

## 4.8 MIDES Project

### 4.8.1 Background

From the decade of 1980-1990, the urban development of the city of San Salvador and the surrounding co-urbanized municipalities has concerned national and local authorities, as well as the residents themselves. As a consequence in 1986, several municipalities formed the "Mayors Council of San Salvador Metropolitan Area (COAMSS)". Later on July 14<sup>th</sup>, 1987, Official Gazette No.129 issued the creation of the denominated autonomous decentralized entity known as "Mayors Council of San Salvador Metropolitan Area (COAMSS)", whose purposes are the following among others:

- Coordinate the services rendered in the AMSS.
- Conduct actions among municipalities of AMSS with the purpose of achieving a harmonic and sustained development of their municipalities.

At the same time, public opinion media, environmental groups and municipal authorities themselves were also concerned about solving the management of solid wastes in AMSS.

### 4.8.2 "Solid Waste Management Improvement in the Metropolitan Region" 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." The study consists of 2 phases.

The recommendations of the Phase 1 (Diagnosis) that were presented in May 1995 are summarized next.

#### Priority 1

- Beginning of a new project of SWM.
- Establishment of a SW collection and haulage system.
- Establishment of a new sanitary landfill, only one for the whole metropolitan area.
- Closing of "Mariona" dumping site.
- Establishment of an education and sensitization program for the citizens.

#### Priority 2

- Establishment of a separation-transfer station for solid wastes.
- Integration of scavenger (*pepenadores*) groups to the new program

#### Priority 3

- Production of energy or compost.

- Installation of a waste oil recovery system and others.

Phase 2 (Execution program) of the project was presented in October 1995. The proposed recommendations that are similar to the diagnosis of Phase 1, highlight the following:

Collection and haulage plan that includes “optimization of materials and human resources, equipment acquisition and replacement plan, a new design of the collection plan and possible privatization scenarios.”

- Construction of a new sanitary landfill.
- Construction of “a transfer unit and a separation center”
- Compost production.

Regarding the “Policy on fees and billing”, the following is recommended:

- The operation and administration of the new sanitary landfill, separation and transfer station should be in charge of a single contractor.
- A minimum annual tonnage should be guaranteed to the private company.
- To bill municipalities.
- Fixed duration of the long-term contract (15 years).
- Contractor must be paid according to a pre-established rate.
- The operation contract should be set in American dollars.

#### **4.8.3 “Solid Waste Management Improvement in the Metropolitan Region” Proposal**

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 4-72: 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
<b>Total</b>	<b>61,200,000</b>

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

Table 4-73: 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					

#### 4.8.4 Agreement COAMSS-CINTEC International Inc.

On November 14<sup>th</sup>, 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.

- COAMSS is committed to acquiring and providing MIDES with two places within AMSS: the first one for the sanitary landfill, separation and recycling plants, the compost plant and the educational center; whereas the second one will be for transfer station.
- 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.
- COAMSS will provide MIDES, with no cost for the latter, with the equipment, machinery, vehicles and spare parts that were used in the APOPA-NEJAPA landfill.
- 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.

#### **4.8.5 Incorporation of "MIDES, S.E.M. de C.V."**

On December 2<sup>nd</sup>, 1997, COAMSS and "CINTEC International Inc." prepared the authenticated document for the incorporation and creation of "MIDES, S.E.M. de C.V.", which contains most of the clauses included in the agreement reached between COAMSS and CINTEC International Inc. on November 14<sup>th</sup>, 1997.

"MIDES, S.E.M. de C.V." is therefore constituted as a public/private joint stock company, created under the Commerce Code of El Salvador.

Company stocks were divided as follows: 90% belongs to CINTEC International from Barbados and 10% to the government through COAMSS. Public shares cannot be transferred.

Other clauses from the articles of incorporation of this company are the following:

- Objective: Designing, construction and operation of a new sanitary landfill, a transfer station, facilities to classify and recycle solid wastes, facilities to process "compost" and an educational center dedicated to SWM in AMSS.
- The term of duration for the society is indefinite.

- Capital stock: Two hundred thousand colones, divided into 2,000 nominal shares with a value of 100 colones apiece.
- Administrators: coordination, arrangements and management of the company are steered by the Board of Directors integrated by three Directors, Chairman, Vice-chairman and a Secretary. (One elected by COAMSS and two by CINTEC).
- Stock subscription: CINTEC subscribes 1,800 stocks (90%) with a value of 180,000 colones and COAMSS subscribes 200 (10%) shares with a value of 20,000 colones.

#### **4.8.6 Private documents authenticated between MIDES and Municipalities**

On February 6<sup>th</sup>, 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 project consists of a new sanitary landfill, facilities to separate and recycle solid wastes, a transfer station, a compost plant and an educational center, as well as the closing of two dumping sites. Among the clauses of the contract, the following are noteworthy:

- The ten municipalities are committed to sending all solid wastes generated as of "beginning date", i.e., date on which the sanitary landfill will receive the first discharge (April 24<sup>th</sup>, 1999).
- Term of the agreement: 20 years starting from the "beginning date".
- Price: US\$18.00/ton plus VAT. This amount will be increased on January 1<sup>st</sup> of each year according to the increment in the cost of living of the previous year, as determined by the Central Bank (BCR).
- Form of payment to MIDES: Every month within the five days after the municipality receives the payment from the electric company fee collection agent. An interest for delay of 2% per month will be imposed on those payments not done in the specified term.
- Fee collection: The Municipality will deposit the fee collected in a bank account exclusively opened for the payment of this service.
- Case of non-fulfillment: If delayed payment is not done, MIDES will be empowered to refuse receiving the discharges from the municipality to the sanitary landfill, unless the whole amount debited is settled, including interests accrued.
- 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 4-74: 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

- In the event of disputes or disagreement, the arbitration will be carried out in the city of San Salvador and will follow the norms of the Commerce Code and the Law on Mercantile Procedures of El Salvador.

#### 4.8.7 Service Rendering Contract between the Municipalities and Electricity Distribution Companies of AMSS

##### 4.8.7.1 CAESS

On August 7<sup>th</sup>, 1998, the "Compañía de Alumbrado Eléctrico de San Salvador, Sociedad Anonima de Capital Variable" or "CAESS S.A. de C.V." entered a service rendering contract with the municipalities of San Salvador, Soyapango, Ciudad Delgado, Mejicanos, Apopa, Nejapa, Ilopango and Ayutuxtepeque to include the fee for the solid waste final disposal site service in the electric power bills, so that both are paid jointly in the bills collected by CAESS. The municipalities pay CAESS a commission of 1.55 colones plus VAT for each bill issued. The amount to be collected or the percentage charged on the kilowatts-hour consumed will be updated periodically, so that CAESS can make the changes and necessary updates for each period. This information will be delivered through any magnetic means or by remote communication. Although Nejapa signed this contract they did not apply it, as the wastes fees were still directly collected from users.

Besides, the municipality of Cuscatancingo also entered a contract with "CAESS" for the collection of the waste fee only by means of the electricity bills, since this municipality does not charge fees for the sanitary landfill.

##### 4.8.7.2 DELSUR

On August 27<sup>th</sup>, 1998, the company "Distribuidora de Electricidad del Sur, Sociedad Anonima de Capital Variable" or "DELSUR, S.A de C.V." entered a service rendering contract with the municipalities of San Salvador, San Marcos and Nueva San Salvador. These contracts have similar clauses to those of CAESS, including the payment of 1.55 colones plus VAT per bill issued.

## **4.8.8 Technical Cooperation by IDB**

### **4.8.8.1 Identification Mission for the Program of Municipal Development of AMSS, November 1998**

The identification mission by IDB that visited San Salvador in November 1998 presented some proposals to finance consulting works aimed at municipal development in different fields. The following proposals related to SWM are highlighted:

- Financing a short term consulting work aimed at (i) the optimization of collection routes, and (ii) definition of a modernization strategy of the service, by analyzing such options as the decentralization at a district level, privatization and creation of micro-enterprises of workers.
- Financing a consulting work in the short term to finalize the concession contract of the sanitary landfill, in which several key points should be deeply analyzed.

### **4.8.8.2 IDB Mission: S. COINTREAU – C. Horning March 1999**

This mission had the purpose of examining the existent contractual obligations for the municipality regarding the transfer and final disposal of its solid wastes, with the purpose of determining if equitable and safer terms could be achieved.

The report prepared by the consultants encompasses different chapters: Background; a Proposed project for the Transfer and Final Disposal of solid wastes; Inappropriate Minimal Flows to be Guaranteed; High Prices; Adverse Impacts occasioned by the Project; Problems with Contractual Agreements; Reasons to Abrogate the Contract. The report also has 10 Annexes (A to J) on different aspects of MIDES project.

The report points out that the findings, opinions and conclusions presented in it belong to the consultants S. Cointreau and C. Horning, and therefore do not reflect the opinions, policies or programs of the IDB.

### **4.8.8.3 IDB Mission: Ricardo Giesecke. April–May , 1999**

This short-term mission had the objective of “conduct a technical consulting on the solid waste field for the municipality of San Salvador, to allow re-negotiation of the SWM contract with CINTEC in order to reach acceptable agreements for each one of the parties involved”.

As a result of the mission, the consultant presents in the annex a draft to modify the contract agreed upon between CINTEC and COAMSS in the following sections:

- Transfer station.
- Material selection plant.
- To eliminate the obstacles temporarily for receiving solid wastes from municipalities that did not sign the contract because of public health and environmental protection purposes.
- The principle of supervision on compliance of the services contracted, and the establishment of the principle of penalties.
- Compost plants.

- Technical closing of the Mariona/Apopa dumping site as soon as possible, for public health purposes.
- Fair and transparent price adjustments guide.
- Rights to eventual scale economies.
- Creation of incentives to promote separation and recycling of wastes.

In its annex 2, the consultant makes some comments on the minimum fixed amount of solid wastes to be received by the MIDES sanitary landfill.

#### **4.8.9 Financing of MIDES Project**

Financing initially proposed by means of a Canadian Pensions fund with a 8% interest rate was not selected. In November 1998 CINTEC financed the project through the French company TREDI, which has significant professional qualifications and experience.

#### **4.8.10 Agreement between MIDES –Municipality Nejapa**

In March 1998, MIDES and the municipality of Nejapa agreed that the latter will receive US \$2 millions as a compensation for the sanitary landfill that is located within its territory, and in which all solid wastes from AMSS are disposed of. This amount also includes the consensus by the local community to allow the passing of collection vehicles in their municipality. The municipality of Nejapa has stated that they have received so far (January 2000) two payments of 800,000 colones for concept of this agreement.

#### **4.8.11 OPAMSS Technical Follow-up Commission for MIDES Project**

On August 30<sup>th</sup>, 1999, OPAMSS, as the technical office of COAMSS, forms a Technical Follow-up Commission for “MIDES S.E.M. de C.V.” Project, which will also perform as CINTEC’s counterpart.

On September 1<sup>st</sup>, 1999, OPAMSS and MIDES reached an agreement upon which the latter was committed to pay the former 50,000 colones per month to finance OPAMSS’ technical commission. On the other hand, OPAMSS was committed to providing a full-time Environmental Unit technician and providing a space for the installation of the Technical Commission.

#### **4.8.12 Project of Modifying the Contract between MIDES and Municipalities**

On September 2<sup>nd</sup> 1999, Ruscani-Valdez Study prepared the Project of “Modifying the MIDES Contract with the municipalities of AMSS” for COAMSS/OPAMSS for their reviewing. This project that takes into consideration some proposals outlined by IDB missions is still being reviewed and therefore not signed by the parties involved.

The modification project encompasses the following components:

- A) Transfer facilities;
- B) Selection or separation facilities;
- C) Facilities for the elaboration of compost;
- D) Minimum payment;



- E) Maintenance of MIDES project;
- F) Closing and rehabilitation of Apopa-Nejapa dumping site;
- G) Annual readjustment;
- H) Additional agreement;
- I) Scale economy;
- J) Supervision.

#### 4.8.13 Performance and Management of MIDES Project

##### 4.8.13.1 New Sanitary Landfill

This facility, inaugurated on March 17<sup>th</sup>, 1999, receives discharges of solid wastes since April 24<sup>th</sup>, 1999.

Table 4-75 shows the information on the performance of Nejapa sanitary landfill during 1999.

Table 4-75: Performance and Management of the New Sanitary Landfill, 1999

Municipality	Discharge amount (thousand ton)	% of Total	(A) MIDES billing (colones)	Paid to MIDES (colones)	(B) Delayed payments (colones)	(B)/(A) ratio
San Salvador	70,179.4	42%	25,699,977.31	21,334,741.53	4,365,235.78	17%
Mejicanos	17,401.7	10%	3,562,568.58	3,562,568.58	0.00	0%
Ciudad Delgado	7,992.0	5%	1,837,448.12	1,935,487.93	-98,039.81	-5%
Ayutuxtepeque	2,727.8	2%	689,079.58	569,392.05	119,687.53	17%
San Marcos	7,226.5	4%	1,456,897.94	1,456,897.94	0.00	0%
Nueva San Salvador	12,251.0	7%	5,174,687.10	2,999,318.47	2,175,368.63	42%
Soyapango	20,637.6	12%	8,265,636.95	8,265,636.95	0.00	0%
Ilopango	11,638.2	7%	2,373,580.94	2,129,143.87	244,437.07	10%
Apopa	13,795.8	8%	3,190,047.83	2,820,561.49	369,486.34	12%
Nejapa	1,916.0	1%	382,748.47		382,748.47	100%
Total	165,766.1	100%	52,632,672.82	45,073,748.81	7,558,924.01	14%

##### 4.8.13.2 Other Activities of MIDES Project

Table 4-76 shows the 1999 performance activities that comprise the MIDES Project.

Table 4-76: Other Activities of MIDES Project, 1999

Activities	Performance
1. Transfer station	<ul style="list-style-type: none"> <li>• CINTEC acquired the land for the transfer station in the municipality of Apopa, about 10 km away from Nejapa S/L.</li> <li>• CINTEC is preparing the Environmental Impact Assessment.</li> <li>• CINTEC previously presented to MARN the application to begin the environmental permission process.</li> </ul>
2. Separation plant for recycling	<ul style="list-style-type: none"> <li>• MIDES changed the location of the future separation plant to the land where the transfer station will be located.</li> </ul>
3. Compost plant	<ul style="list-style-type: none"> <li>• No progress</li> </ul>
4. Closing of two dumping sites (Mariona and Ilopango)	<ul style="list-style-type: none"> <li>• Initial topographic works in Mariona.</li> <li>• MIDES modified the initial proposal and will not close Ilopango dumping site.</li> </ul>
5. Communication, education and sensitization program	<ul style="list-style-type: none"> <li>• Participation in the “Yo no la riego (<i>I do not spill it</i>)” campaign carried out by the municipality of San Salvador.</li> <li>• Construction of an educational center: no progress</li> <li>• When the sanitary landfill began operations, different activities were conducted and preparation and diffusion of informative material on the project was carried out.</li> <li>• A video on the integral management of solid wastes was prepared.</li> <li>• Students’ visits to Nejapa sanitary landfill.</li> </ul>
6. Program of Administration	<ul style="list-style-type: none"> <li>• To expedite in order to allow CAESS and DELSUR be in charge of the collection of fees of Nejapa sanitary landfill.</li> <li>• Data processing project for billing through CAESS or DELSUR</li> </ul>
7. Integration program	<ul style="list-style-type: none"> <li>• 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.</li> </ul>

#### 4.8.13.3 Opinion on MIDES Project

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.

### 4.9 Assessment of the Present Condition and Confirmation of Key Issues

#### 4.9.1 Technical System

##### 4.9.1.1 Municipal Solid Waste Management

###### 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<sup>3</sup> 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**

### **b.1 Landfilling Operation**

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. In other words, if such appropriate practices are not enforced, environmental problems by 1000ton/day would be huge.

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.

### **b.2 Landfill Structure**

The landfill structure designed for the MIDES Nejapa site is good enough to protect the environment. The problem with MIDES landfill is that some of the measures proposed such as evaporation lagoons and biogas removal are not constructed yet.

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. A possible additional improvement measure for the 3 sites, regarding the structure, is biogas removal system. Another structural recommendation could be to employ final soil cover with enough thickness for reducing the long term environmental contamination when the 3 sites are closed.

### **b.3 Landfill Management**

#### **b.3.1 Hygiene and Scavenger Control**

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

#### **b.3.2 Surface Water Management**

In the rainy season in 1999, mismanagement of surface water in MIDES site resulted in a huge generation of leachate and its discharge to the surrounding environment.

As for San Martin open dumping site, a vertical shaft (pozo) was constructed to connect to the storm sewer below buried waste with an aim of reducing leachate generation and its contamination. However, maybe because it is the dry season today, surface water control ditches are not yet constructed to connect to the vertical shaft. It is awaited that before the rainy season comes the surface runoff of rain water should be well controlled to direct to the vertical shaft.

#### 4.9.1.2 Medical Waste Management

##### a. 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.
- The use of nuclear medicine and the generation of radioactive waste concentrates in three hospital centers: Rosales from MSPAS, Medico Quirúrgico and Oncológico from ISSS.
- However, 13 additional medical centers that reported radioactive waste were discovered in the study, which came essentially from the X-ray system. Actually, this does not generate radioactive waste but the exposure risk is present if radiological protection lacks or checkup by the corresponding teams.
- From the three hospital centers that deal with nuclear medicine, the best equipped facility for this is the Oncológico hospital; therefore, a greater support on these activities in the remaining centers should be provided.

##### b. 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.

#### 4.9.2 Institutional System

##### 4.9.2.1 Field of Competency and Institutional Coordination

- Coordination of MSPAS with most of AMSS municipalities is acceptable. The support being provided by the former relies mainly on hygienic education, personnel training and occupational health for the cleansing staff; however, this is conducted in a limited manner. It should be taken into consideration that there is only one person in a central level in charge of the solid waste management program within the MSPAS' Department of Environmental Health. On the other hand, regarding the issue of hospital solid waste management that is controlled by MSPAS, coordination with most of the municipalities is quite weak or even non-existent with some of them.
- The Ministry of Environment and Natural Resources (MARN), created in 1998, replaced the "Secretary of Environment (SEMA)". Its organizational chart is still being prepared and coordination with some municipalities of AMSS has just started. Besides, the Environmental Law has not been regulated yet to allow MARN to exercise its corresponding actions. Therefore, Article 52, which states that MARN and MSPAS should be coordinated with municipalities to promote reduction, recovery and recycling of solid wastes, is not fully complied with.

- Coordination among municipalities is quite acceptable. A key element within this coordination is COAMSS, which has had an active participation in recent years. Regarding SWM, COAMSS has promoted and conducted MIDES project. Nevertheless, 4 municipalities out of the 14 belonging to AMSS do not take part in this MIDES project. In any case, the strengthening of COAMSS and OPAMSS is vital to improve SWM in AMSS.
- Cooperation among the neighboring municipalities in AMSS and with San Salvador municipality is good, especially when equipment is lent when emergency situations arise.
- Municipalities are the fundamental piece in SMW of AMSS; however, since law states that municipalities are autonomous and due to political differences, metropolitan technical solutions for the urban cleansing service are sometimes difficult to achieve.
- Inspection and auditing by the *Ministerio Público* (Public Surveillance Office) regarding SWM is still quite limited.
- OPAMSS has a primordial function in the supervision of MIDES project, such function is being carried out since September 1999.
- Besides, it is estimated that the supervising and controlling function by municipal cleansing services on the contracts and concessions signed by the municipalities is very weak.

#### **4.9.2.2 Legislation and Regulatory Framework**

- National legislation on municipal solid waste is quite limited.
- The Basel Convention is just being enforced.
- The scarce provisions in the Health Code regarding municipal solid wastes have not been practically enforced. In fact, there are discrepancies between Article 56 of the Health Code and Article 4 No. 19 of the Municipal Code with respect to the jurisdiction on urban solid waste management.
- Enforcement of the provisions of the Environmental Law, whose regulation has not been approved yet, is still incipient.
- There exist no municipal ordinances that regulate SWM in the municipalities of AMSS, with the exception of San Salvador, Antiguo Cuscatlan, Soyapango and Apopa. The aforementioned suggests that some municipalities collect even hazardous wastes, since there is no provision that prohibits such collection.
- Sanctions from the Health Code, Environmental Law, Municipal Code and the regulating municipal ordinances are not really enforced on those who violate SWM. In some cases fines do not even compensate the means to collect such fine. San Salvador's regulatory municipal ordinance is being updated and should be approved soon.

#### **4.9.2.3 Other Bodies Participating**

- International bodies such as IDB and PAHO provide technical support for SWM in AMSS. It is necessary to continue with this type of cooperation, especially for the organizational development of cleansing services and staff training.

- No Salvadoran enterprises are interested in the contracting-out or concession of the different stages of SWM. The financial risk in the case of concessions restrains the participation of large and medium size companies. An exception is CINTEC, a contractor of MIDES project, which is constructing Nejapa sanitary landfill.
- Regarding hospital wastes, CINTEC is a contractor for the treatment of pathological hospital wastes, as well as the company "Transporte Guadalupe" that collects such wastes.
- Participation by formal/informal micro-enterprises and cooperatives is increasing. Most of the personnel working in this field comes from former scavengers of "Mariona" dumping site. There exist 45 formal and informal micro-enterprises where more than 300 people work in collection and sweeping activities and some of the micro-enterprises have been supported by NGOs. While the demand for cleansing services by the population of several municipalities in AMSS is not satisfied, increase of micro-enterprises mainly in collection can be expected. This is a positive aspect because this could provide employment to some of the scavengers that were displaced from dumping sites.
- Universities and professional groups such as AIDIS have cooperated in the development of cleansing services in AMSS; and it is advisable that they keep on supporting such.
- The same can be said about ISDEM and COMURES, whose assistance in institutional development of municipalities is essential. It is also advisable that this cooperation reach municipal cleansing departments or units in AMSS.
- Regarding NGOs, there are two groups: the first one consists of those NGOs that support and promote the creation of cooperatives and micro-enterprises, environmental education activities and such related to SWM, which are deemed as necessary and should continue. The second group belongs to smaller and weaker organizations with financial problems and they lack qualified human resources for SWM, whose participation is not necessary.

#### **4.9.2.4 Information System**

- Operative cleansing services in most municipalities do not have information or data at all or handle them insufficiently. This situation does not allow a correct decision-making process if the efficiency and quality of services and the reduction of operation costs is pursued.
- MIDES obtains the weight of the collection truck that arrive to Nejapa sanitary landfill and "Mariona's temporary transfer station" by means of weighbridges installed at both sites. This information is and will be useful for collection planning of the diverse municipalities. Completion of the information with the weighing of the recyclable materials separated everyday in "Mariona" should be done as an additional data for SWM planning, and is not being carried out.
- Lack of information is even more critical with respect to budgetary and cost data, as cleansing services are totally unaware of such information.

#### 4.9.2.5 Social and Community Aspects

- Scavengers: They are also known as “*pepenadores*” in San Salvador. Men, women and children that separate reusable or recyclable materials during the different stages of SWM to trade them later. The whole process is informal.

The main scavenger groups that currently operate are distributed as follows:

- Peddling purchasers of paper, bottles and others that pay certain money to the citizens to acquire such materials.
  - “Pre-scavenging” is carried out before collection at points where solid wastes are discharged, which will be picked by collection trucks. This is conducted mostly at high-income residential zones.
  - During the collection by the crew of municipal collection trucks, who separate those items with a greater commercial value.
  - At “Mariona temporary transfer station” where around 300 scavengers separate the discharged material from collection trucks and after separating the materials, wastes are loaded again in the truck and taken to Nejapa sanitary landfill. This staff will keep on working until the selection plant for recycling is built.
  - In “La Chuca (Espiga)” dumping site, where around 20 scavengers select the wastes coming from the municipalities of Antiguo Cuscatlán and Cuscatancingo.
  - “San Martín #1” dumping site, where solid wastes from San Martín are disposed of, and “Cantón El Rosario” dumping site where wastes from the municipality of Tonacatepeque are discharged, with around 20 scavengers.
  - A total of not less than 600 persons, without including the municipal collection personnel, separate solid wastes. The solution of this social problem, especially that of the scavengers from the “temporary transfer station” and other dumping sites will have to be dealt with in the short term.
- Unions: The staff of 7 municipalities, including the cleansing personnel are associated with at least 4 associations -ASTRAM, ATRAM, CGTM and ATMES. In the remaining 7 municipalities -Delgado, Cuscatancingo, Ayutuxtepeque, Antiguo Cuscatlán, San Martín, Nejapa and Tonacatepeque, the cleansing staff is not associated. Salvadoran legislation prohibits governmental workers –including those of municipalities- to belong to a union. Therefore, these groups belong to what they call “Association”, which in fact performs as a union that defends the interests of the associates. In 1999, 3 short strikes and two stoppages took place in 4 municipalities. Since there is not a single union, the solution of contingent conflicts and negotiations during discussions is feasible. However, it is possible in the future that efficiency of services will improve, and consequently the proposals to rationalize staff will require of further negotiations to reach a consensus with such associations.
  - Community participation: Yet it is true that each generator has the right to a clean and healthy environment, he/she is also responsible for participating in the different stages of solid waste management. Such participation stands for to minimize generation; to help recovery, reuse and recycling of solid wastes; to achieve self-sustainability of the service through paying fees that cover their real

costs and to inspect whether regulations on the service are being enforced, over those who render the service and those who use the service. As a consequence, a sensitization, communication and educational program for the population is important. Achievements will be obtained in the long term, not in short-term “campaigns” because it is all about behavioral changes in the civil society and such change by adults may be difficult to achieve. Therefore, fundamental concepts of SWM will have to be included in the educational plans and programs for elementary 6 years in an articulated and continuous manner, so that student can clearly understand them and become customs during their childhood and later on a natural behavior when they are grown up.

#### **4.9.3 Organizational System**

Table 4-77 summarizes the key issues that have been confirmed.



Table 4-77: Organizational Systems in SWM. Confirmation of Key Issues

Items	Key issues
Organization	<ul style="list-style-type: none"> <li>- Organization chart: With the exception of San Salvador, the other cleansing services are organized by operations in collection, sweeping and maintenance.</li> <li>- Hierarchy of the cleansing service: very low; 4<sup>th</sup> level.</li> <li>- Regulatory ordinance of the cleansing service: only in 4 municipalities.</li> <li>- Function handbook of cleansing service: only in 4 municipalities.</li> <li>- San Salvador has a more complex organization.</li> </ul>
Planning	<ul style="list-style-type: none"> <li>- Human resources in cleansing services in several municipalities are not qualified.</li> <li>- The main plans and projects for SWM in mind by municipalities should meet the sustainability of the services.</li> </ul>
Operation	<ul style="list-style-type: none"> <li>- 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.</li> <li>- Most of the municipalities face preventive maintenance, spare parts supplying and equipment repair problems.</li> <li>- Manual and mechanic sweeping is provided directly by municipal cleansing services.</li> <li>- Some municipalities are thinking about getting rid of containers. (There are more than 200 in AMSS).</li> </ul>
Commercial	<ul style="list-style-type: none"> <li>- Fee collection efficiency along with electricity billing by CAESS and DELSUR is high.</li> <li>- 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.</li> <li>- Modernization and updating of the tax payers' registry is required.</li> <li>- The community refuses to pay for a high sanitary landfill fee.</li> <li>- The collection of the waste fee from those that are not rendered the service is unfair.</li> <li>- Great generators of wastes should not be subsidized either for the sanitary landfill fee.</li> </ul>
Financial	<ul style="list-style-type: none"> <li>- Revenue/expenditure ratio of cleansing service has a deficit in almost all the municipalities.</li> <li>- No municipality has a cost accounting of the services.</li> <li>- Treasury works with only one and whole accounting for the entire municipality.</li> </ul>
Administrative	<ul style="list-style-type: none"> <li>- 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.</li> <li>- Formal and informal participation by private sector is important, and its participation in SWM will keep on increasing.</li> <li>- 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.</li> <li>- Management of pathological hospital wastes by MSPAS, that began in January 2000, should improve day by day in close cooperation with AMSS municipalities.</li> </ul>
Social	<ul style="list-style-type: none"> <li>- Present and future activity by micro-enterprises should be promoted, consulted, trained and formalized.</li> <li>- Formalization of more than 300 scavengers that are working at Mariona and 3 other dumping sites.</li> <li>- A study to create collection micro-enterprises, formed by municipal workers themselves as an alternative option.</li> <li>- Weak community participation should change through sensitization, informational, communication and educational programs focused on elementary education.</li> </ul>

## 4.9.4 Financial System

### 4.9.4.1 Examination on Current Balance of SWM

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. In other words, most municipalities presently can not collect SWM fees even to cover the recurrent direct cost of municipal SWM. Therefore it is strongly anticipated that the indirect cost of SWM and a capital expenditure when necessary (e.g., replacement of collection vehicle in the near future) need to be covered by some other financial sources of the municipality or that SWM fees should be collected more. However, these must be another difficult task for those municipalities.

Table 4-78: 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 <sup>1</sup> )	(c/person <sup>2</sup> )		(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	50.6
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: <sup>1</sup> Service Projected Population, <sup>2</sup> Census Population

In view of negative indicators shaded in the cells of the above table, Mejicanos, Ayutuxtepeque, San Marcos, and Soyapango must be facing the hardship in recovering the municipal SWM costs.

### 4.9.4.2 Examination on Municipalities' Ability-to-Pay (ATP) for Present SWM

#### a. Scale of Municipal Income

Taking a look at the scale of municipal income (impuestos y tasas municipales), San Salvador, Antiguo Cuscatlan and Nueva San Salvador might have higher possibility to reserve the appropriate ATP than other 11 municipalities in AMSS for maintaining the current SWM. This is because the 3 municipalities have the municipal revenue of US\$56.3/person/year, US\$42.0/person/year and US\$31.0/person/year respectively,

however, that for other 11 municipalities ranges from US\$4.6/person/year to US\$8.8/person/year only. It suggests that even a slight increase of SWM cost (e.g., US\$1.0/person/year) brings a large hardship for such municipalities.

**b. Current Balance (Revenue/Expenditure) of Municipal SWM**

In view of "Current Balance of SWM" examined in the above section 4.9.4.1, as most municipalities presently can not collect SWM fees sufficient enough to cover the recurrent direct cost of municipal SWM, most municipalities do not presently secure ATP for present SWM.

Furthermore, if additional expenditure such as capital expenditure to renew the waste collection vehicle become necessary in the near future, it is further anticipated that the municipalities' ATP for maintaining the present level of SWM becomes critical.

**c. Municipal Cost Recovery for Cleansing Service**

It becomes necessary for municipalities to increase the municipal revenue in order to maintain the municipalities' ATP for present SWM. One typical action to raise the municipal revenue for covering the SWM service is to raise the fees for the same service that should be paid by the users of the service, namely the citizens.

In this context, it is necessary to examine the citizen's ATP for receiving cleansing services. This is examined in the section below.

**4.9.4.3 Examination on Citizen's ATP for SWM**

**a. Present Burden on Citizen's Income (BCI)**

In order to examine citizen's ability-to-pay (ATP) for SWM fees, Table 4-79 shows relation between the "SWM cost per person per year" and average annual income of the citizen. The column D in the table shows the average annual income of citizen that ranges from 7,000 to 40,000 colones depending upon respective municipalities. The column E shows present SWM costs (**direct cost only**) for respective municipalities. Hence, column G shows average SWM cost burden for a citizen on their income.

Table 4-79: 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.

**b. Ability-to-Pay (ATP)**

The indicator of citizen's 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<sup>9</sup> of middle income countries with GDP per capita of about US\$1,950 is given in Table 4-80.

Table 4-80: 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 to 1.7

Meanwhile, Table 4-80 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

<sup>9</sup> Conceptual Issues and Experiences in Developing Countries, December 1991, Sandora Cointreau-Levine

municipal SWM. A mean value of 0.53% and 1.19% is calculated as **0.86%** herewith.

**c. Willingness-to-Pay (WTP)**

Table 4-81 shows 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 4-81: 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 4-11 illustrates relations among present citizen's burden, ATP and WTP.

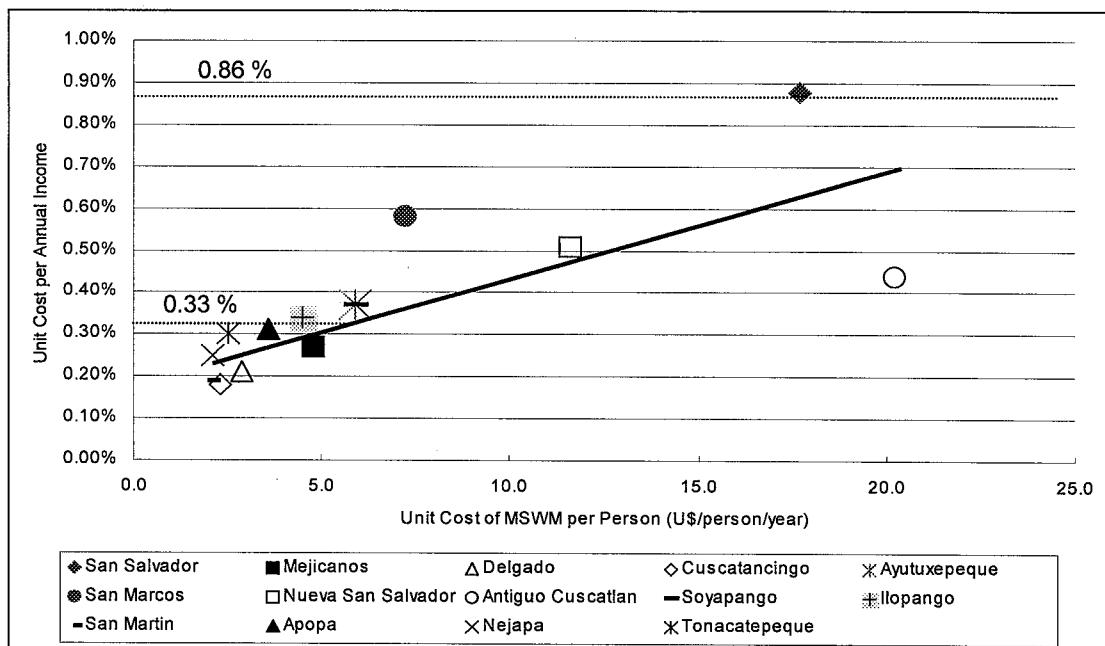


Figure 4-11: Relation among BCI, ATP and WTP

#### d. Examination of Appropriate Range of BCI

As shown in Figure 4-11, present “burden on citizen’s income (BCI)” for 7 municipalities of Mejicanos, Delgado, Cuscatancingo, 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.

#### 4.9.4.4 Key Issues on Financial Aspects

It should be a political decision of a mayor that what priority be given to the SWM issue among all the municipal administration issues. In so doing, it is essential that plans and strategies on municipal SWM with concrete ideas (i.e., concrete planning

figures) should be formulated, practiced and monitored. In other words, it should be clarified what percentage of the whole municipal budget be appropriated for the SWM and how much should be proportioned for respective components of collection, street sweeping, final disposal, etc. from the whole SWM budget. And that should be an open information to the public in countries and/or cities where a democracy is further sought. However in practice, such information is not easily found in most of 14 municipalities for reviewing and analyzing the sustainability of municipal SWM.

**a. Key Issues**

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)

**4.9.5 Sanitary Education and Public Participation**

While the lack of waste collection generates high health risks and other problems, the accumulation of waste in "quebradas", rivers and illegal waste dumping also causes serious environmental problems including water pollution risks.

Inappropriate SWM can have serious consequences in the public health and a significant impact on the environment. Sound SWM is thus a crucial component of public health protection.

Sanitary and environmental degradation affects sustainable development. It has negative impacts on health and life expectancy, and consequently, reduces human capital investment and economic growth. Additionally, it reduces the quality of life, soil and labor productivity, and increases production costs.

According to surveys carried out by different organizations in other studies, the population has shown a lack of perception toward the solid waste problems when answering the questionnaire surveys carried out in the country:

- Sanitary education programs related to solid waste have been of little coverage.
- There is no unification of conceptual and/or operative approaches at an inter-institutional level.
- The people do not perceive sanitary education as part of the problem related to solid waste. Also, institutions do very little in modifying the situation.
- Active community participation is rarely considered in the sanitary education programs.

Life and environmental quality may decrease if the potential and the existing impacts are not correctly assessed and necessary control measures are not adopted. The

participation and own efforts made by the community to control the negative effects of the waste mismanagement will contribute positively to improve quality of life and the environment.

In AMSS there is no appropriate SWM at the citizen level, therefore, sanitary education and public awareness promotion are fundamental for the sustainability of the efforts made for appropriate SWM.