3.6 Institutional, Organizational and Financial System

3.6.1 Institutional System of Solid Waste Management[6]

3.6.1.1 Legislation and Regulation

A legal and regulatory framework controls the environmental management for solid waste in El Salvador, including AMSS, with the following juridical hierarchy:

- The Constitution of the Republic
- Treaties and agreements signed and ratified by El Salvador
- Secondary laws related
- Municipal ordinance.

Table 3-25 summarizes the juridical framework related to the management of solid wastes.

Table 3-25: Juridical Framework related to Solid Waste Management

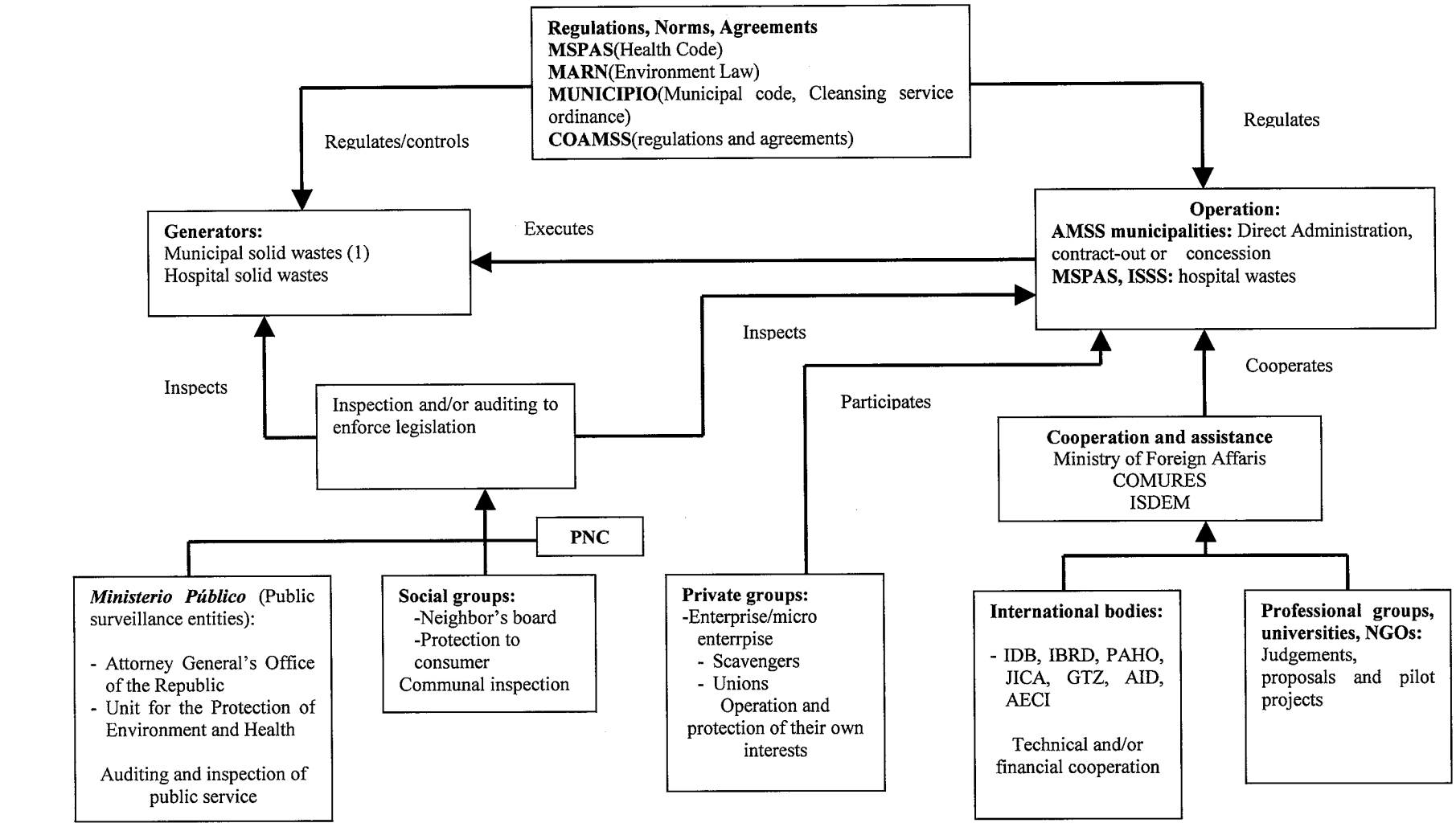
Juridical instrument	Enforced in	Relation with solid wastes	Body in charge	Sanctions	
				Regime	Enforcement
Constitution of the Republic	Throughout the country	Regular	Executive power	NA	NA
International treaties and agreements (Basel convention)	Throughout the country	Partial	MARN	Yes	None
Health Code	Throughout the country	Partial	MSPAS	Yes	Minimal
Municipal code	Municipality	Partial	Each municipality	Yes	Minimal
Environmental Law	Throughout the country	Partial	MARN	Yes	Minimal
Regulatory Ordinance on Cleansing service	Municipality	Partial	Each municipality	Yes	Minimal

Note: NA: not applicable
Source: Prepared by the Study Team

Figure 3-5 shows the institutional framework that encompasses all public, private and social sectors, as well as international bodies, that permanently and occasionally participate in the regulation, operation, inspection, financing and cooperation for the municipal and hospital solid waste management in AMSS.

Table 3-26: summarizes the functions to be performed by the diverse institutions and bodies in SWM in AMSS.

[6] Study on the institutional system is based on the information provided by AMSS municipalities in January 2000, on the "Análisis Sectorial de Residuos Sólidos en El Salvador" carried out by PAHO in May 1998 and on other documents of the bibliography.



(1) Municipal solid wastes: domestic, institutional, commercial and street sweeping solid wastes

Figure 3-5: Regulatory and Operative Institutional Framework of SWM in AMSS

Table 3-26: Functions to be performed by Institutions and Entities of SWM in AMSS (Year 1999)

Bodies	Establishes norms	Plans	Operates	Finances	Commercializes	Manages	Regulates	Inspects/ audits	Punishes	Cooperates/ consults
MSPAS	X	X					X	O	O	O
MARN	X	X					X	X	X	O
Municipalities	X	X	X	X	X	X	X	X	X	
COAMSS	X	X					X		X	O
OPAMSS	X	X					X			X
Solid waste generators		O	X	X		O		O		X
Ministerio Público (Public surveillance entities)								X	X	
Enterprise/ micro-enterprise		X	X	X	O	X				
Scavengers			X		X	X				
Unions			X			X				
Prof./Univ/NGOs		O				O	O	O		X
Communal groups		O	O	X		O		X		X
International bodies				X						X

Note: X: Total function O: Partial function Blank: No action

3.6.2 SWM Organizational System

a. Scheme of Municipal Cleansing Service

Based on the information compiled during the visits to the 14 municipalities the Study Team has prepared Table 3-27 and Table 3-28 that show the following:

- The 14 municipalities have their own organization charts. In general terms all municipalities follow the same model, with certain variables. It can also be noted that at least 4 of these organizational charts lack of the cleansing service.
- Only three municipalities have detailed charts on their cleansing services.
- Likewise, only 4 municipalities have ordinances that regulate the cleansing service; as a consequence, the remaining municipalities collect even hazardous refuse because there is no provision that prohibits such. In the same manner, only 4 municipalities have a Handbook of Cleansing Functions.
- Almost 30% (variation from 9% to 41%) of municipal personnel belongs to the cleansing service; more than 20% (variation from 5% to 48%) of municipality budget are spent on the cleansing service.

Table 3-27: Organization chart and Municipal Ordinances in AMSS

Municipality	Organization Chart		C.S. Regulating ordinance	Ordinance Fees		C.S. functioning handbook
	Municipality	C.S.		C.S.	S/L	
San Salvador	Yes	Yes	Yes (May 1989)	9/4/99		Yes
Mejicanos	Yes	-	-	14/5/99	19/1/200	-
Delgado	Yes	-	-		20/5/99	-
Cuscatancingo	Yes	Yes	-		-	-
Ayutuxtepeque	Yes	-	-	22/1/93	26/3/99	-
San Marcos	Yes	-	-	3/6/99	17/3/99	-
Nueva San Salvador	Yes	-	-	26/3/99	26/3/99	-
Antiguo Cuscatlán	Yes	-	Yes (Jan. 3, 1998)	1/6/94	-	-
Soyapango	Yes	Yes	Yes (Nov 25, 1998)		17/3/99	Yes
Ilopango	Yes	-	-	12/1/2000	12/1/2000	-
San Martín	Yes	-	-	26/5/95	-	Yes
Apopa	Yes	-	Yes (Feb 22, 1993)	21/5/99	25/5/99	-
Nejapa	Yes	-	-	10/12/98	-	Yes
Tonacatepeque	Yes	-	-	3/2/99	-	-

Note:
C.S.: Cleansing service
S/L: Sanitary landfill

Table 3-28: Hierarchy of the Cleansing Service in Municipalities of AMSS (Staff and resources), 1999

Municipality	1999 budget (million ¢)			Personnel(N°)			Position of cleansing service within municipal organization
	M	CS	CS/M%	M	CS	CS/M%	
San Salvador	353.0	54.6	15	4,000	1,000	25	Environmental sanitation manager (4th level)
Mejicanos	17.0	6.6	39	237	85	36	Does not appear in environmental sanitation (4th level)
Delgado	18.0	5.0	28	124	45	36	Does not appear in cleansing department (5th level)
Cuscatancingo	24.1	1.6	7	200	37	19	One of 12 departments (3rd level)
Ayutuxtepeque	8.7	1.6	18	52	11	21	One of 2 units of Public Services section (5th level)
San Marcos	10.7	1.8	17	102	42	41	One of 9 Sections of Services (4th level)
Nueva San Salvador	34.6	5.4	16	530	172	32	One of 8 Sections of Services (4th level)
Antiguo Cuscatlán	18.6	5.9	32	370	97	26	One of 8 Units of public services (5th level)
Soyapango	40.3	14.5	36	375	116	31	One of 4 Sections from the Municipal Services Management Office (4th level)
Ilopango	13.0	6.2	48	208	72	35	One of 5 Sections of public services (4th level)
San Martín	7.1	2.8	39	106	24	23	One of 4 Sections of public services (4th level)
Apopa	12.2	2.2	18	179	41	23	One of 9 Sections of Services (4th level)
Nejapa	8.5	0.5	6	45	12	27	Does not appear in Public Services (4th level)
Tonacatepeque	6.0	0.3	5	45	13	29	

Note: M: Municipality
CS: Cleansing service
Source: Table prepared by the Study Team based on information collected during the visits.

3.6.3 Financial System

The municipal finance for the 14 municipalities in AMSS mainly consists of:

- Municipal fund (Sección I) and
- Subsidies from Central Government (Sección II and Sección III).

Since Sección I used to be categorized as autonomous funds, it had been basically managed at municipality's discretion.

However, since "Fondo de Desarrollo Economico Social(FODES)" was established in 1998, whose subsidy has been granted to municipalities for the establishment of their infrastructure through "Fondo de Inversion Social para el Desarrollo Local(FISDL)" and "Instituto Salvadoreño de Desarrollo Municipal (ISDEM)", 20% of the subsidy became available as funds for municipal operations. That accounts for a part of present Sección I.

Municipalities formerly collected only cleansing fee (tasa de aseo) from citizens for covering the expenditure of cleansing services. Since Nejapa landfill site started to be operated in 1999 by the MIDES, 10 municipalities collect landfill fee (tasa de

relleno sanitario) from citizens to cover the final disposal cost in addition to the cleansing fee.

Cost accountability of municipal SWM further becomes unclear for most of the municipal officers, because landfill fee collection from the citizens and its payment to the MIDES has started just recently and an independent (revenue and expenditure) accounting for the sanitary landfill is started to be employed.

Table 3-29 shows trends of annual revenue and expenditure of respective municipalities from 1997 to 1999. Comparing (Tax + Non-tax) per population of municipal revenue projected for 1999, the following municipalities which encompass high-income residential areas ranked top among the 14 municipalities.

- San Salvador: 492.2 colon/person (US$ 56.3/person)
- Antiguo Cuscatlan: 367.4 colon/person (US$ 42.0/person)
- Nueva San Salvador: 271.0 colon/person (US$ 31.0/person)

As for the other 11 municipalities, it fluctuates around one-tenth of the top 3 cities. An average of all 14 municipalities is as follows:

- AMSS average: 187.3 colon/person (US$ 21.4/person)

Table 3-29: Trend of Annual Revenue and Expenditure

Unit : 1000colon

			San Salvador	Mejicanos	Delgado	Cuscatancingo	Ayutuxtepeque	San Marcos	Nueva San Salvador	Antiguo Cuscatlan	Soyapango	Ilopango	San Martin	Apopa	Nejapa	Tonacatepeque
1997 Real	Revenue (A)	Total	237,909	14,946	9,930	NA	2,757	NA	28,389	20,302	29,625	10,512	NA	NA	1,907	NA
		Tax revenue	91,745	1,505	NA	NA	769	NA	10,357	NA	6,622	NA	NA	NA	NA	NA
		Non-Tax revenue	71,951	7,608	1,480	NA	675	NA	8,569	6,090	6,234	NA	NA	NA	NA	NA
		Others	74,213	5,833	8,450	NA	1,313	NA	9,463	NA	16,769	NA	NA	NA	NA	NA
	Expenditure(B)		254,369	NA	5,074	NA	2,757	NA	27,987	19,712	32,327	5,907	NA	NA	2,491	NA
	Balance(A-B)		-16,460	NA	4,856	NA	0	NA	402	590	-2,702	4,605	NA	NA	-584	NA
1998 Real	Revenue (A)	Total	298,632	14,945	10,358	NA	3,533	NA	34,006	22,754	31,364	11,254	6,517**	NA	6,034	1,906**
		Tax revenue	90,942	1,909	NA	NA	1,295	NA	12,397	NA	6,163	NA	1,045	NA	NA	NA
		Non-Tax revenue	97,028	7,720	5,059	NA	900	NA	5,024	7,160	7,123	NA	3,490	NA	NA	NA
		Others	110,662	5,316	5,299	NA	1,338	NA	16,585	NA	18,078	NA	1,982	NA	NA	NA
	Expenditure(B)		281,664	16,538	8,700	NA	3,543	NA	30,437	20,046	34,563	9,957	NA	NA	7,472	NA
	Balance(A-B)		16,968	-1,593	1,658	NA	-10	NA	3,569	2,708	-3,199	1,297	NA	NA	-1,438	NA
1999 Budget	Revenue(A)	Total	322,537	15,227	18,175	13,017	8,652	10,662	56,785	21,265	40,332	12,970	6,743	13,994	8,554	5,986
		Tax+ Non-tax(c)	**233,013**	**9,312**	**11,486**	**4,959**	**1,740**	**4,622**	**41,391**	**15,713**	**19,585**	**7,274**	**4,534**	**8,420**	**1,265**	**1,785**
		Tax revenue	115,299	1,621	1,363	227	114	1,191	14,716	8,164	7,003	2,081	1,044	3,082	55	24
		Non-Tax revenue	117,714	7,691	10,123	4,732	1,626	3,431	26,675	7,549	12,582	5,193	3,490	5,338	1,210	1,761
		Others	89,524	5,915	6,689	8,058	6,912	6,040	15,394	5,552	20,747	5,696	2,209	5,574	7,289	4,201
		(c)/population (colones/person)	**492.2**	**50.3**	**76.9**	**55.1**	**45.6**	**66.4**	**271.0**	**367.4**	**69.1**	**57.1**	**44.9**	**51.3**	**40.2**	**44.8**
		(c)/population (US$/person)	**56.3**	**5.7**	**8.8**	**6.3**	**5.2**	**7.6**	**31.0**	**42.0**	**7.9**	**6.5**	**5.1**	**5.9**	**4.6**	**5.1**
	Expenditure(B)		322,537	15,227	18,175	13,017	8,652	10,662	56,785	21,265	40,332	12,970	6,743**	13,994	8,554	5,986
	Balance(A-B)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999 Real	Revenue (A)	Total	360,804	10,553	21,171	11,665	5,216	10,298	38,497	24,698	48,806	16,660	7,278**	10,222**	5,440	4,333
		Tax revenue	93,532	2,545	1,068	235	174	1,434	13,730	8,536	7,865	2,633	1,662	3,196	319	34
		Non-Tax revenue	146,023	5,056	6,345	5,684	2,379	4,759	18,091	8,846	17,954	6,762	3,582	5,310	1,220	3,061
		Others	121,249	2,952	13,758	5,746	2,663	4,105	6,676	7,316	22,987	7,265	2,034	1,716	3,901	1.238
	Expenditure(B)		383,030	18,240	20,841	11,750	6,754	9,436	34,600	18,597	41,728	13,337	7,875**	11,297**	4,963	3,652
	Balance(A-B)		-22,226	-7,687	330	-85	-1,538	862	3,897	6,101	7,078	3,323	-597	-1,075	477	681
Population (1999)			473,374	185,204	149,394	90,079	38,158	69,660	152,723	42,773	283,598	127,434	101,086	163,974	31,466	39,871

sources : financial department of each municipalities, note : ** projection, Non-tax revenue: mainly the fee for municipal service, NA: not available
1US$=8.75colones

Table 3-30 illustrates unit cost for SWM by respective municipalities based on the analysis above on annual expenditure. The result shows that the unit cost of SWM in AMSS ranges from US$ 9.4 to 53.9/ton and the average unit cost in AMSS is calculated as US$ 43.2/ton.

Table 3-30: Unit Cost of SWM

Item / City	Service projected population (1998)	Colons				US $			
		Per person	Per ton			Per person	Per ton		
		Overall cost (c/person)	Collection and transport (c/ton)	Disposal (c/ton)	Overall cost (c/ton)	Overall cost (US$/person)	Collection and transport (US$/ton)	Disposal (US$/ton)	Overall cost (US$/ton)
San Salvador	467,006	154.7	87.7	147.7	443.4	17.7	10.0	16.9	50.7
Mejicanos	180,775	41.5	97.1	169.0	309.8	4.7	11.1	19.3	35.4
Delgado	145,189	25.2	100.1	202.1	346.6	2.9	11.4	23.1	39.6
Cuscatancingo	85,825	20.3	144.1	NA	193.6	2.3	16.5	NA	22.1
Ayutuxepeque	26,216	52.0	142.4	214.9	386.1	5.9	16.3	24.6	44.1
San Marcos	68,685	43.9	120.0	140.4	279.1	5.0	13.7	16.0	31.9
Nueva San Salvador	133,461	101.3	265.0	188.6	507.1	11.6	30.3	21.6	58.0
Antiguo Cuscatlan	40,515	176.5	337.5	25.3	494.1	20.2	38.6	2.9	56.5
Soyapango	282,066	51.5	96.2	192.1	335.7	5.9	11.0	22.0	38.4
Ilopango	122,309	39.7	132.5	180.2	327.2	4.5	15.1	20.6	37.4
San Martin	66,861	17.3	121.3	NA	138.1	2.0	13.9	NA	15.8
Apopa	155,588	31.1	76.4	206.2	305.8	3.6	8.7	23.6	35.0
Nejapa	14,464	18.1	135.5	NA	158.5	2.1	15.5	NA	18.1
Tonacatepeque	27,640	18.4	53.7	NA	69.8	2.1	6.1	NA	8.1
Total	1,816,600	75.1	128.0	NA	385.8	8.6	13.5	NA	44.1

NA: not available

Table 3-31 shows typical cost of municipal SWM in Latin American countries.[7]

Table 3-31: Typical Cost of Municipal SWM

Item	Portion (%)	Unit cost (US$/ton)
Collection	43 to 45	15 to 40
Transfer	0 to 15	0 to 10
Final disposal	0 to 10	0 to 10
Total (without sweeping)	100	35 to 70

The unit cost in the AMSS that are estimated through the above analysis could be ranked in the middle value of typical municipal SWM cost in Latin American countries.

However, it is necessary to analyze and evaluate the unit cost in view of ability to pay by municipalities and citizens, in order to realize a sustainable municipal SWM.

[7] Diagnosis of Municipal Solid Waste Management in Latin America and the Caribbean, Second edition, PAHO, 1998

Table 3-32 shows the balance of Municipal SWM. Municipal revenue is fees collected from users and expenses comprise of cost on cleansing services activities by municipal cleansing departments, and landfill fee paid to MIDES and commission paid to electric power companies.

Table 3-32: Balance of Municipal SWM (1999)

Unit : 1,000 colones

	Revenue	Expense	Balance
San Salvador	96,839	72,241	24,598
Mejicanos	7,152	7,502	-350
Delgado	3,906	3,665	241
Cuscatancingo	2,100	1,742	358
Ayutuxtepeque	1,321	1,364	-43
San Marcos	2,394	3,018	-624
Nueva San Salvador	16,110	13,525	2,585
Antiguo Cuscatlan	3,191	7,149	-3,958
Soyapango	13,194	14,516	-1,322
Ilopango	5,357	4,861	496
San Martin	1,553	1,159	394
Apopa	3,981	4,842	-861
Nejapa	250	262	-12
Tonacatepeque	276	510	-234

The expense shown in the table above only refers to direct expenses of municipalities (i.e., indirect expenses are not added up), however, only 6 out of 14 municipalities have positive balance.

Municipalities that can not secure such revenue at present to at least cover the direct expenses should either

- re-structure the fee collection system, or
- cut down the expenses drastically,

in order to realize a sustainable municipal SWM.

3.7 Relevant Studies

The table below shows studies related with SWM that were carried out in El Salvador in recent years.

Table 3-33: Relevant Studies

Date	Name of Study	Remarks
1992	Feasibility assessment for the implementation of a solid waste transfer station for the zone.	Ing. Jorge Sánchez, ISDEM
1992	Final consulting report on waste collection designing in the city of San Salvador	Ing. Francisco Gálvez Von Collas
1994	Current situation of solid wastes and guidelines proposal for the creation of policies and strategies to integrate the sector	Executive Secretariat of the Environment (SEMA), Ing. Juan Guillermo Umaña
1995	Project on Solid Waste Management Improvement of the Metropolitan Region, Phase-1: Diagnosis	Canada International Development Agency (CIDA), San Salvador municipality ADS Groupe-Conseil Inc., Doble G
1995	Project on Solid Waste Management Improvement of the Metropolitan Region, Phase-2: Execution program	CIDA, San Salvador municipality ADS Groupe-Conseil Inc., Doble G
1996-97	Metropolitan plans for the cities of Santa Ana, Sonsonate, San Miguel and San Salvador Metropolitan Area	
1997	Support to the Environmental Sanitation Program of El Salvador, Environmental Policy for Solid Waste Management	Executive Secretariat of the Environment (SEMA) SM Group International Inc.
1997-1999	Design and feasibility study of the Decontamination of critical areas, El Salvador (ES-0074). • Diagnosis– Current situation of Municipal Solid Waste • Report of alternatives– Municipal Solid Waste Management • Diagnosis– Current situation of Hazardous Medical Waste • Report of alternatives– Hazardous Medical Waste Management • etc.	BID, ARCADIS-EuroConsult, Eurolatina
1998	Preliminary mission in the Solid Waste Management field	BID/San Salvador municipality Sandra Cointreau Levine
August 1998	Sector Analysis of Solid Wastes in El Salvador	MSPAS, PAHO
1998	Solid waste pollution in San Salvador Metropolitan Area. Work paper	MARN, USAID, PRISMA, Gilberto García
September 1998	"Regional Medical Solid Waste Management Program, Assessment study of possible alternatives in Medical Solid Waste treatment, in terms of typology and location, and Environmental Impact Assessment of the recommendable solution"	ALA 91/33 agreement, ECO Ingenieros

3.8 MIDES Project

In 1994, the Canadian Agency of International Development financed this project as a response to a request by the municipality of San Salvador, which was carried out in 1995. The study was carried out by the Canadian company "ADS Groupe-Conseil Inc." associated with the Salvadoran company "Empresas Doble G."

In September 1997 the associated companies CINTEC (Canadian), SOPRIN ADS (Canadian) and LYNMAR (Salvadoran) presented COAMSS a proposal for SWM in AMSS.

The solutions outlined by these companies in their proposal were similar to those recommended in the "SWM Improvement in the Metropolitan Region" project, which was carried out in 1995, and in which the consulting company ADS also participated.

The investment costs estimated for the first five years were as follows:

Table 3-34: Proposed Investment Costs

Activities	Cost (US $)
Communication, education and sensitization program	2,150,000
Administration program	2,250,000
Integration program	1,000,000
New sanitary landfill	23,500,000
Separation center	9,000,000
Transfer station	6,200,000
Closing of two dumping sites	7,700,000
Compost plant	1,200,000
Warranties, insurance and financing	8,200,000
Total	**61,200,000**

The terms of execution of the proposal encompassed a 5-year program, as shown next:

Table 3-35: Proposed Program

Activities	1998	1999	2000	2001	2002
Communication, education and sensitization program					
Administration program					
Integration program					
New sanitary landfill					
Separation and transfer station					
Closing of 2 dumping sites					
Compost plant					

On November 14th, 1997, an agreement was signed between COAMSS -represented by the Mayor of San Salvador and Coordinator of COAMSS- and CINTEC International Inc., a company established under the laws of Barbados and represented by a Director of that company.

Such agreement was made in order to establish a PUBLIC/PRIVATE JOINT STOCK COMPANY, under the laws of the Republic of El Salvador and called "Manejo Integral de Desechos Sólidos, Sociedad por Acciones de Economía Mixta" or simply "MIDES". Said had the purpose of designing, building and operating an integrated solid waste management system and its related facilities in AMSS, which consists of a new sanitary landfill, transfer facilities, facilities to classify and recycle garbage, facilities for processing compost and an educational center, as well as the closing of the existent landfills.

The main clauses of this agreement were the following:

- MIDES' equity will be divided into 200 stocks for public sector and 1800 stocks for private sector, each one having a nominal value of 100 colones.
- Three Directors will constitute MIDES' Board of Directors; one appointed by the public sector and the other two by the private sector.
- It is agreed upon that the price for use of the facilities of the project (all of them, not only the sanitary landfill) will be of US$18/ton. Such price will be annually increased according to the increase of cost of living in El Salvador, which is estimated by the Central Bank (Banco Central de Reserva, BCR).
- It is guaranteed that the municipalities participating in the Project will deliver MIDES a minimum amount of 360,000 tons per year during 20 years, with a minimum monthly payment equivalent to 30,000 tons, according to the metric ton price paid at that time.
- COAMSS will be responsible for the fee collection from users, which will be conducted by electric power distribution companies.
- CINTEC is committed to financing the project up to a maximum amount of US$61,200,000, as described in the PROPOSAL.
- The term of the agreement is set at 20 years as from the moment the sanitary landfill receives its first discharge of solid wastes. Although there is not a specific timetable for the execution of the project, it is considered that the programming presented in the PROPOSAL is valid.
- In cases of dispute or disagreement, arbitration will be carried out in Miami, Florida, USA.

On February 6th, 1997, Mayors of San Salvador, Mejicanos, Ciudad Delgado, Ayutuxtepeque, San Marcos, Nueva San Salvador, Soyapango, Ilopango, Apopa and Nejapa entered individual authenticated private contracts with "MIDES, S.E.M de C.V.", so that each municipality participates in the project for the integral management of solid wastes in AMSS.

The 10 Municipalities have guaranteed MIDES the delivery of a minimum amount of solid wastes in the facilities during the 20 years of the contract. The total minimum amount per year adds up to 360,000 tons (30,000 ton/month), and each municipality is committed to delivering the following minimum quantity:

Table 3-36: Minimum Amount to be Disposed of at Nejapa's Sanitary Landfill

Municipality	% of total	Minimum amount/year (ton)	Minimum amount/month (ton)
San Salvador	46.67	168,000	14,000
Mejicanos	5.83	21,000	1,750
Ciudad Delgado	7.50	27,000	2,250
Ayutuxtepeque	1.50	5,400	450
San Marcos	2.67	9,600	800
Nva. San Salvador	5.00	18,000	1,500
Soyapango	13.89	50,000	4,167
Ilopango	3.61	13,000	1,083
Apopa	12.50	45,000	3,750
Nejapa	0.83	3,000	250
Total	100.00	360,000	30,000

Table 3-37 shows the 1999 performance activities that comprise the MIDES Project.

Table 3-37: Other Activities of MIDES Project, 1999

Activities	Performance
1. Transfer station	• CINTEC acquired the land for the transfer station in the municipality of Apopa, about 10 km away from Nejapa S/L. • CINTEC is preparing the Environmental Impact Assessment. • CINTEC previously presented to MARN the application to begin the environmental permission process.
2. Separation plant for recycling	• MIDES changed the location of the future separation plant to the land where the transfer station will be located.
3. Compost plant	• No progress
4. Closing of two dumping sites (Mariona and Ilopango)	• Initial topographic works in Mariona. • MIDES modified the initial proposal and will not close Ilopango dumping site.
5. Communication, education and sensitization program	• Participation in the "Yo no la riego (*I do not spill it*)" campaign carried out by the municipality of San Salvador. • Construction of an educational center: no progress • When the sanitary landfill began operations, different activities were conducted and preparation and diffusion of informative material on the project was carried out. • A video on the integral management of solid wastes was prepared. • Students' visits to Nejapa sanitary landfill.
6. Program of Administration	• To expedite in order to allow CAESS and DELSUR be in charge of the collection of fees of Nejapa sanitary landfill. • Data processing project for billing through CAESS or DELSUR
7. Integration program	• MIDES has registered 370 authorized scavengers with an "identification card" and distributed as follows: 28 in carpentry shops in Ciudad de Don Bosco and Apopa; around 250 in separation activities in Mariona and the remaining in collection micro-enterprises in different municipalities.

The JICA Study Team visited the municipalities of Mejicanos, Ciudad Delgado, Ayutuxtepeque, San Marcos, Nueva San Salvador, Soyapango, Ilopango, Apopa and Nejapa. Mayors or officials interviewed expressed that the greatest advantage of the project was the direct benefit for public health and for the preservation of the environment. Regarding the greatest disadvantage, most of them mentioned high cost as the most important restriction.

3.9 Assessment of the Present Condition and Confirmation of Key Issues

3.9.1 Technical System

a. Collection and Haulage System

The collection and haulage in AMSS are working fairly well. This would be because that the municipalities have enough experience of operating it and the personnel concerned have been get used to it. However, problems actually exist in the collection and haulage. Those are;

- the working rate and productivity decline of the 16yd^3 compactor,
- the haulage occupying the considerable portion (time and distance) in a trip, and
- the poor maintenance (in the most municipalities).

b. Final Disposal System

It is appreciated but is also as a matter of course that the MIDES site has stationed heavy equipment for waste accumulation/compaction and applies daily soil coverage practices because the site receives as much as about 1000ton/day.

Meanwhile, as for ESPIGA site which receives receiving about 70ton/day, it is awaited that daily waste accumulation/compaction and soil coverage should be practiced.

As for San Martin and Tonacatepeque open dumping sites, it would be very appreciated that if they are improved to apply once- or twice- a week of soil coverage. However in practice, it would be very difficult to cover soil over the disposed waste since the waste is dumped down in a ravine slope in these sites.

The landfill structure designed for the MIDES Nejapa site is good enough to protect the environment.

Although the other three sites are already in use since a few years before, it is impossible today to add bottom impermeable liner or leachate collection/treatment system.

While MIDES site has sufficient control over hygiene and scavenging, the other 3 sites need to be improved in this context.

c. Medical Centers with Medical Waste Management System

- There are deficiencies in the labeling of wastes; it is not standardized and does not allow the identification of the generation source within the facilities.

- Central warehouses do not have all the drainage, hydraulic installations and finish conditions and restricted access only takes place in 50% of establishments. There are no appropriate facilities to disinfect the containers utilized for the storage and haulage of wastes.

d. Medical Centers that Do Not Have a Hospital Solid Waste Management System

- The majority of these hospitals report that they separate polluted from common waste; however, this separation is not reliable since no color code, tagging or standardized containers are used. They do not have written instructions or the willingness from the general management to implement them.

3.9.2 Institutional and Organizational System

Table 3-38 summarizes the key issues that have been confirmed.

Table 3-38: Organizational Systems in SWM. Confirmation of Key Issues

Items	Key issues
Organization	- Organization chart: With the exception of San Salvador, the other cleansing services are organized by operations in collection, sweeping and maintenance. - Hierarchy of the cleansing service: very low; 4th level. - Regulatory ordinance of the cleansing service: only in 4 municipalities. - Function handbook of cleansing service: only in 4 municipalities. - San Salvador has a more complex organization.
Planning	- Human resources in cleansing services in several municipalities are not qualified. - The main plans and projects for SWM in mind by municipalities should meet the sustainability of the services.
Operation	- Collection coverage: 60% to 95% of urban population in the different municipalities. Most of these cleansing services are rendered by the corresponding municipality, but private contractors/concessionaires also provide such. - Most of the municipalities face preventive maintenance, spare parts supplying and equipment repair problems. - Manual and mechanic sweeping is provided directly by municipal cleansing services. - Some municipalities are thinking about getting rid of containers. (There are more than 200 in AMSS).
Commercial	- Fee collection efficiency along with electricity billing by CAESS and DELSUR is high. - With the exception of San Salvador, when fees not paid for the waste service in the bill of the following month is not recovered, it could allow user to pay for the waste fees only 6 months/year. - Modernization and updating of the tax payers' registry is required. - The community refuses to pay for a high sanitary landfill fee. - The collection of the waste fee from those that are not rendered the service is unfair. - Great generators of wastes should not be subsidized either for the sanitary landfill fee.
Financial	- Revenue/expenditure ratio of cleansing service has a deficit in almost all the municipalities. - No municipality has a cost accounting of the services. - Treasury works with only one and whole accounting for the entire municipality.
Administrative	- The important difference of workers per 1000 people (a range from 0.3 to 2.4 workers/1000 inhab.) should be studied and analyzed regarding the efficiency of the service rendered. - Formal and informal participation by private sector is important, and its participation in SWM will keep on increasing. - It will be necessary to re-examine the contract-out and concession processes to achieve a total transparency of both, competition among enterprises and cost reduction. On the other hand, Technical Supervision Units in municipalities should be duly organized. - Management of pathological hospital wastes by MSPAS, that began in January 2000, should improve day by day in close cooperation with AMSS municipalities.
Social	- Present and future activity by micro-enterprises should be promoted, consulted, trained and formalized. - Formalization of more than 300 scavengers that are working at Mariona and 3 other dumping sites. - A study to create collection micro-enterprises, formed by municipal workers themselves as an alternative option. - Weak community participation should change through sensitization, informational, communication and educational programs focused on elementary education.

3.9.3 Financial System

In order to realize a sound and sustainable municipal SWM, it is necessary to establish a system to assure the revenue (i.e., the service fee collection) to cover not only the direct cost but also the indirect cost of municipal SWM. However in the present situation, only a few municipalities out of 14 municipalities have just enough revenue (SWM fees) to cover the direct cost of the municipal SWM.

Table 3-39: Examination of Current Balance of SWM

	SWM cost (**direct** only)	SWM Fees collected	Balance	Municipal (Tax+Non-tax) Income total	Share of SWM cost to Tax+Non-tax	Municipal budget total: Central subsidy & (Tax+Non-tax)	Share of SWM cost to total revenue
	A	B	B-A	C	A/C	D	A/D
	(c/person[1)])	(c/person[2)])		(c/person*2)	%	(c/person*2)	%
San Salvador	154.7	204.6		492.2	31.4	681.4	22.7
Mejicanos	41.5	38.6	red	50.3	82.5	82.2	50.5
Delgado	25.2	26.1		76.9	32.8	121.7	20.8
Cuscatancingo	20.3	23.3		55.1	36.9	144.5	14.0
Ayutuxtepeque	52.0	34.6	red	45.6	114.1	226.7	22.9
San Marcos	43.9	34.4	red	66.4	66.2	153.1	28.7
N. San Salvador	101.3	105.5		271.0	37.4	371.8	27.3
Antiguo Cuscatlan	176.5	74.6	red	367.4	48.0	497.2	35.5
Soyapango	51.5	46.5	red	69.1	74.5	142.2	36.2
Ilopango	39.7	42.0		57.1	69.6	101.8	39.0
San Martin	17.3	15.4	red	44.9	38.7	136.9	26.0
Apopa	31.1	24.3	red	51.3	60.6	85.3	36.5
Nejapa	18.1	7.9	red	40.2	45.0	271.8	6.7
Tonacatepeque	18.4	6.9	red	44.8	41.2	150.1	12.3

Note: [1] Service Projected Population, [2] Census Population

In order to examine citizen's ability-to-pay (ATP) for SWM fees, Table 3-40 shows relation between the "SWM cost per person per year" and average annual income of the citizen.

Table 3-40: SWM Cost and Burden on Citizen's Income (BCI)

A	B	C	D	E	F	G
	Annual Municipal SWM cost (colones)	Service projected population (1999)	Average annual income (colon/person)	Unit cost per person (colon/person/ year)	Unit cost per person (US$/person/year)	Unit cost per Annual income
San Salvador	72,241,000	467,006	17,650.7	154.7	17.7	0.88%
Mejicanos	7,501,702	180,775	15,488.6	41.5	4.7	0.27%
Delgado	3,665,464	145,189	12,029.8	25.2	2.9	0.21%
Cuscatancingo	1,741,541	85,825	11,481.6	20.3	2.3	0.18%
Ayutuxepeque	1,363,733	26,216	14,183.9	52.0	5.9	0.37%
San Marcos	3,017,786	68,685	10,813.6	43.9	5.0	0.41%
Nueva San Salvador	13,525,187	133,461	20,011.0	101.3	11.6	0.51%
Antiguo Cuscatlan	7,149,455	40,515	39,874.4	176.5	20.2	0.44%
Soyapango	14,515,509	282,066	13,801.2	51.5	5.9	0.37%
Ilopango	4,860,581	122,309	11,547.1	39.7	4.5	0.34%
San Martin	1,159,211	66,861	8,891.0	17.3	2.0	0.19%
Apopa	4,841,514	155,588	10,173.1	31.1	3.6	0.31%
Nejapa	261,952	14,464	7,321.6	18.1	2.1	0.25%
Tonacatepeque	509,705	27,640	7,321.6	18.4	2.1	0.25%
Total/average	137,827,505	1,816,600	14,327.8	75.1	8.6	0.52%

The SWM direct cost ranges from **0.19% to 0.88%** of the citizen's income in AMSS.

The indicator of citizen's ability-to-pay (ATP) for SWM fees (i.e., what percentage on income) varies depending on the economical situation of respective countries or cities. As a general reference for this examination, an example[8] of middle income countries with GDP per capita of about US$1,950 is given in Table 3-41.

Table 3-41: Representative Costs of Municipal SWM

SWM cost components	Percentage on Citizen's Income (%)
Collection	0.5 to 1.1
Public cleansing	0.1 to 0.2
Disposal	0.05 to 0.2
Transfer	0.1 to 0.2
Total	0.75 to1.7

Meanwhile, Table 3-41 indicates a reasonable range of citizen's burden for municipal SWM cost (which includes capital expenditure and indirect costs). The range from 0.75% to 1.7% of income is for bearing both current and capital expenditure of municipal SWM. Assuming representative proportions of 70% and 30% between current expenditure and capital expenditure on municipal SWM, it is suggested that a range from 0.53% to 1.19% of income is for bearing the current expenditure of municipal SWM. A mean value of 0.53% and 1.19% is calculated as **0.86%** herewith.

[8] Conceptual Issues and Experiences in Developing Countries, December 1991, Sandora Cointreau-Levine

Table 3-42 shows willingness-to-pay (WTP) for municipal SWM fees by citizens in AMSS that is induced from the public opinion survey (POS) of this study. It ranges from 33.3 to 65.0 colones/person/year being 0.17% to 0.65% of their annual income. Its mean value is 44 colon/person/year and 0.33% of the annual income of citizens.

Table 3-42: Willingness to Pay for Municipal SWM Fees

	Willingness to pay (colon/person/year)	Willingness to pay per Annual income
San Salvador	50.7	0.29%
Mejicanos	47.7	0.31%
Delgado	35.7	0.30%
Cuscatancingo	40.5	0.35%
Ayutuxepeque	-	-
San Marcos	48.3	0.45%
Nueva San Salvador	33.5	0.17%
Antiguo Cuscatlan	65.0	0.16%
Soyapango	38.0	0.28%
Ilopango	33.3	0.29%
San Martin	57.7	0.65%
Apopa	35.4	0.35%
Nejapa	-	-
Tonacatepeque	-	-
Average	44.2	0.33%

Source: results of public opinion survey in this study

Figure 3-6 illustrates relations among present citizen's burden, ATP and WTP.

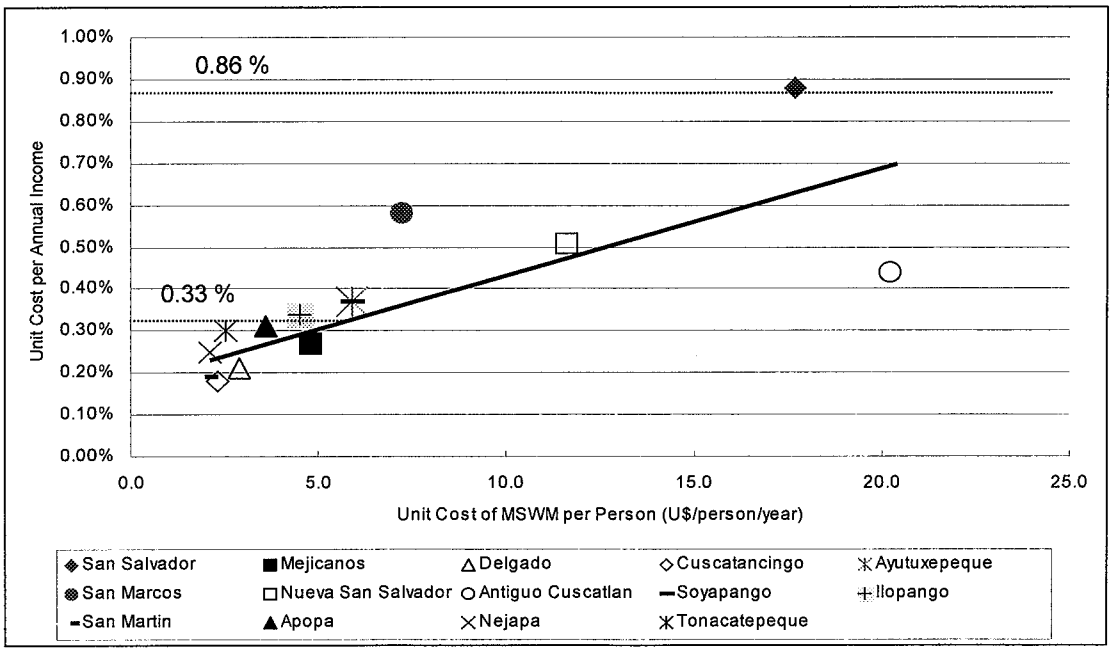


Figure 3-6: Relation among BCI, ATP and WTP

As shown in Figure 3-6, present "burden on citizen's income (BCI)" for 7 municipalities of Mejicanos, Delgado, Cuscatancigo, San Martin, Apopa, Nejapa, Tonacatepeque are 0.27%, 0.21%, 0.18%, 0.19%, 0.31%, 0.25%, 0.30% respectively and they are below the mean value of WTP given by the POS. However, the mean value of BCI (i.e., 0.53%) for 14 municipalities exceeds the mean value of WTP (0.33%) given by the POS.

Present BCI of San Salvador municipality accounts for 0.88%, which exceeds the ATP value (0.86%) induced from Cointreau's data.

If it is assumed that the appropriate BCI for AMSS is in the range of a mean value of the ATP above and the WTP from the POS, the present BCI of 14 municipalities on average falls on this mean value of ATP and WTP (about 0.6%). It consequently suggests that the **present BCI in AMSS reaches the upper limit of citizen's ATP in general in AMSS.**

This shows that the direct cost of present municipal SWM is considerably expensive against general ATP of citizen in AMSS.

Meanwhile, the municipal SWM cost examined herewith is the direct cost of municipal SWM in AMSS, which does neither include the indirect cost nor capital expenditure. Therefore, actual citizen's burden will be heavier than what was examined above.

In this context, examination of the following issues should be required for formulating the Master Plan.

1. A system to establish, realize and monitor the revenue/expenditure balance of municipal SWM (i.e., an independent cost accounting for SWM)
2. Establishment of component-wise cost accountability for SWM
3. Principles and strategies for fee collection (e.g., improvement of fee collection system)
4. Fee rates justification (examination of respective users' burden in view of ability-to-pay)