plan. These improvements were examined over the course of the Study. However, if it is applied for project implementation as an important assumption, it will reduce the materialization of the project.

However, with the rapid expansion of the Central District, drastic administrative and operational improvement is considered vital to solve the increasing problems on solid waste. Prior to this, organizational reform is needed.

To cope with these conflicting problems, a two phase plan (an immediate plan and a full-scale plan) was established. The basic policy for the short term plan was to enhance the plan's workability with the premise of obtaining the municipality and the Cleansing Department's cooperation. The long term plan proposed thorough solutions including organizational and institutional reconstruction, establishing a sufficient preparation period in order to solve further problems in the future.

b. Formulation of a Sustainable Plan

The factor that significantly set solid waste projects apart from other infrastructure projects such as construction of roads and dams is the small capital but high operation and maintenance costs it requires. In terms of investment, the operation and maintenance plan is far more important than the facility and equipment plan. Therefore, the formulation of a sustainable operation and maintenance plan was given priority.

c. Appropriate Technology

The operation and maintenance plan is an integral part of the SWM plan. Since it is necessary that the either AMDC or the Cleansing Department independently carries out O&M using whatever resources they possess (technology, finance, and human resources), the basic policy for the technical plan would be the use of technology currently available in Honduras and the introduction of new technology suited to local conditions.

d. Participation

Changes in the SWM system directly affect the residents as waste is the result of their daily activities. Separate collection, recycling, self disposal, as well as the construction and operation of a final disposal site cannot be carried out without the consent and cooperation of the residents. Accordingly, resident participation was encouraged during the planning phase and the opinions of the residents are fully reflected in the plan.

1.4   Study Organization, Persons Involved and Study Schedule

1.4.1   Study Organization

The Municipality of the Central District was the counterpart agency and the coordinating body for negotiations with other governmental and non-governmental organizations concerned. It organized a counterpart team consisting of personnel in charge of various aspects of SWM.

The Steering Committee organized by the Honduran side convened to make strategic decisions related to the Study.

The Advisory Committee, which was organized by JICA, gave necessary advice to JICA.

Figure 1-2 shows the study organizational structure.
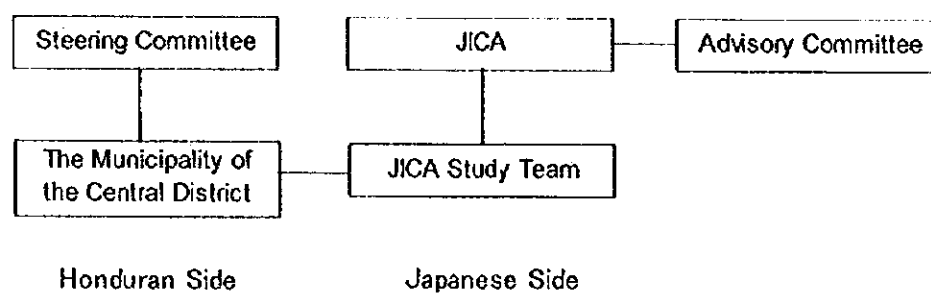
Figure 1-2: Study Organizational Structure

1.4.2   Persons Involved

a.   Members of the Study Team

Assignment	Name of Expert	Nationality
Team Leader & Solid Waste Management Planning	Takeshi TOMIYASU	Japanese
Collection and Transport Planning & Waste Amount and Waste Composition Surveys	Akira DOI	Japanese
Management and Financial Planning	Kozo BABA	Japanese
Final Disposal Site Planning	Jose ARELLANO V.	Chilean
Environmental Consideration	Masaharu KINA	Japanese
Social Consideration & Public Education Programs	Jorge Alberto RODRIGUEZ M.	Honduran
Facility Design & Cost Estimation	Andrew DORMAN	Australian
Institution and Organization Planning	Victor Ojeda R.	Costa Rican
Translator	Valerio GUTIERREZ	Honduran
Administrative Coordinator	Ayako IDO	Japanese

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b.   Members of the Honduran Counterpart

The following staff were appointed as counterpart members in response to the request made by the Study Team.

Name	Assignment
Pastor Mendez:	Chief coordinator
José Adolfo Aguilar:	Administration staff of solid waste with basic computer knowledge
Marcos Matamoros:	Institutional and organizational system
Angela Victoria Sánchez:	Financial accounting
Marlon Aguilera:	Final disposal
Pastor Mendez and Humberto Medina:	Collection and haulage
Graciela Castellanos and Karla Lezama:	Environmental education and social promotion
Jenny Sager	Administrative Coordinator
Myrna B. Oyuela:	Secretary

c.   Members of the Steering Committee

The AMDC organized a Steering Committee upon the commencement of the Study, which was authorized to conduct activities to promote the Study.   The Steering Committee consisted of representatives of the following entities and experts.

a)   Director of Public Service Division of the AMDC
b)   Urban Development Manager of the AMDC
c)   Planning and Project Office of the AMDC
d)   Social Development Manager of the AMDC
e)   Head of Environmental Department of AMDC
f)   Ministry of Natural Resources and Environment
g)   Ministry of Health
h)   Ministry of International Technical Cooperation
i)   Experts with environmental management backgrounds

d.   Members of the JICA Advisory Committee

Assignment	Name	Position
Chairman & Solid Waste Management Planning	Hidetoshi KITAWAKI	Professor, Faculty of Regional Development Studies, Toyo University
Solid Waste Administration	Michinobu SEGAWA	Chief of Research & Development Section, OSAKA Research Center, Japan Waste Research Foundation

1.4.3   Study Schedule

The study schedule is shown in Figure 1-3.

Figure 1-3: Study Schedule

Phase	Formulation of Master Plan (M/P)					Feasibility Study for the Priority Project(s)						
Year	1997	1998										
Month	12	1	2	3	4	5	6	7	8	9	10	11	12

Work Item

[A] Preparation Work in Japan
- A1 Collection and review of data
- A2 Establishment of study policy and method
- A3 Preparation of IC/R

[B] 1st Study Work in Honduras
- B1 Submission and discussion on IC/R
- B2 Data collection and analysis
- B3 Field survey to determine present SWM condition
- B4 Survey of waste amount and composition
- B5 Waste amount survey at the existing final disposal site
- B6 Time & motion survey
- B7 Public opinion survey
- B8 Survey on the existing disposal site
- B9 Assessment of the present condition and confirmation of the main issues
- B10 Setting up planning framework of M/P
- B11 Discussion on basic policy of M/P
- B12 Discussion on pilot project(s)
- B13 Preparation, submission and discussion of P/R

[C] 1st Study Work in Japan
- C1 Collection and haulage plan
- C2 Processing, treatment, and recycling plan
- C3 Final disposal site plan
- C4 Fee collection/ financial system plan
- C5 Organization and institutional system plan
- C6 Operation and management plan
- C7 Sanitary education plan
- C8 Preliminary project cost estimation
- C9 Phased implementation plan
- C10 Project evaluation
- C11 Selection of priority project(s)
- C12 Planning of pilot project(s)
- C13 Preparation of IT/R

[D] 2nd Study Work in Honduras
- D1 Discussion on IT/R
- D2 Seminar on SWM technology (1)
- D3a Collection and analysis of supplementary data for priority project(s)
- D3b Supplementary survey for priority project(s)
- D3c Surveying and Geological survey
- D4 Implementation of pilot project(s)
- D5 Assessment and problem finding of pilot project(s)
- D6 Formulation of the plan for the priority project(s)

[E] 2nd Study Work in Japan
- E1 Preparation of DF/R

[F] 3rd Study Work in Honduras
- F1 Discussion on DF/R
- F2 Seminar on SWM technology (2)

[G] 3rd Study Work in Japan
- G1 Preparation of F/R

Reports	IC/R▲		P/R▲			IT/R▲					DF/R▲	F/R▲	
Total Month	1	2	3	4	5	6	7	8	9	10	11	12	13
Month	12	1	2	3	4	5	6	7	8	9	10	11	12
Team Leader & Solid Waste Management Plan													
Collection and Haulage Plan													
Management and Financial Plan													
Final Disposal Site Plan													
Environmental Consideration													
Social Consideration & Public Education													
Facility Design & Cost Estimation													
Organizational and Institutional System													
Interpreter													
Administrative Coordinator													

1-8

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1.5 Reports

The JICA Study Team prepared and submitted the following reports in English and Spanish to the Government of Honduras.

	Report	Period of Submission	Number of Copies to be submitted		
1	Inception Report	Beginning of January 1998	15 copies (English)		
			15 copies (Spanish)		
2	Progress Report	End of March 1998	15 copies (English)		
			15 copies (Spanish)		
3	Interim Report	Beginning of June 1998	15 copies (English)		
			15 copies (Spanish)		
4	Draft Final Report	Middle of October 1998	Main	15 copies	(English)
			Main	15 copies	(Spanish)
			Supporting	15 copies	(English)
			Data Book	15 copies	(English)
			Summary	15 copies	(English)
			Summary	15 copies	(Spanish)
5	Final Report	Middle of December 1998	Main	10 copies	(English)
			Main	40 copies	(Spanish)
			Supporting	25 copies	(English)
			Data Book	25 copies	(English)
			Summary	10 copies	(English)
			Summary	40 copies	(Spanish)

1.6 Technology Transfer

During the Study, the Study Team pursued technology transfer for the Honduran counterparts by conducting the following:

a) On the job training

b) Counterpart training in Japan
   Mr. Orlando Paniagua Lozano, in the Public Works Division of the AMDC, took a counterpart training course in Japan from September 6th, 1998 to September 26th, 1998.

c) Explanation of reports

d) Seminars on SWM technology
   • The 1st seminar took place on June 17th, 1998
   • The 2nd seminar took place on October 15th, 1998

Chapter 2

Profile of the Study Area

The Study on the Solid Waste Management of the Urban Area
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2   Profile of the Study Area

2.1   Natural Conditions

2.1.1   Location

Honduras is located in Central America stretching from longitude: $83°10'$ to $89°22'$ west and latitude: $12°58'$ to $16°02'$ north.

The Study Area is located in the south-central region of Honduras, comprising the cities of Tegucigalpa and Comayaguela, which until 1938 were administratively independent as "Municipalities" under the Department of Tegucigalpa. In that year, the two cities merged to form what is now the "Central District". It is the capital of Honduras and commonly referred to as only "Tegucigalpa City" meaning the whole of the Central District, belonging to the Department of Francisco Morazan. The coordinates of the Study Area are from longitude $87°12'$ to $87°22'$ west and latitude $13°99'$ to $14°13'$ north.

2.1.2   Climate

The Study Area basically has two seasons that are six months each: rainy and dry. In general, the rainy season is from May to October and the dry season from November to April.

Table 2-1 shows the mean monthly rainfall, the mean temperature, mean wind velocity and mean relative humidity recorded over the past 54 years (1944-1997, excluding the period between 1947-50 that has no rainfall data) in the Central District, as registered by the meteorological station at Toncontin Airport.

Table 2-1: Climatic Statistics Registered at Toncontin Airport Meteorological Station (1944-1997)

Category/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (Mean)
Mean Monthly Rainfall (mm)	6.5	3.7	9.7	38.0	146.8	160.9	81.9	96.5	178.7	112.9	33.3	9.7	875.3
Mean Monthly Temperature (°C)	19.5	20.4	22.1	23.4	23.5	22.7	22.1	22.3	22.2	21.5	20.4	19.5	21.6
Mean Monthly Wind Velocity (Knots)	8.1	8.0	7.6	7.2	6.0	5.4	6.3	6.1	5.2	6.0	7.4	8.0	6.8
Mean Monthly Relative Humidity (%)	72	67	62	61	68	76	74	74	78	79	78	76	72

Source: Records from the Meteorological Station, Toncontin Airport, 1998.

The wettest day recorded during this period was in May 1959, with 109.0 mm of rainfall. August 1995 saw the highest rainfall amount with 432.9 mm of rain in that month. In 1955, precipitation was 1,274.3 mm for that year alone, which is the highest amount registered since records began. The highest monthly temperature registered was 37.8 °C in April 1973, and the lowest was 3.9 °C in January 1956.

2.1.3 Topography

Honduras is a mountainous country, with a topography and soil quality that is favorable for the development of forests.

The Study Area is basically mountainous lying at an elevation between 900 masl (area between Barrio El Chile and Buenos Aires) and 1,535 masl (area between El Picacho and Piliguin). However, most of the urban area is located between 1,000 and 1,300 masl.

According to a survey conducted by METROPLAN on 457 barrios and housing developments in the Central District, 27% of the area has a natural slope gradient between 15% and 60%; (Table 2-2) this poses a strain on waste collection activities, because collection vehicles are not intended to ascend gradients exceeding 20%.

Table 2-2: Classification of Gradients in the Barrios of the Central District

Gradient Classification	Number of Barrios	%
up to 15%	26	6
15 to30%	50	11
30 to 45%	40	9
45 to 60%	34	7
Flat	307	67
TOTAL	457	100

Source: METROPLAN, AMDC, 1998

Such topographical features also hinder the installation of other basic public services, like water supply and sewerage, since SANAA has established a maximum elevation service of 1,150 masl.

Historically most of the inhabited highlands have been located in the Tegucigalpa side and most of the inhabited lowlands have been in the Comayaguela side.

However, at present as the lowlands have already become saturated, the remaining highlands of both cities are increasingly in demand, especially by the low income population. This will further increase the number of inhabited steep areas and thus bring about more problems in supplying basic public services, especially those related to waste collection.

2.1.4 Geological Conditions

The geology of the Study Area consists of sedimentary rocks from the Valle de Angeles formation, at the east-central part of the Central District, including most of the area traditionally regarded as the business center of Tegucigalpa and Comayaguela. These rocks are characteristically layers of red shale, limolite, sandstone and quartz conglomerates. The origin of these rocks correspond to the beginning of the tertiary period of the Cenozoic Era, some 65 million years ago.

From the south through to the north-east of the area, old clastic sediments alternate with flows of riolite, known as the Jutiapa formation. It tapers at the west-central part of the Central District and widens to the south and north-east. This formation corresponds to the end of the tertiary period.

Volcanic areas dominate the west with alternating andesite and basaltic rocks from the end of the tertiary and beginning of quaternary periods, respectively, including several volcanic cones, the most relevant being the Pedregal Lagoon.

Because of the geological and topographical conditions many barrios are prone to landslides, earth collapses, settlements, and floods during the rainy season, which promotes local migration to other areas of the Central District. METROPLAN has classified such areas as follows (Table 2-3).

Table 2-3: Classification of Barrios by Degree of Risk

Degree of Risk	Regulations	Number of Barrios	Percent (%)
I (light)	Certain types of construction permits can be issued with due consideration.	43	10
II (middle)	Construction permits may be given under the supervision of engineers.	63	14
III (high)	Construction authorizations are not issued, but people can continue living there.	60	13
IV (extreme)	No one is allowed to continue living there, also no new constructions are permitted.	6	1
Rest		285	62
TOTAL		457	100

Source: METROPLAN, AMDC, 1998

2.2 Socioeconomic Conditions

2.2.1 National Economy

a. Economic Trend before 1997

a.1 GDP Trend

The average growth rate during the Callejas Administration (1990-1993) was 3.8%, and being 6.2% in its the last year. However, the economic growth rate seriously plummeted in 1994 under the succeeding Reina Administration, as droughts during that year compelled the government to delay the plan for a long period which resulted in negative growth of -1.4%. Although the growth rate recovered in the following year to 4.3%, it fell to 3.7% in 1996. The average economic growth rate from 1994 to 1996 was 2.2%. Economic growth in 1995 and 1996 was largely due to the expansion of the mining industry, public utilities, and financial services. Public utilities such as electricity, gas and water supply showed a total increase of 15.4% in 1996.

Consequently, within the four-year period from 1992 to 1996, industrial growth was largely attributed to the service industry, particularly the heightened contribution of the financial and public utilities sectors as shown in Table 2-4.

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Table 2-4: Changes in the Industrial Structure

(Unit: million Lps. in 1978 price)

Item	1992	%	1996	%	1996/92
Agriculture, Forestry, Fishing	1,413	27.8	1,628	26.9	1.152
Mining	83	1.6	108	1.8	1.301
Manufacturing	765	15.1	935	15.5	1.222
Construction	284	5.6	252	4.2	0.887
Public Utilities	130	2.6	184	3.0	1.415
Transportation	441	8.7	517	8.6	1.172
Trade, Restaurant &Hotel	529	10.4	653	10.8	1.234
Finance, Insurance, Real Estate	402	7.9	615	10.2	1.530
Home ownership	334	6.6	399	6.6	1.195
Government	291	5.7	286	4.7	0.983
Services	406	8.0	468	7.7	1.153
Total	5,078	100.0	6,045	100.0	1.190

Source: "CIFRAS 92-94", BCH
"Memoria 1996", BCH

a.2 Public Sector Growth Trend

The most significant contribution of the Reina Administration (1994-1997) to the nation's economy was succeeding in trimming financial deficits incurred by the public sector to 2.9% of the GDP in 1996. The public sector (SPNF) deficit grew to 10.2% (in 1993) of the GDP during the Callejas Administration. The Reina Administration's financial deficit reduction policies centered on: (1) curtailment of expenditures by cutting public spending and retrenching government employees, (2) reinforcement of restraints on lending, and (3) augment of revenues by increasing taxes and reinforcing tax collection capabilities. As can be seen from Table 2-5, revenue of the central government in 1996 was 2.1 times the 1993 figure, while the percentage of GDP showed a 0.5 % decrease to 19.0%. While the expenditure in 1996 was about 1.9 times the 1993 figure, as a percentage of GDP, the expenditure was successfully reduced from 20.8% in 1993 to 18.1% by the end of 1996.

Table 2-5: The Changes of Central Government Finance

Item	1993 million Lps.	1993 % of GDP	1996 million Lps.	1996 % of GDP	1996/1993
Current Revenue	3,770	19.5	7,922	19.0	2.10
Current Expenditure	4,016	20.8	7,535	18.1	1.88
Capital Balance	-2,765	14.3	-1,084	2.6	0.39
Deficit(-)	-3,011	15.6	-1,471	3.5	0.49
cf. GDP		19,317		41,649	2.16

Source: "CIFRAS 92-94", BCH
"Memoria 1996", BCH

a.3 International Balance of Payment Trends

The international balance of payment showed a surplus as the increase in export volume surpassed the increase in import volume, and due to the increase in transfer income (Table 2-6).

Table 2-6: Changes in Balance of Payment

(Unit: million US$)

Item	1993	1994	1995	1996	1996/1993
Export	1,214	1,367	1,751	1,939	1.597
Import	1,760	1,946	2,194	2,411	1.370
Balance of Trade	-545	-579	-443	-472	
Transfer	218	211	248	275	1.261
Balance of Current Account	-328	-368	-195	-197	
Capital Account	207	242	207	189	0.913
Errors & Omission	-72	106	-	136	
Global Balance	-193	-20	12	128	

Source: "Memoria 1996", RHSHCP
"Memoria 1996", BCH

Nonetheless, foreign debt increased from US$3.693 billion in 1993 to US$4.086 billion in 1996, 92% of which was incurred by the public sector.

a.4 Prices and Employment

The annual inflation rate grew from 10.7% in 1993 to 23.8% in 1996, resulting in the devaluation of Lps. from 6.57 in 1993 to 11.84 to US dollar in 1996.

After falling sharply in 1994, the rate of unemployment soared and was almost equivalent to the 1993 figure in 1996.

Table 2-7 shows the major indicators of the Honduran economy.

Table 2-7: Major Economic Indicators

Item	Unit	1993	1994	1995	1996	1997
Nominal GDP	Million Lps.	19,317	24,770	32,626	41,171	52,872
Real GDP Growth Rate	%	6.1	-1.3	4.1	3.7	4.5
Per capita GDP	US$	560	537	615	601	673
Central Government Deficit (GDP %)	%	15.6	8.2	4.2	3.8	2.8
Consumer Price Index	%	+10.7	+21.7	+29.5	+25.3	+12.8
Unemployment	%	4.7	2.8	3.2	4.6	4.0
External Debt	Million US$	3,693	4,083	4,243	4,123	4,095
Average US$ Exchange Rate	Lps.	6.57	8.51	9.47	11.84	13.14
Population	1,000	5,248	5,422	5,603	5,789	5,981

Source: Memoria 1996, RHSHCP
Memoria 1996, BCH
Honduras en Cifras 1995-1997, BCN

b. Economic Trend in 1997

Economic indicators in 1997 show the trend of economic improvement as follows.

- GDP growth rate: 4.5% per year
- Inflation rate: 12.5% per year
- Foreign currency reserves: US$293.3 million, 68.6% higher than the previous year
- Government Deficit: Lps.588.5 millions, equivalent to 1% of the GDP

2-5

b.1 Production

The growth in production during 1997 was 4.5% of the GDP. In particular, finance sector (9.2%), public utilities (7.6%), manufacturing industry (6.1%), and agricultural industry (3.2%), showed the most significant growth.

Agricultural production showed a 4.9% increase as of November, despite the fact that it held level from January to November, showing an increase of only 0.7% from last year. Conversely, mining production from January to November widely surpassed the previous year's figure at an increase rate of 11.9%, but fell to -5.9% as of November. The manufacturing industry quickly recovered from April and showed a growth of 15.6% in November alone. Production in this sector from the months of January to November showed a 10.3% increase from the previous year.

b.2 Price

Food prices rose in July, from the previous month, reaching a plateau at 2.4%; at the end of December, the consumer price index closed at 1,099 (1978 = 100), up 12.8% from the previous year.

b.3 Exports

The total export amount in 1997 reached US$1,535.6 million in FOB price.

Despite the decrease in export volume, the coffee export amount from January to November was up 15.1%, as coffee prices showed a 45% increase from the previous year. On the other hand, the decrease in the volume of bananas for export is reflected in the export amount, which was down 17.0% between January and November, in comparison to the same period in 1996. Overall, for the year 1997, exports exceeded imports resulting in an addition to foreign reserves of US$ 499 million, which is twice the figure in November of the previous year.

b.4 Interest Rate

In spite of the continuing depreciation of the Lps., the interest rate for loans from financial institutions fell by 1.45% from its peak in August and reached 32% on average in December.

c. Economic Development Plan

The president, Flores, advocated social reforms during his presidential campaign and the social reconstruction policy was included in the "New Agenda". Although the new agenda has not yet been approved as a national plan, it indicates the basic policy of the new administration and consists of: 1) preamble (new agenda for Honduras for the year 2000), 2) action plan, and 3) project funding. The program of the new administration is outlined in Annex 1.

2.2.2 Regional Economy

a. General Conditions

Banks, trading companies, hotels, and government institutions in Honduras are mostly concentrated in the national capital, Tegucigalpa. Most large-scale factories are located in San Pedro Sula, in the northern region, while food manufacturing industries are located close to the capital. Although Honduras has modern commercial facilities

such as supermarkets and shopping arcades, mini-marts and general stores still predominate.

b.   Gross Regional Domestic Production (GRDP)

The GDP of Honduras has been calculated, but the GRDP is not known due to lack of estimates and relevant basic data are still unpublished. For the formulation of the SWM master plan, GRDP is estimated using the data on number of employees by income and economic sector as shown in Table 2-8.

Table 2-8: 1997 GRDP of the Central District by Economic Activity

Items	GRDP (1,000 Lps.)	Share of GDP (%)	Number of Employee (people)	Share of Whole country (%)
Agriculture, Forestry, Fishing	62	0.5	1,479	0.2
Mining	94	10.2	538	12.5
Manufacturing	2,100	22.0	68,713	19.4
Construction	783	28.9	23,613	27.1
Public Utilities	1,454	44.6	2,793	44.3
Transportation	725	31.8	14,270	30.0
Trade, Restaurant & Hotel	1,487	23.7	81,606	22.2
Finance, Insurance, Real Estate	2,680	52.2	20,601	48.6
Home ownership*	1,101	37.4		
Government*	1,140	37.4		
Services	1,983	37.4	107,609	30.1
Total	13,609	25.5	321,222	15.6

Note: The GRDP of Home ownership and that of Government were estimated using the share of Services in the whole country.

c.   Income

Table 2-9 shows that workers in the Central District earn an average income of Lps. 1,747 per month (national average of Lps. 1,319/month). The head of a family earns a monthly average of Lps. 3,415 (national average of Lps. 2,608 /month). According to the public opinion survey, the average expenditure of low-income households is Lps. 1,990 /month, while the middle-income and high-income households spend a monthly average of Lps. 3,250 and Lps. 6,879, respectively. Making the assumption that expenditure is equal to income, based on the income of the family head, the distribution of population by income level is 50% in the low-income group, 30% in the middle-income group and 20% in the high-income group.

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Table 2-9: Distribution of Income in Central District in 1997

Monthly Earnings (Lps.)	Reported Employees			Reported head of house		
	Number	per cent (%)	Cumulative (%)	Number	per cent (%)	Cumulative (%)
Less than 100	1,990	0.6	0.6	578	0.4	0.4
101 - 250	8,556	2.8	3.4	1,247	0.8	1.2
251 - 500	28,284	9.2	12.7	5,833	3.7	4.9
501 - 750	20,371	6.7	19.3	17,692	11.3	16.2
751 - 1,000	63,624	20.8	40.1			
1,001 - 1,500	70,691	23.1	63.2			
1,501 - 2,000	41,676	13.6	76.8	53,748	34.3	50.5
2,001 - 2,500	17,724	5.8	8.6			
2,501 - 3,000	15,823	5.2	87.7			
3,001 - 4,000	12,168	4	91.7	47,147	30.1	80.6
4,001 - 5,000	9,709	3.2	94.9			
5,001 - 7,500	7,505	2.5	97.3	22,079	14.1	94.7
7,501 - 10,000	4,084	1.3	98.7			
1,0000 and over	4,089	1.3	100.0	8,249	5.3	100.0
Not Declared	14,928	excluded		10,172	excluded	
Total Number	321,222	100.0		166,745	100.0	
Total Income(1,000 Lps.)	535,204			534,675		
Average Income (Lps.)	1,747			3,415		

Source:
"Programa de Encuesta de Hogares", Secretaria de Industria, Comercio y Turismo, June, 1997

2.2.3 Administration

The Republic of Honduras is divided into 18 departments, that are divided into municipalities, villages and barrios.

The government is exercised by three supreme powers: executive, legislative and judicial. The highest authority is held by the President who is elected by direct vote, every 4 years. A second term in office is not allowed. At the same time, there are three vice-presidents. The legislature is integrated by 128 seats who are elected during the presidential elections. According to the population each department has right to elect certain number of members. The Supreme Court is integrated by 9 members who are named by the Legislature.

The executive power is exercised by through the ministries, among them is the Ministry of Government, which hierarchically precedes the municipal administrations of the country through the department's governors, who act as intermediaries between the executive power and the municipalities.

At the same time, the municipalities are autonomous and administrated by councils directly elected by the people (Law of Municipalities, Article 3).

The organization chart of the AMDC, as of March 1998, is shown in Figure 2-1.

Municipal Corporation

Secretary for Municipal Council

Mayor

Municipal Audit

Municipal Development Council

Family Development Office

Public Relation

Legal Advisor

Rural Area Development Office

Project Planning

Tecnica Intenacional Advisor

Promdeca

General Manager

Solid Waste Management Executing Unit

Human Resources

Computer Center

Urban Development

Administration and Finance

Social Development

Infrastructure

Treasury

Financial Control and Planning

Health and Sanitation

Metroplan

Payment

Fifteen Days Plan and Budget Evaluation

Nourishment Control

Urban Work Permissions

Safe Control

Document Review

Health Service

Transport Route

Reception

Contract and Bidding

Health Capital

Self Improvement Work

Land Tenure

Tax Control

Education

Cadastre

Expenditure Control

Children

Police Cout of Law

Big Tax Payers

Adult

Public Services

Information

Employee's Training

Cleansing Department

Tax Policy

Community Service

Markets and Cemeteries

Accounting

Employment

Environment

Revenue

Culture and Turism

Green Area and Basins

Expenditure

Sports

Parks and Gardens

Internal Services

Social Participation

Procurement

Supplying

Note:
PROMDECA stands for Metropolitan Processor of Beaf.
Municipal Corporation means the legislative council of the AMDC.

Figure 2-1: Organization Chart of the AMDC as of March 1998

2.2.4 Demographics

a. Analysis of Population of Honduras and Central District

The last National Census of Population and Housing was executed in 1988 by the Directorate of Statistics and Census. Since there is no population registration system in Honduras, accurate population data are not available at present. In this study, the several population studies were carefully analyzed to estimate the present population of the Central District (Refer to Annex 1). Consequently, the historical data from 1791 are taken into account for both the Central District and the whole of Honduras. Regarding the data for 1988, the adjusted final values are used (Table 2-10, Table 2-11, Figure 2-2, and Figure 2-3).

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Table 2-10: Population of Honduras and its Growth Rate(1791-1988)

Year	Urban	G.R. (%)	Rural	G.R. (%)	Total	G.R. (%)
1791	----	----	----	----	96,421	----
1801	----	----	----	----	128,453	2.91
1881	----	----	----	----	307,289	1.10
1887	312,319	----	19,598	----	331,917	1.29
1895	----	----	----	----	398,877	2.32
1901	----	----	----	----	543,741	5.30
1905	----	----	----	----	500,136	-2.07
1910	----	----	----	----	553,446	2.05
1916	----	----	----	----	605,997	1.52
1926	----	----	----	----	700,811	1.46
1930	262,815	-0.40	591,369	8.25	854,184	2.22
1935	290,509	2.02	671,491	2.57	962,000	2.41
1940	----	----	----	----	1,107,859	2.86
1945	348,043	1.82	852,499	2.42	1,200,542	2.24
1950	424,453	4.05	944152	2.06	1,368,605	2.66
1961	437,818	0.28	1,446,947	3.96	1,884,765	2.95
1974	833,179	5.07	1,823,769	1.80	2,656,948	2.68
1988	1,893,339	6.04	2,550,382	2.42	4,443,721	3.74

Source:
1) Censos de Población y Vivienda Levantados en Honduras de 1791 a 1974 (reedición), Junio, 1981. Dirección Gral. de Estadísticas y Censos, Secretaría de Economía.
2) Censo Nacional de Población y Vivienda, 1988. Dirección Gral. de Estadísticas y Censos, SECPLAN, Diciembre 1990.

It can be observed that the growth rates for the period prior to 1930 are not steady and in some cases are negative. Considering the lack of technology it may be assumed the results had a large margin of error, specially when considering the rural census, due to the poor access. However, considering the small populations in that period the effect on the projections is deemed to be negligible.

Table 2-11: Population of the Central District and its growth rate(1791-1988)

Year	Urban	G.R. (%)	Rural	G.R. (%)	Total	G.R. (%)
1791	----	----	----	----	5,431	----
1887	12,585	----	----	----	12,585	0.88
1901	----	----	----	----	29,789	6.35
1905	----	----	----	----	27,623	-1.87
1910	----	----	----	----	28,949	0.94
1916	----	----	----	----	32,621	2.01
1926	----	----	----	----	32,505	-0.04
1930	27,573	1.84	19,502	----	47,075	9.70
1935	34,900	4.83	23,098	3.44	57,998	4.26
1940	----	----	----	----	76,499	5.69
1945	55,755	4.80	30,707	2.89	86,462	4.07
1950	72,385	5.36	27,563	-2.14	99,948	2.94
1961	134,075	5.76	30,866	1.03	164,941	4.66
1974	273,894	5.65	31,493	0.15	305,387	4.85
1988	576,661	5.46	47,881	3.04	624,542	5.24

Source: 1) Censos de Población y Vivienda Levantados en Honduras de 1791 a 1974 (reedición), Junio, 1981. Dirección Gral. de Estadísticas y Censos, Secretaría de Economía. 2) Censo Nacional de Población y Vivienda, 1988. Dirección Gral. de Estadísticas y Censos, SECPLAN, Diciembre 1990.

b. Estimated Population as of 1998

By plotting these historical population data for the Central District as well as for the whole country, a resulting exponential curve of population is obtained. An extrapolation of the curve give the projected population for the target year 2010. From these data the increase in growth rate can be quantified; the projected population for the intermediate ranges can be found by using the following equation:

$$Pp = Pb (1+r)^n$$

Where Pp = Projected population
              Pb = Base population
              r = Growth rate per year
              n = Number of years

The generated values are listed in Table 2-12.

Table 2-12: Projected Population of the Central District and Honduras(1989-1998)

Year	Central District (Urban)	Honduras (Total)	Central District/Honduras
1988 (Base)	576,661 Growth rate=3.94%	4,443,721 Growth rate=2.94%	12.98%
1989	599,394	4,574,214	13.10%
1990	623,022	4,708,538	13.23%
1991	647,582	4,846,807	13.36%
1992	673,111	4,989,137	13.49%
1993	699,646	5,135,645	13.62%
1994	727,226	5,286,457	13.76%
1995	755,894	5,441,697	13.89%
1996	785,692	5,601,495	14.03%
1997	816,665	5,765,987	14.16%
1998	848,859	5,935,308	14.30%

The projected urban population growth rate of 3.94% for the Central District is slightly less than the previous values of 4.8% to 5.76% during the last few decades. Also the value does not deviate from the latest trends of other major cities in Honduras where cities like San Pedro Sula and its surrounding areas has been targeted by migrant workers and their dependents, attracted to the introduction of large free zones where many multinationals have located their factories. In the case of the Central District, although similar free zones, with the corresponding development of industrial areas are being introduced in the mid-term, its expansion will not reach the magnitude of San Pedro Sula, where the largest harbor nearby and modern airport in Honduras are located to reinforce the export of manufactured products.
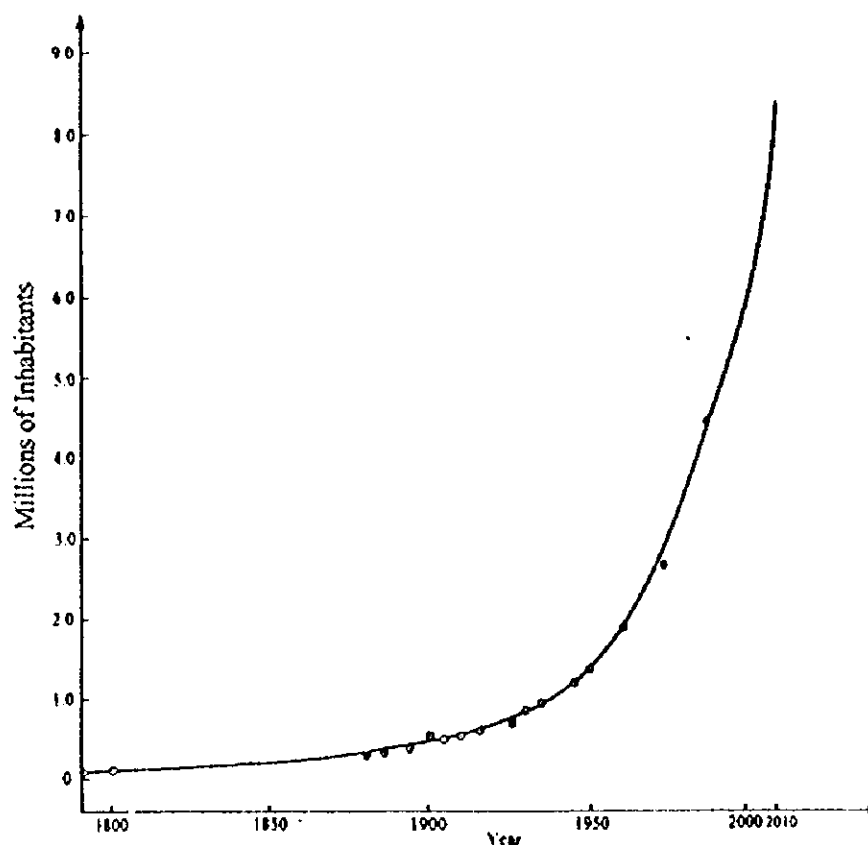
Figure 2-2: Record of Honduras Population (1791-1988) and its Projection
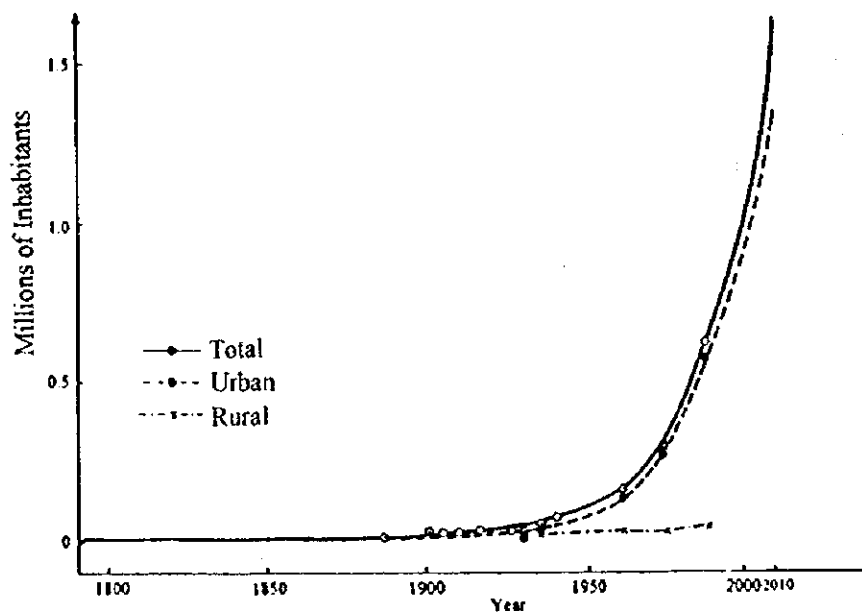
Figure 2-3: Record of the Central District Population (1791-1988) and its
Projection

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c. Classification of Barrios and Population by Income Level in the Central District.

c.1 Classification of Population by Income Level

A classification of the population by income level was performed by using the data provided by the Program of Multipurpose Survey of Households of the General Directorate of Statistics and Census[1]. The survey was distributed to a population of 166,745 persons of which 156,573 answered the questions for households with five ranges of monthly income. The analyzed results are summarized in Table 2-13.

Table 2-13: Classification of Population by Income Level in the Central District

Category	Range	No. of Persons	%
Low	0-2,500 Lps.	79,098	50
Middle	2,501-5,000 Lps.	47,147	30
High	5,001 Lps.or more	30,328	20
Total		156,573	100

Sources: Adapted from Programa de Encuesta de Hogares de Propósitos Múltiples, Dirección General de Estadísticas y Censos, Junio 1997.

According to these results the present population can be classified as follows (Table 2-14):

Table 2-14: Classification of population by Income Level (1998)

Category	1998
Low	424,429
Middle	254,658
High	169,772
Total	848,859

c.2 Classification of Barrios by Income Level

Due to the lack of studies related to this topic, the classification of barrios of the Central District was performed by the Study Team in collaboration with the Cleansing Department, according to the different categories of residential areas currently being used (Table 2-15).

Table 2-15: Classification of Barrios by Income Level in the Central District

Zone	Total Barrios	Low(%)	Middle(%)	High (%)	Total(%)
El Pastel	167	80	16	4	100
El Picacho	78	45	46	9	100
Kennedy	147	29	29	42	100
Loarque	38	29	71	0	100
Toncontin	81	37	52	11	100
Total	511	49	34	17	100

Source: Social Promotion Service, Cleansing Department. Public Services, AMDC, 1998

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[1] page 203, Table 32: "Households by monthly income level according to main characteristics of the household head, Central District, June 1997"

2.2.5 Industrial Trends

There are 21,878 businesses established within the Central District, comprising industries related to retail outlets, commerce and services. According to the data at the AMDC, the businesses are divided into 37 different types totaling 326 units as outlined in Table 2-16.

Table 2-16: General Industries in the Central District (April, 1998)

No.	Type	Number
1	Alcohol Distillery	1
2	Grain dryer	1
3	Carpenter	127
4	Mechanic's workshop	11
5	Tire Retreader	8
6	Printer	78
7	Manufacturer of industrial equipment	4
8	Confectionery industry	1
9	Meat processing	2
10	Packaging factory	1
11	Coffee industry	1
12	Mineral water treatment plant	2
13	Textile factory	2
14	Tortilla factory	8
16	Shoe factory	9
17	Apparel factory	16
18	Pencil factory	3
19	Sawmill	2
20	Furniture factory	13
21	Wood pulp factory	1
22	Factory of wood pulp crafts	1
23	Chemical plant	4
24	Glass and porcelain factory	4
25	Petroleum processing facility	1
26	Clay product factory	2
27	Cement factory	1
28	Brick factory	2
29	Metal refinery	1
30	Metal processing factory	1
31	Hat factory	2
32	Battery factory	6
33	Plastics factory	6
34	Signboard factory	1
35	Match factory	1
36	Ice cream factory	1
37	Cookie and cracker factory	1
TOTAL:		326

2.2.6 Education

Table 2-17 shows the illiteracy rates for the 18 departments. The illiteracy rate of the Central district is 7.0%, while the average illiteracy rates of whole country are 17.4% for urban and 42.4% for rural areas.

Table 2-17: Illiteracy rate for each department

(Unit:%)

No.	Department	Urban	Rural
1	Atlantida	13.3	38.1
2	Colon	21.1	36.0
3	Comayagua	17.4	38.0
4	Copan	26.4	53.4
5	Cortés	20.2	37.1
6	Choluteca	23.2	41.1
7	El Paraiso	20.3	44.8
8	Francisco Morazan	11.9	38.7
	Central District	7.0*	---
9	Gracias a Dios	0.0	34.7
10	Intibuca	16.1	44.6
11	Islas de la Bahia	9.0	11.8
12	La Paz	16.4	40.7
13	Lempira	25.2	55.8
14	Ocotepeque	22.6	45.4
15	Olancho	22.5	45.6
16	Santa Bárbara	30.1	48.5
17	Valle	24.6	38.4
18	Yoro	18.6	36.0
	TOTAL	17.4	42.4

Source: Censo Nacional de Población y Vivienda, 1988.
*Encuesta permanente de Hogares de Propósitos Múltiples, Junio 1997.

2.2.7 Community Structure

The urban area of the Central District is divided into 29 sectors. They are also divided into Barrios, that are located in the old urban area, or housing developments (Colonias), located in the new developments on the outskirts.

Some of the communities have organizations such as foundations (known as "patronatos") or associations ("asociaciones") or homemakers' clubs ("clubes de amas de casa"). These organizations have a spokesperson who legally represent the communities before the authorities, for the purpose of requesting the execution of some public works or services.

2.2.8 Squatter Settlements

These are communities which usually are in the fringes of the urban area, and are in the earlier stages of integral development. They lack basic infrastructure such as access roads, water supply, sewerage, cleansing service, as well as some public facilities like schools, community centers, sport fields and health centers.

The number of squatter settlements began to increase from the 1960's, in comparison to previous periods. At present the expansion of squatter settlements continue, due to the following reasons:

- the precarious economical situation
- rural to urban migration

- excessive housing prices
- migration from other parts of the city where landslides and floods occur frequently.

The squatters usually settle on lands where the owners have no property titles. The people form their own organizations in order to seek assistance from the AMDC and to obtain legal rights to the land, and then proceed to look for financing and/or grants from national or international entities. In this way they execute basic services such as electricity, water supply, sewerage, etc. and finally become recognized as a developed urban area.

The present number of squatter settlements without any of the basic services is thought to be 47 out of 511 Barrios and Colonias of the Central District, representing 9% of the total. However, considering that some of the public services are already installed in some of these areas, the number of slums and semi-urban areas may rise to about 200 (40% of the total).

2.2.9 Religion and Customs

The Honduran Constitution guarantees the freedom of religion. Although for many decades, since independence in 1821, the official religion as stated by law, was Roman Catholicism, at present many others have been established, such as Evangelists, Saint of the Latter Days, Mormons, etc.

However, nearly 95% of the population still belong to the Roman Catholic Church. According to the Almanaque Mundial (World Almanac 1997) the various faiths in Honduras, today, are distributed as follows: Catholics 94.2%, Evangelists 1.3%, Eastern Orthodox 0.4%, Muslims 0.1%, Buddhists 0.2% and others 3.8%.

Some of the customs and celebrations practiced in Honduras have a religious symbol, such as Easter (March or April) and Christmas/New year (December/January). Other localized festivals such as the day of the Patron Saint of Teguchigalpa, Independence Day and International World Labor Day, as well as important events e.g. sports tournaments bring out a large crowd into the streets who often litter and create a transient increase in the amount of street waste generated. During festivities and celebrations a large amount of waste is also discarded in public areas that originate from various decorations and other festive items, such as fireworks, palm leaves and confetti. These items accumulate in the streets and often add to the amount of waste produced in the city.

The ethnic division of the country is as follows: mestizo(mixed indian and european) 90%, indian 7%, white 1%, others (black; mulato; (mixed: european and black), zambo(mixed: indian and black)), 2%.

The official language is Spanish, however there are several local dialects like: miskito, garífuna, tawaka, pech, tolupán, xicaque, paya, lenca, sumo). The main language spoken by the foreign communities are English, Chinese and Arabic.

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2.2.10 Public Health

The public health sector is integrated and its corresponding coverage is as follows: the Ministry of Health (50%), the Honduran Institute of Social Security (10%), the National Autonomous Service of Aqueducts and Sewerage, and some private institutions (10-15%).

The total coverage of the health system is about 75%, leaving 25% without any access to health services. As a result there are several areas with a high incidence of the following illnesses:

- Infant mortality
- Communicable diseases (infectious, respiratory)
- Nutrition related illness

Besides these traditional illnesses, cholera was introduced to Honduras at the beginning of the 90's that is still not eradicated; it has only been controlled by health campaigns and environmental hygiene. However, during March 1998, the illness re-appeared in the eastern region (La Mosquitia) killing at least 12 people.

2.3 Urban Structure

2.3.1 General Conditions

a. Historical Review

By 1578, Tegucigalpa had been a base of gold and silver mining settlements, the authorities of Guatemala from which it depended, decided to enhance the city to a "High Mayorship" ("Alcaldía Mayor"). Its first name was "Tusgalpa" meaning "silver hill" (cerro de plata). Due to the abundance of water and forest it centralized the domain of several neighboring Indian towns where there were mines like Santa Lucía, Cedros, El Corpus, San Antonio de Oriente and Yuscarán.

After many years of mining exploitation by the Spanish, the distribution of houses in the village expanded randomly. Later on, the city began to radiate with the churches at the center.

In 1762 it received the status of "Real Villa de San Miguel de Tegucigalpa y Heredia".

In 1791, when the first national population registry was compiled, Honduras was organized as 35 "curatos", and Tegucigalpa and Comayaguela were towns ("pueblos") of the Tegucigalpa "curato", been the first its head town.

Up to that time the capital of Honduras was Comayagua. Tegucigalpa became the capital in 1880 during the Government of Marco Aurelio Soto when it was moved to the present location because of the vicinity to El Rosario mines at San Juancito town.

In 1897 the city of Comayaguela was raised to the category of "city" and in the following year, it was integrated as a part of the capital city of Honduras.

In 1901 Tegucigalpa and Comayaguela appeared as one of the 25 municipios comprising the Department of Tegucigalpa.

In 1938 President Tiburcio Carías Andino merged both municipalities forming the "Central District" as one municipality of the Tegucigalpa Department. The name of this Department was finally changed in 1943 to "Francisco Morazan Department" as registered in the National Census from 1945.

b.   Present Situation

At present, according to the "Plan de Arbitrios" (Tax Plan) of the AMDC for 1998, the Central District covers an area of 1,396.5 Km^2, through 59 sectors. Of these, 29 sectors are located in the urban (201.5 km^2) and 30 sectors in the rural areas. At the same time the urban area is divided into 5 areas as follows: El Pastel, El Picacho, Kennedy, Loarque, and Toncontin.

2.3.2   Land Use Conditions

At present the sole analysis on the land use conditions of the Study Area available is in relation to the Study of Improvement of the Urban Traffic System in Tegucigalpa, elaborated on 1996 under the cooperation of JICA, acting as a counterpart to the AMDC.

According to this study, land use in the Central District is divided into 5 categories. The largest is the open areas (68.5 Km^2) without any construction, including rivers, streams, steep slopes and forestry. However, the risk of landslides in slopes with a gradient over 30%, environmental obstacles like location of watersheds, etc. limit the usable land to about 20% (14.23 Km^2) of the total open area.

The following are residential areas, with an average density of 196 persons/ha. The commercial area includes small and large businesses in the center or housing developments. The public area include schools, hospitals, government buildings, parks and recreational centers, excluding military installations.

The existing land use condition in the Central District is shown in Table 2-18 and Figure 2-4.

Table 2-18: Present Land Use Condition in the Central District

Land Use	Open	Residential	Public	Commercial	Industrial	Total
Area (km^2)	68.5	34.4	5.4	9.9	0.7	118.9
Percentage (%)	57.64	28.94	4.54	8.30	0.59	100.00

Source: Improvement of the Urban Traffic System in Tegucigalpa, JICA, Nov. 1996

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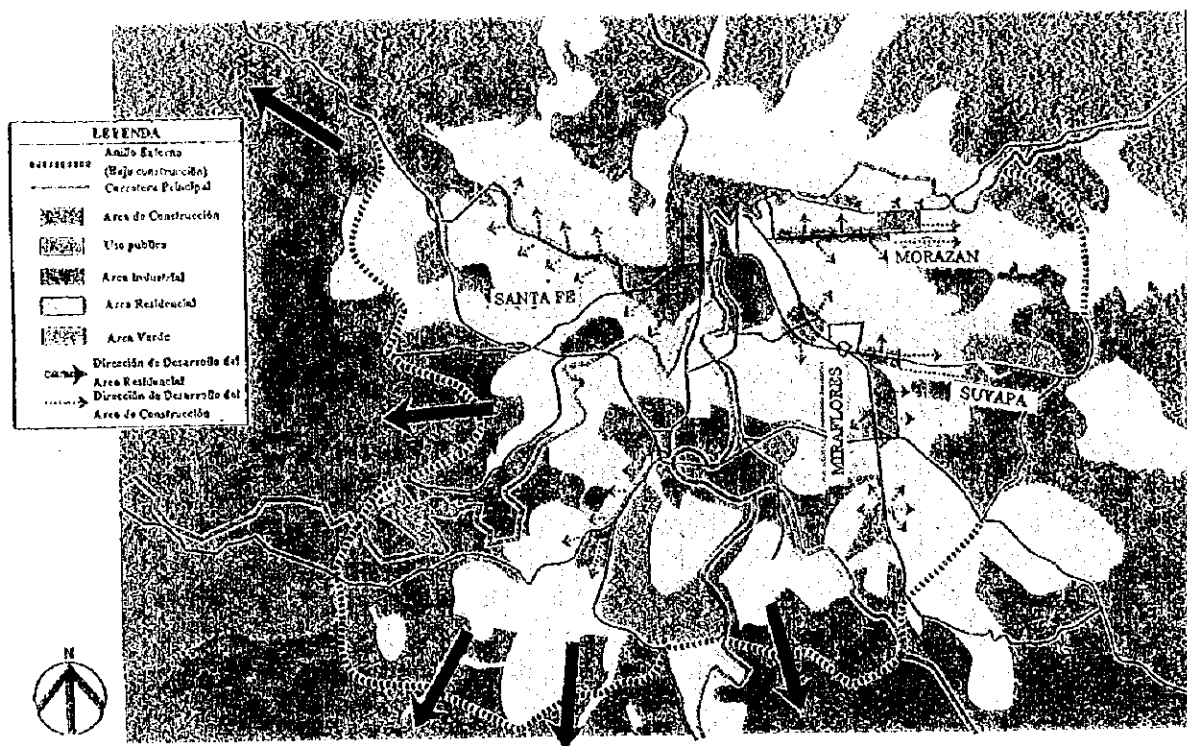
Figure 2-4: Present Land Use Conditions in the Study Area

(Source: Improvement of the Urban Traffic System in Tegucigalpa, JICA, Nov. 1996)

2.3.3 Mass Transit

In the city of Tegucigalpa there is only transportation by roads, there is no rail service due to the mountainous topography of the city.

The Metropolitan Development Plan (METROPLAN) of the AMDC in 1975 established five categories for the urban road network, defining design criterions as shown in Annex 1.

2.3.4 Residential Classification

In 1975, METROPLAN of the AMDC divided residential areas to be developed into 8 types (R-1 to R-8). Four of these types are for one-family use and four for multi-family use. It also specifies the net density per hectare, dimensions of the plot, and parking requirements (Table 2-19). Sub-urban developments (U-R) are regulated and must have a minimum plot area of 1,000 m^2. Further sub-division of these developments is prohibited.

Table 2-19: Residential Classification in the Central District

Type	Condition	Net Density (Inh/ha)	Minimum Area (m²)	Front length (m)	Occupation Factor	Construction Index	Front/ Depth	Parking (Vehicles)
R-1	one-family	150	400	15	0.5	1.0	1:3	2 >240m2 const. area 1 if less
R-2	one-family	400	150	10	0.6	1.0	1:3	1
R-3	one-family	600	100	8	0.8	1.5	1:3	1
R-4	one-family	800	60	6	0.8	1.5	1:3	0
R-5	multi-family	1,000	60	6	0.3-0.7	2.5	1:3	1
			400	15	0.3-0.7	2.5	1:3	1
R-6	multi-family	700	60	6	0.5-1.0	7.0	---	1
			400	15	0.5-1.0	7.0		1
R-7	multi-family	700	---	---	---	---	---	---
R-8	multi-family	2,000	---	---	0.25	1.0	---	1/8
U-R			1,000		0.2	0.4		

Source:Reglamento de Zonificación General. METROPLAN, AMDC.1975.

Finally another classification of population center acknowledge by METROPLAN, is the "invasions" or illegal settlements, which is land appropriated by a group of people living in slum areas within the Central District. The register from 1965, covers about 85 barrios (15% of total), however it is estimated that about half of them have already been legalized and are under development, acquiring several basic public services.

A summary of the actually registered types of residential areas in the Central District are shown in Table 2-20.

Table 2-20: Register of Residential Classification in the Central District

Type	Number of Barrios	%
R-1	72	12
R-2	75	13
R-3	61	10
R-4	274	47
R-5	3	1
R-6	-	-
R-7	-	-
R-8	1	0
U-R	13	2
Invasion (from 1965)	85	15
TOTAL	584	100

Source: METROPLAN, AMDC.1998.

2.4   Financial Conditions

2.4.1   Financial Status of the Central Government

Table 2-21 shows the net calculation of the public finances (SPNF) in Honduras, with the exclusion of transfers between the central government, decentralized institutions and the local governments.

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Table 2-21: Public Sector Finances in 1997

(Unit: Million Lps.)

	SPNF	Central Government	Decentralized Institutions	Local Governments
Current Revenue	17,955	10,352	8,411	760
Current Expenditure	13,736	9,864	5,200	601
Capital Revenue	222	3	435	877
Capital Expenditure	5,059	2,605	2,041	1,296
Recovery of Interests	29	391		
Deficit (-) or Surplus (+)	-589	-1,723	1,606	-260

Source: Memorial 1997, BCH

The SPNF deficit in 1997 was 65% less than the previous year, at Lps.589 million (1.0% of the GDP). Although financial conditions were in the red until 1995, the decentralized institutions recorded a surplus in 1996, and the deficits of the central and local governments were reduced as well. The ensuing sections detail the financial condition of the central government.

a. 1997 Revenue and Expenditure

The revenue and expenditure in 1997 showed a deficit of Lps. 1.7 billion (2.8% of the GDP). The 1997 deficit was 5% lower than 1996 (Lps.1.8 billion). This is because current revenues increased by 30.6% while current expenditure increased only 28.8%. Foreign loans covered the 82% difference.

b. 1997 Tax Revenues

The tax revenue for 1997 was Lps.1,680 million higher than the previous year, as it totaled Lps.8,652 million. Direct taxes contributed Lps.2,512 million, indirect taxes Lps.3,984 million, and tariffs a total of Lps.2,156 million. Income tax makes up 91% of the direct taxes. 58% of the indirect taxes is attributed to tax on general sales.

c. Budget of Related Ministries

Table 2-22 shows the changes in budgets of the Ministry of Health and the Ministry of Natural Resources and Environment.

Table 2-22: Changes in the Budget of Related Ministries

(Unit: Million Lps.)

Year	1996	1997		1998
Ministry	Executed	Budget	Executed	Budget
Total	10,881	12,998	13,477	15,439
Ministry of Health	1,005	1,137	1,187	1,337
Ministry of Natural Resources and Environment	398	690	173	403

Source: Memoria 1996, Republica de Honduras Secretaria de Hacienda y Credito Publico
La Gaceta, 31 December 1997 and 31 December 1996 Information from Ministry of Finace

2.4.2 Financial Status of the Local Government

a.1 Overview

Table 2-23 shows the changes in revenue and expenditure of the AMDC. Reliability of these data are questionable due to the recent political transition in January 1998.

Table 2-23: The changes in the AMDC Budget

(unit: 1,000 Lps)

	1995	1996	1997			1998
	executed	executed	approved (a)	executed* (b)	(b/a) %	Executing Budget
Revenue	125,794	153,491	253,900	184,854	72.8	290,420
- Current	109,279	124,785	n.a.	156,860		211,420
- Capital	16,515	28,706	n.a.	27,994		79,000
Expenditure	133,362	181,923	253,900	202,130	79.6	313,677
- Head & Staff	n.a.	44,059	51,233	55,098	107.5	81,455
- Public work	n.a.	45,004	64,833	57,775	89.1	110,839
- Urban and social development	n.a.	35,427	56,396	53,233	94.4	38,500
- Transfer	n.a.	7,180	10,714	11,579	108.1	35,500
- Public debt	n.a.	50,253	70,724	24,445	34.6	47,383
Balance	-7,566	-28,432	0	-17,276	60.8	-23,257

Note: The figures from the budget executed in 1997 were reported by the former municipality.
Source: Financial Department of AMDC

In 1997, while the revenue only reached 73% of the budget, the expenditure amounted to 80% of the budget, leading to a deficit of Lps.17 million. In comparison with 1996, although the shortfall in revenue remained at 60%, the deficit was for the third consecutive year. As a result, as of February 1998, the deficit amounted to Lps.389 million, which is equivalent to twice the revenue in 1997. Since the executing budget for 1998 shows the same tendency, the financial reconstruction of the AMDC is an urgent issue.

a.2 Present Situation and Problems Related to Municipality Tax Collection

In this section, the amount of fixed property tax and business income tax billed in 1997 were compared with the actual amount collected. Regarding personal income tax, the potential taxable amount was calculated by multiplying the number of those in employment per income level by tax rates per income level. For the business income tax, 75% of the amount billed in 1998 was assumed as the potential taxable figure in 1997. Using the same method as the property tax and business income tax calculations, the potential waste collection fee figures were calculated. Regarding other taxes, 75% of the estimated amount of tax to be collected in 1998 was assumed to be the potential taxable amount. Table 2-24 shows the results of the collection rate obtained from these comparisons.

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Table 2-24: The Comparison of Potential of Tax Charged and Tax Actually Collected in 1997

Items		Potential (1,000 Lps.)	Executed (1,000 Lps.)	Collection Rate (%)
1.Direct tax		137,377	83,324	60.7
- Property tax		50,550	19,694	39.0
- Personal income tax		21,200	9,818	46.3
- Business income tax		65,252	53,812	82.5
- Cattle tax		375	0	0.0
2.Indirect tax		53,250	22,073	41.5
- Vehicle registration tax		22,500	6,955	30.9
- Other indirect taxes		8,250	2,308	28.0
- Recovery & Fines		22,500	12,810	56.9
3.Public service fees		42,396	31,364	74.0
- Waste	with property tax	14,440	7,033	48.7
collection fee	with business income tax	17,456	12,833	73.5
- Other service fees*		10,500	11,524	109.8
4.Rental fee & others		18,750	20,099	107.2
- Market		4,500	88	2.0
- Others		14,250	20,011	140.4
Total current revenue		251,773	156,860	62.3

Note: *The figure includes fees for firefighters.
Source: Financial Department of A.M.D.C.

Since the collection of municipal taxes has compelling force, the low collection rate of property taxes indicate that follow-up systems for unpaid bills are not in place. Unless this aspect of fee collection is improved, the reconstruction of the municipal finances will be an impossible task.

2.4.3 Taxation System

a. National Taxation System

a.1 Overview

In this section, the structures of the present national taxation system are summarized.

The national taxation system in Honduras is composed of:

- **direct taxation;** such as taxes on income, ownership, net activities. However, income tax is the major source of direct taxation.

- **indirect taxation;** such as taxes on production, consumption, sales, and special services. Taxes on production, consumption, and sales are divided into two categories: tax related with production, consumption, and sales of beer, liquor (including rum), petroleum products, soft drinks and cigarettes, and general sales tax.

- **taxes on international trade** including customs tariff and export tax.

a.2 Income tax

Income tax is levied on income gained through commercial activities or provision of labor regardless of whether they are companies or individuals. Revenues of individuals are subject to progressive taxation as shown in Table 2-25.

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Table 2-25: Income Tax Rate as of February, 1996

Range of Annual Income		Income Tax Rate
From	To	%
Lps. 0.01	Lps.50,000.00	0
Lps.50,000.01	Lps.100,000.00	10
Lps.100,000.01	Lps.200,000.00	15
Lps.200,000.01	Lps.500,000.00	20
Lps.500,000.01	Lps.1000,000.00	25
Lps.1,000,000.01	and over	30

Note: Severance payment, vacation bonus, "13th Month Pay", and "14th Month Pay" are tax exempt.
Source: "Ley del Impuesto sobre la Renta", DEI

Profits made through business activities are also subject to progressive taxation as shown in Table 2-26. There are some controversial conjectures that this system dissuades the companies from making better performances.

Table 2-26: Net Profit Tax Rate

Yearly Income	
Lps.0 - Lps. 100,000	15%
Lps.100,001 - Lps. 500,000	35%
Lps.500,001 - Lps. 1,000,000	35% plus 10% on anything over Lps.500,000
Lps.1,000,000 and over	35% plus 15% on anything over Lps.1,000,000

Source: "Ley del Impuesto sobre la Renta", DEI

a.3 Sales Tax

In June 1998, the general sales tax rose from 7% to 12% and that for alcohol and cigarettes increased from 10% to 15% as well.

a.4 Export Tariffs

Export tax is 1% of FOB price. However, tax on bananas is scheduled to be canceled. Tax rates for customs tariff vary depending on the goods. However, tax rates are to be lowered gradually according to different categories by 2000 based on the Central American Agreement.

b. Local Tax

Local tax can be classified into local tax, fees, and contributions under the municipality law. In Tegucigalpa's Central District, there is a broad spectrum of fees that are imposed. There are 30 types of service fees and if rental fees are included, there are 47 types of fees. Major municipality taxes related with waste fees are examined in this study.

b.1 Property Tax

The property tax is a local tax imposed on real estate and houses. Property valuations are reviewed every five years. In urban areas, the tax rate is 0.35% of the valuation amount. However, for property resided by the owner, a property value of up to Lps.100,000 is exempt. Property tax is generally collected in August. Waste collection fee for households is jointly billed with the property tax.

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b.2 Personal Income Tax

Personal income tax is the local tax imposed on an individual's income. It is different from the national income tax and is levied on income of Lps.1 and upwards. As shown in Table 2-27, personal income tax follows a progressive taxation system.

Table 2-27: Tax Rate of Personal Income Tax

Range of Annual Income		Per thousand
From	To	
Lps.1.00	Lps.5,000	1.50
Lps.5,000.01	Lps.10,000	2.00
Lps.10,000.01	Lps.20,000	2.50
Lps.20,000.01	Lps.30,000	3.00
Lps.30,000.01	Lps.50,000	3.50
Lps.50,000.01	Lps.75,000	3.75
Lps.75,000.01	Lps.100,000	4.00
Lps.100,000.01	Lps.150,000	5.00
Lps.150,000.01	and over	5.25

Source: "Plan de Arbitrios", La Gaceta, 27,Dec.,1997

b.3 Business Income Tax

The business income tax is a local tax imposed on the revenue generated through a company's activities and the tax rates are variable depending on the revenue as shown in Table 2-28. Except for the residential waste collection fee, the waste collection fee shall be collected together with the business income tax every month.

Table 2-28: Tax Rate of Business Income Tax

Range of Annual Income		Per thousand
From	To	
Lps.0.01	Lps.500,000	0.30
Lps.500,000.01	Lps.10,000,000	0.40
Lps.10,000,000.01	Lps.20,000,000	0.30
Lps.20,000,000.01	Lps.30,000,000	0.20
Lps.30,000,000.01	and over	0.15

Source:Reglamento de Ley de Municipalidades, 1993

2.5 Environmental Policy

2.5.1 National Environmental Action Plan

On 1993 the Secretariat of Environment (SEDA), developed the Environment and Development Action Plan.

The Action Plan identified the main environmental problems as water and soil pollution, and solid waste disposal. The objectives of the Action Plan are to reduce the concentration of pollutants in the water and soil, through prevention and mitigation programs and to promote programs and pilot projects for manual sanitary landfills at a municipal level. Also the Action Plan aims to provide health and sanitation services to a larger portion of the population, such as: basic sanitation, water supply, collection and disposal of solid waste.

2.5.2 Organizations Concerned

The institutions concerned with the solid waste management are the following:

- Municipality of the Central District (AMDC)
- Secretariat of Public Health and Social Welfare (SSP)
- Secretariat of Natural Resources and Environment (SERNA)
- Secretariat of Government and Justice, and the municipalities
- National Service of Aqueducts and Sewerage (SANAA)
- National Enterprise of Electricity (ENEE)
- National Agrarian Institute (INA)
- Honduran Forestry Development Corporation (COHDEFOR)

Some community based and private institutions as well as NGO's also have promoted and executed hygiene and sanitation activities such as seminars, workshops and publicity campaigns to raise public awareness on the risks related to environmental pollution. Among these institutions are:

- Honduran Ecological Association (Asociación Ecológica Hondureña)
- Committee for the Conservation and Improvement of the Environment
- Rotary Club (Club Rotario)
- Lions Club
- Chamber of Commerce and Industry
- Junior Chamber
- PHYSYS
- PEPSI
- A CURACAO
- Telesistema Hondureño
- TACA International

2.5.3 Legislation

Environmental legislation has been consolidated since the publication of the General Law of Environment in 1993 (Decree 104-93) and its by-laws (Decree 109-93). It enabled the creation of the Secretariat of Environment, which in 1997 was combined with the Secretary of Natural Resources, forming the Secretariat of Natural Resources and Environment (SERNA).

Regarding solid waste collection, the Environmental Law promotes the municipalities to adopt a system of collection, treatment and final disposal of waste, including the possibilities of re-utilization and recycling (Art. 67).

Other laws that take environmental issues into account are:

- Law of Municipalities (Decree 134-90) and its by-laws (Ac. 018-93).
- Regulations on the National System of Environmental Impact Evaluation, and the forestry and agricultural related laws.
- Sanitation Code, Decree 65-91 (Código Sanitario, Decreto 65-91):

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Regarding solid waste, the sanitation code states that is the municipalities' obligation to organize, contract and bear responsibility for the cleaning, collection, treatment and final disposal of waste (Art. 52).

It also states that the operation of final disposal sites require prior authorization by the corresponding municipality with the approval of the Public Health Secretariat (Art. 53).

- Sanitary Regulations on Environmental Sanitation (Reglamento Sanitario de Saneamiento Ambiental)
- Police Law
- Law of AMDC Taxes ("Plan de arbitrios" de la AMDC)

2.6 Public Utilities

2.6.1 Water Supply

The national water supply coverage rate steadily rose during the 1985-95 period, from 62% in 1985 to 77% in 1995. The improvement has been greater in rural areas with an increase from 45% in 1985 to 66% in 1995 (Refer to Annex 1). The lack of coverage in the urban areas (9%) correspond to the marginal or slum areas.

In the Central District SANAA supplies services to 81,614 clients. In the Central District, those who have no access to SANAA's services, are supplied by the private sector (water tankers and wells), that is much more expensive and of poorer quality than SANAA's service.

2.6.2 Sewerage

In the period between 1985 - 1995, the sewerage service has covered a larger population than water supply, expanding from 59% in 1985 to 82% in 1995 nationally. Also the improvement has been greater in rural areas with an increase from 38% in 1985 to 71% in 1995 (Refer to Annex 1). The 5% deficit in coverage of urban areas correspond to the marginal or slum areas.

2.6.3 Roads

Table 2-29 shows the present road conditions in the Central District.

Table 2-29: Classification and Condition of Roads in the Central District

Category	TOTAL	Paved Network						Unpaved
		Concrete Blocks (Adoquin)	Hydraulic Concrete	Asphaltic Concrete	Simple Sealed Surface	Stone Paving	Total Paved	
Primary (km)	77.83	----	2.62	75.21	----	----	77.83	----
Secondary(km)	343.18	36.18	73.51	151.56	0.18	6.66	268.09	75.09
Tertiary (km)	251.38	4.05	15.27	7.17	----	1.89	28.38	223.00
Total (km)	672.39	40.23	91.40	233.94	0.18	8.55	374.30	298.09
Share	100%	5.98%	13.60%	34.80%	0.03%	1.27%	55.67%	44.33%

Source: Infrastructure Division, AMDC, March,1998 (unpublished data).

According to the table unpaved roads occupy a large proportion of the total (44%), which is mainly concentrated in the areas that have a steep gradient where access for

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collection service trucks is hindered. Also most of the paved roads observed are of
asphalt concrete.

2.6.4 Priority Ranking for Infrastructure Investments

According to a study currently undertaken by METROPLAN to ascertain the present
infrastructure conditions in the barrios of the Central District, water supply is the most
widespread covering a larger number of barrios, followed by street lighting, primary
schools and sewerage (Table 2-30). The least common are health centers, middle-high
schools and community centers.

Table 2-30: Ranking of Present Infrastructure Investments in the Central
District

	Sewer-age	Water Supply	Latrine	Street Lighting	Health Center	Kinder-garden	Primary School	Middle-High School	Community Center
Number of Barrios	192	373	135	283	23	183	200	77	80

Source: METROPLAN, AMDC, 1998