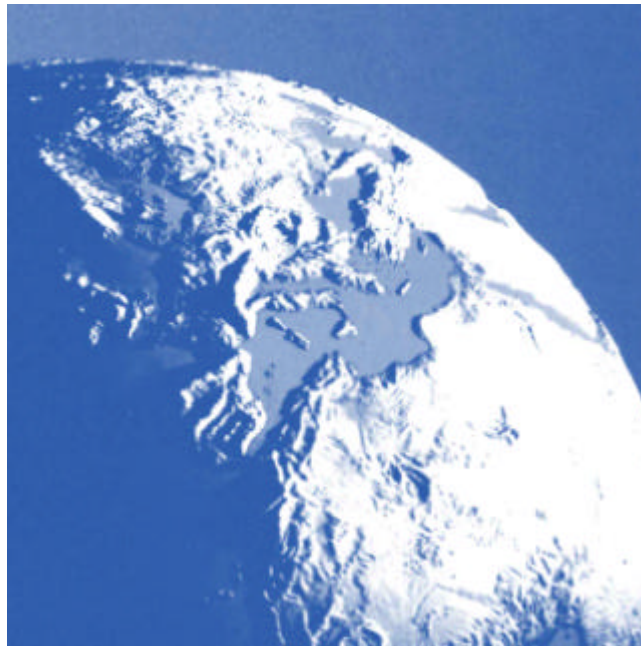




POLICY AND INSTITUTIONAL ASSESSMENT OF SOLID WASTE MANAGEMENT IN FIVE COUNTRIES

Cyprus, Egypt, Lebanon, **Syria**, Tunisia



Cedare



**Blue Plan
Regional Activity
Centre**

**Sophia Antipolis,
December 2000**

Regional Study on

Policies and Institutional Assessment of Solid Waste Management in



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Introduction

This document represents the outcome of a study on Municipal Solid Waste in Syria as part of a regional study that is undertaken in five countries of the region. It reflects the current practices, problems and planned solutions for Syria's Municipal Solid Waste Management.

The aim of this study is to assess the policy and institutional frameworks for MSW management in the five selected countries, namely Egypt, Syria, Lebanon, Tunisia and Cyprus. The objectives are to identify appropriate strategies and solutions for improvement based on each country's needs and the broader political and social changes going on within that country.

The study is divided into 7 Sections; section 1 provides *general country background* information providing the reader with an overview of the geography, the population, the political structure of the Central Government and a broad view of the current macro-economic situation.

Section 2 deals with the *regulatory framework* in Lebanon concentrating on those institutions involved with environmental matters in general and MSW in particular. The section offers an analysis of the current environmental legislation and concludes with a perspective of the Government's strategic plans.

Section 3 is devoted to the institutional framework reviewing the local governments with the organizations controlling them. The section discusses in details the government both at the regional and district levels.

Section 4 provides a look at the *private sector* profile in Syria and gives the example of the pilot initiative that was undertaken in Aleppo city.

Section 5 is devoted to *practices* in the MSW sector. The section discusses the MSW composition and recycling involving the formal and informal sectors.

Section 6 covers *performance assessment* at the central government level and at the local government level as well as the formal and informal private sector.

Section 7 presents *conclusions and recommendations* related to the central government as well as the local government authorities.

1. General Country Information

1.1 Physical Geographical Environment

The Syrian Arab Republic (herein after referred to as Syria) is located east of the Mediterranean Sea and shares its borders with Turkey, Iraq, Jordan, Israel, and Lebanon. It has an area of 18,517,971 hectares, of which 6 million hectares are cultivated land and the remaining is desert and rocky-mountains. The Syrian Desert is suitable for grass growing and is used as pastures during sufficient rainfall.

Mediterranean Sea climate generally prevails in Syria. This climate may be characterized by a rainy winter and a dry hot summer, separated by two short transitional seasons. The temperature frequently falls under 0 c in winter, but rarely under -10 c especially in December and January, while in summer it may rise frequently up to 48 c especially in July and August. The daily differences between the maximum and minimum temperature are generally quite high in most of the country. This difference sometimes reaches 23 c in the interior areas and 13 c in coastal areas.

The precipitation occurs during winter, snow falls over all the regions with an altitude exceeding 1500m above sea level. Regions with an altitude of 800–1500m are subject to both rain and snow. Other regions with lower altitudes are subject to rain and rarely to snow except the desert regions where even sufficient rain seldom falls. The mountainous and coastal regions are the regions of heaviest rain, second in order are the northern region (North Aleppo, Kamishly and Malikieh). The southeastern and the desert regions are the parts with the lowest amounts of rain.

The country, from time to time, is subject to dry seasons, and the rain shortage leads to a great decrease in agricultural production, which is considered as the main source of National Income. Geographically, Syria may be divided into the following regions, depending on the climate and agricultural land:

- 1- The coastal region; it lies between the mountains and the sea, it is characterized by heavy rainfall in winter (annual rainfall between 350-600mm).
- 2- The mountainous region; runs from the north down to the south of the country and includes all mountains and hills which are parallel to the Mediterranean Sea. This regions is characterized by a heavy rainy winter (annual rainfall may exceed 1000 mm). The coastal and mountainous regions form the first settlement zone (see map1).
- 3- The interior region or the plains region; it comprises of the plains of Damascus, Homa, Aleppo, Hassakeh and Dar'a. It is situated to the east of the mountainous region and north of the country. This region is subject to annual rainfall between 250—350mm, and forms the second and third settlement zones (see map 1).
- 4- The desert region; it consists of the desert plains situated in the southeastern part of the country, at Jordanian and Iraqi borders. This region is characterized by little rainfall in winter and a hot dry summer and forms the fifth settlement zone.
- 5- The fourth (marginal) settlement zone lies between the interior region and the desert, and is characterized by annual rainfall between 200—250mm.

Table 1 below shows the physical and climate features for selected local cities in Syria.

Table 1. Physical and Climate Change for Selected Cities

Name of city	Altitude above Sea level	Average temperature	Maximum Temp in Summer1997	Minimum Temp in Winter 1997	Annual precipitation in MM
Damascus	707	16.8	40.5	-7.5	135
Aleppo	379	17.2	40.3	-5.7	325
Homs	508	18.3	37.5	-7.0	425
Lattakia	10	19.5	37.4	1.0	750
Al-rakka	240	19.8	43	-7.8	200

* Source; Statistical Abstract for S.A.R 1998

1.2 Population and Demographic Indicators

Number of Syrian population was 17,460,000 according to the civil registration records of January 1999. Annual Growth Rate according to 1970, 1981, 1994 censuses is 3.3% . The following is the population proportional distribution by age group:

less than 10 years	30.3%
10-----20 years	26.1%
20-----60 years	38.6%
> 60 years	5 %

*Source: Statistical Abstract for S.A.R 1998

There are 360,586 Palestinian refugees living in Syria within limited regions beside main cities and generally in big slum areas.

Table 2 shows the population size and growth rate for selected local cities (end of year 1999):

Table 2. Population Size and Growth Rate

Name of city	Population size	Growth rate %
Damascus	1524317	1.8
Aleppo	1822400	3.61
Homs	630000	3.16
Lattakia	360000	2.36
Al-raka	180000	3.59

*Source: Statistical Abstract 1998 + civil registration records

1.3 Economic Condition

About half of the population live in cities and the other half live in rural regions, while about 28.8% of the labor force works in agricultural activities according to labor force survey 1995. Labor force distribution over the economic sectors is as follows:

- 25.7% work in government
- 40% work in organized private sector
- 33.8% work in non-organized private sector
- 0.5% work in collective & cooperative sector.

GNP has reached US\$1110 per capita in 1995 and this is due to the fact that national economy has achieved a good balance between the agriculture, mining, industry and the service sectors, also levels of education and technology are high compared to those in neighboring Arab states.

The agriculture production is very important and has achieved about US\$5.6 million in 1997 at current prices in spite of using only 80% of agriculture suitable land (32% of that land is irrigated and 68% is non irrigated planting). Agriculture gross output forms 23% of total gross output. Plant products (cereals, fruits, industrial crops like cotton, sugar, beet, peanut and tobacco, vegetables, pastorals, etc...) forms 68% of agriculture gross out put. Animal products (livestock, milk products, eggs, etc...) forms 32% of agriculture gross output.

Syrian industries are distributed into the following groups:

a- Mining and Quarrying: it includes petroleum, salt, natural asphalt phosphate, sands, gravel's and marbles.

b- Manufacturing industries, it includes;

- 1- food staff and beverages
- 2- tobacco

-
- 3- textile and tam
 - 4- clothes for preparation and dyeing
 - 5- tanning preparation & hides
 - 6- wood and wood production
 - 7- paper and paper production
 - 8- coke and refined oil production
 - 9- chemical materials and production
 - 10- pharmaceutical production
 - 11- rubber & plastics
 - 12- non- metallic production
 - 13- basic metallic industry
 - 14- mineral products other than machinery's
 - 15- other equipment and machines
 - 16- electric equipment and machines
 - 17- communication ,radio and TV
 - 18- furniture and products elsewhere.

c- Electricity industry

The industrial production has achieved about US\$8.9 thousand million in 1997 at current prices, it forms 35% of total cross output.

Industrial growth increased in the last five years especially in private sector activities and investments, which is concentrated on the manufacturing industries. Average household income is 10,000 S.P per month (US\$ 200).

1.4 Socio-Cultural setting

Around 89% of Syrian population are Moslems, 10% are Christians and 1% are of other religions. Holidays are generally set according to Islamic holidays including Ramadan (the month of fasting). Friday is the weekly holiday and there are 15 public holidays throughout the year.

The official working hours of the government are from 8:00 a.m. to 2:00 p.m., but in the private sector it extends to 7:00 p.m. or more. Social activities may continue to 1:00 a.m. or more, especially in the summer and this habit causes some problems in the collection of waste from the streets.

Syria is an agricultural country and produces variable kinds of fruits and vegetables, and the people usually eat fresh food, which produces high quantities organic wet waste.

Around 22% of the population are students. About 3,599,000 students are at pre university education, about 160,000 in the universities (Syria has four universities in Damascus, Aleppo, Homs and Lattakia), and about 55,000 students are in the high and intermediate institutes.

1.5 Political structure

The system of government in Syria is republican and the president has wide functions. He is elected for a term of seven years by general referendum.

Syria is administratively divided into 14 Mohafaza (province Governorate). Each Mohafaza is headed by a Mohafez (province governor), Mohafazate centers are the chief cities after which the Mohafazat are named and these are: Damascus City, Damascus, Aleppo, Homs, Hama, Lattakia, Deir-al-zor, Idleb, Hasakia, AL-Rakka, AL-Sweida, Dar'a, Tartous & Quneitra.

Each Mohafaza is generally divided into Manatik (regions), AL-Mantika (singular of Manatek) is headed by a director (police officer). AL-Mantika center is the Mantika central Town, after which the Mantika is named. There are in all (60) Manatek.

Each Mantika is further divided into smaller administrative units called Nawahi. There are in all 204 Nahia (singular of Nawahi). Director of AL-Nahia (police officer) heads Nahia. Each Nahia covers a number of villages and a village is the smallest administrative unit.

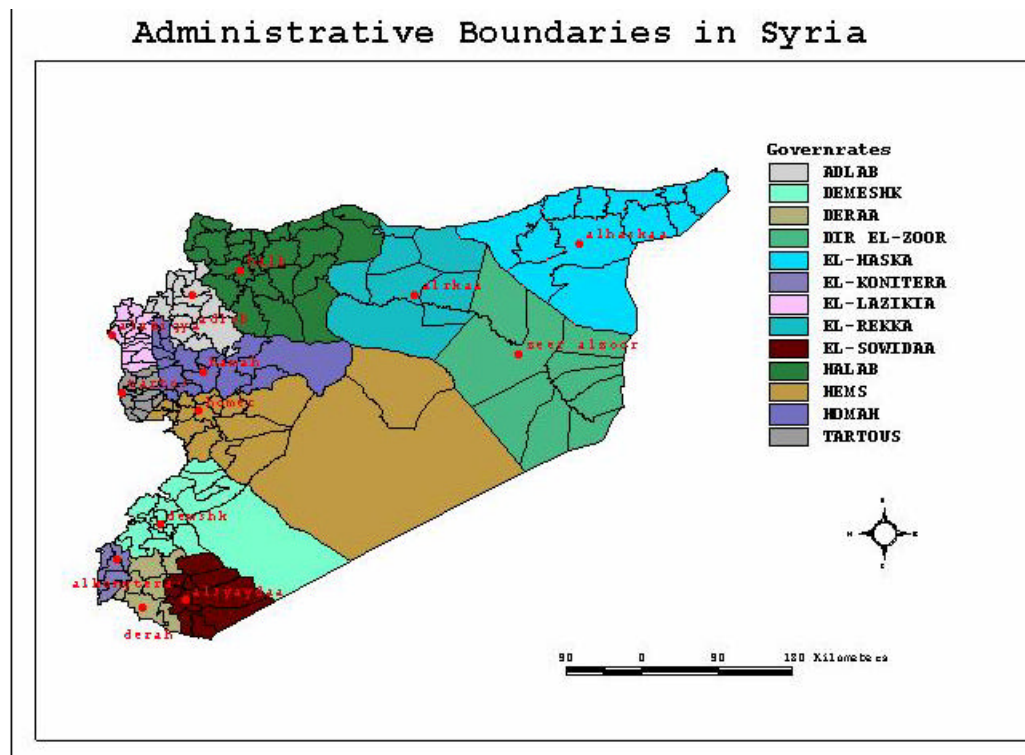
The leaders of Manatik and Nawahi were leaders of municipalities before 1972, when the local administrative law was established. Now there is no role for the Ministry of interior & its system in SWM, only its responsibilities are security, civil registration system, administration of public election operations and helping other governmental systems in execution of laws and orders.

After the local administrative law was established, there is a council for each Mohafaza, each city (population >20000 inh), each town (10,000-20,000), each village (5,000-10,000inh) or each rural unit (<5000 inh). The councils of cities, towns, villages and rural units are connected with Mohafaza council, and for each council there is a chief and executive office.

The members of Mohafaza council and members of council for city or town or village are elected directly by the people (over 18 years old) every 4 years. The members of the council elect the members of its executive office and the chief of the executive office and council for two years, only the governor, as chief of Mohafaza council and its executive office, is appointed by the President.

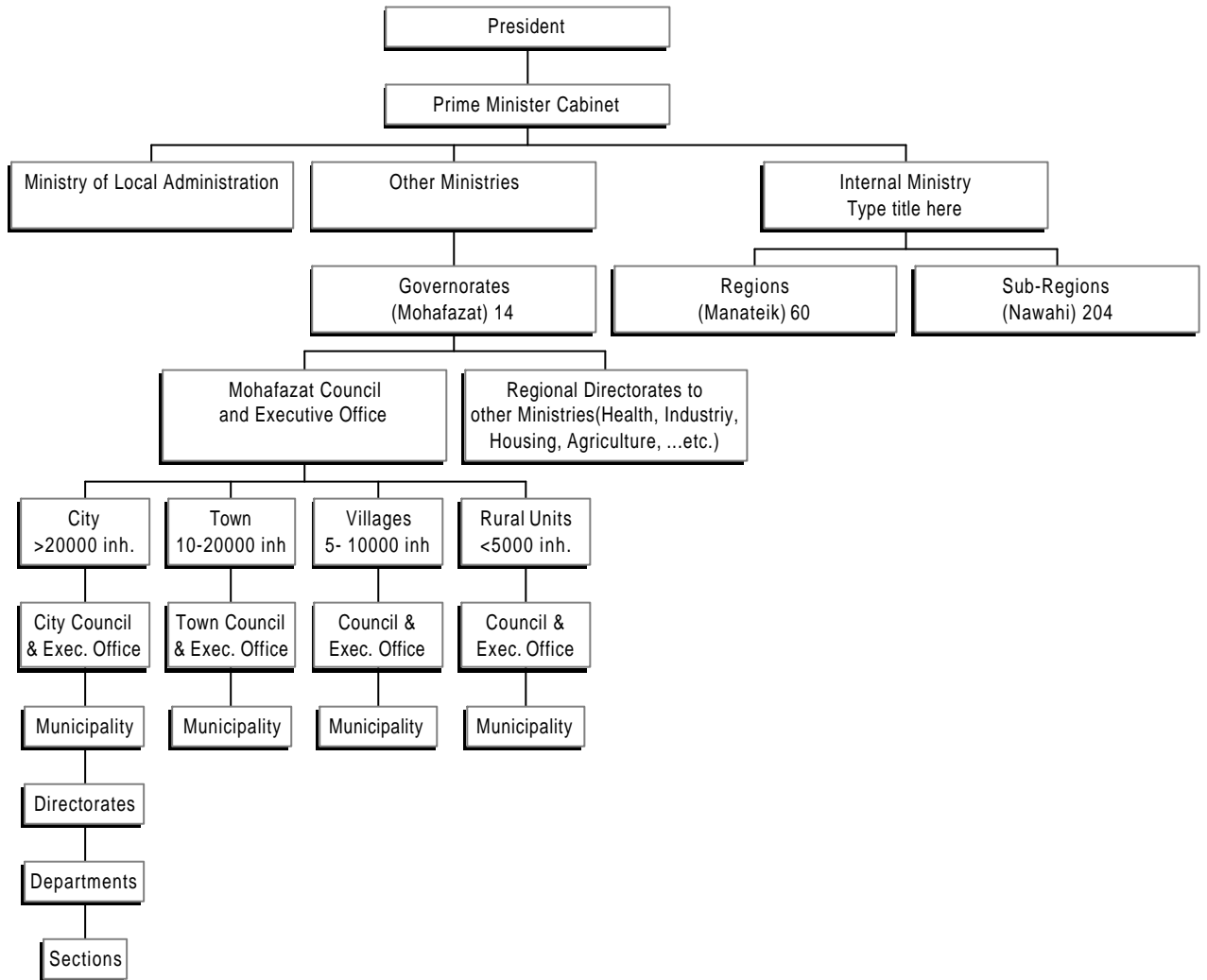
The chief of the council and its executive office for the city, town or village is a Mayer of municipality of that city, town or village. The council and its executive office play the main role in planing the functions of the municipality, but the work and follow up, are done by the different divisions of the municipality (directorates, departments and sections...).

The Administrative division in Syria is shown in **Figure1**.



The system of municipalities and councils is related to the ministry of local administration. The internal ministry system helps the local administrative system in executing the laws and orders and in public election operations.

Figure 2- Local Administrative Structure and Government System



2. POLICY FRAMEWORK

2.1 Solid Waste Legislation & Regulation Framework

The main organizations with primary responsibilities for setting the national policy on environment including solid waste management SWM are; the Higher Council for Environmental Safety, Ministry of State for the Environment and the Ministry of Local Administration. Of course any law needs agreement of parliament and passes by presidential decree.

At the moment there is no specific legislation in Syria that covers environmental issues (including SWM) either on the national level or at the local level. However, There are general legislation, decrees and orders from the Prime Minister and Minister of Local Administration, and general recommendations from The Higher Council for Environmental Safety and the Ministry of State for the Environment. Of course the Ministry of state can't issue laws and true environmental decrees due to the absence of an environmental law, it can only issue some organizational orders.

2.1.1 Local Administrative Legislation

The law of local administration (No 11 date 11.5.1971) and its executive rule (President Decree No2297, date 28.9 .1971), have broad objectives of which are;

- ♦ Responsibility concentrates in the hands of the people
- ♦ The Local Administrative Units in all levels are responsible directly for the economy, culture, service...etc
- ♦ The aims of the Local Administrative Unit is the attainment of public health, comfort, safety and public development.

The Ministry of local administration was established by Presidential Decree (No.36 date 12.8.1971). The main mandate of the Ministry is to propose the general policy for the Local Administrations according to the country's needs, establish plans and programs and supervise and assess the execution of these programs according to the Local Administration's law, and to co-ordinate between the central system and the local units and local planning.

The Ministry of Local Administration has not issued any rules or regulations concerning solid waste management in the Mohafazat. According to presidential orders and decrees and the law of Local Administration, the municipalities are obliged to collect solid waste, and are empowered to issue the necessary rules and regulations for the collection, transportation, and deposition of waste. The law of Local Administration gives the municipalities and its councils the right to make decisions, rules and regulations regarding solid waste management.

Law No.1, 1994 (the law of service tax) gives the local administrative councils the right to impose levies (tariffs for households and service charges for commercial establishments), as they deem suitable. The municipalities also have the right and power to impose fines for solid waste mismanagement up to a maximum sum of SP500 (US \$10) for serious problems. They are also empowered to remove any waste at the expense of the citizen /polluter.

2.1.2 Environmental Legislation

As mentioned above there is a general lack of environmental legislation in Syria. The parliament is currently pending the 8th draft of an environmental bill. The Ministry for State for the Environment expects that the draft bill will be passed on by parliament in the year 2000. If this law is passed it will provide provisions within the following main areas:

- Standards and classification
- Waste management in general
- E.I.A and permitting
- Environmental disasters
- Responsibilities and liabilities
- Legal and administrative measures
- Environmental protection and development fund
- Sanctions and punishments

Below is a brief summary of the draft bill of the environmental law:

Article 1, chapter I- uses the following definitions concerning (solid waste):

Waste: *“Unwanted solid, liquid or gaseous substance resulting from different kinds of activities”*

Hazardous wastes: *“Substances which have dangerous characteristics, effect health and have harmful substances such as poison, contagious substances, radioactives, inflammable or exploding substances”.*

Article 2-e -chapter II- protection of the Environmental Elements, (Issued upon the approval of the high council for Environmental safety and issued according to the proposal of the general commission for Environmental affairs) states the following:

“tables for solid, liquid and gaseous pollutants, either physical or chemical, including their quality and how badly effect on environment. Set a comprehensive classification for wastes, dangerous substances and pesticides and the way of uses, keeping or dispose these wastes. Further more to find the proper places of treating according to the approved standards”.

- ♦ Article 3, chapter II states:

“It is prohibited to collect, dump or discharge into surface water or aquifers any solid, liquid or radioactive substances that may cause pollution and do harm the health of human beings or other living organisms or impair the use of water in human activities. Such substances include any industrial waste, solids...etc., which are not treated according to approved standards and specifications”.

- ♦ According to article 11 the following is banned:

“Ship traffic in the regional water loading hazardous waste” and “dumping of waste, carcasses from the ships or other activities in regional water”.

- ♦ Article 12-a banning:

“Transfer, burning, dumping, storage, disposal of the toxin, radioactive, hazardous wastes in the Syrian land or its regional water”.

- ♦ Article 12-b states that:

“The procedures of handling hazardous wastes should abide with all preventive procedures mentioned in enforceable regulations to guarantee that there will be no environmental damage. The owner of any plant or industrial activity should notify the Commission of every accidental spill of toxic or hazardous products in the environment to undertake immediate procedures to avoid damages”.

- ♦ Article 13, chapter III- Environmental impact assessment, states that:

“The licensing authority conducts an environmental impact assessment for the plants according to the requirements, conditions and environmental standards issued by a council’s decision in accordance with article 2 of this law, and defines the plants that the rule of this article is applicable to, by a decision from the Minister”.

- ♦ Article 19-a, chapter V- Responsibilities and Compensation of damages, states:

“Anyone who affects the environment conscientiously or deliberately is considered responsible, and he is obliged to remove and recover damages and return the situation as it was before. If he refuses, the general commission for environmental affairs will recover the damages and then oblige him with all expenses in addition to all administrative expenses.”

-
- ♦ Article 27-a to h, chapter IX – punishment, states that:

“Anyone who breaks provisions in article 3, 11, 12-a and 12-b will be punished. The punishment can be imprisonment for a period of time not less than 10 days, and in cases where the act leads to the death of three or more persons the punishment will be life in penal servitude.”

2.1.3 Local Decrees

Local orders from governor council or local council, which aim to execute the local administration law and service tax law.

The Governor forms committees to study solid waste problems and matters concerning tariffs and service charges or penalties and fines

2.2 Waste Management policy and Strategic Planning

General planning for environmental protection, salaries’ policy and privatization of some sides of SWM is the responsibility of the central government (Prime Minister’s Cabinet and its Committees and some ministries).

Collection and disposal of solid waste is the responsibility of the municipalities and the local planning for the collection and disposal of waste is the responsibility of the local councils and the governorate and its councils.

2.2.1 National Policy & Strategic Plans

Prior to 1998, there was no national strategy or coordination of activities. In 1998, a “State of the Environment in Syria”, a “National Environment Action (NEAP)” and “Basins Environmental Action Plan” were prepared by the Ministry of State for the Environment and Governorates, but have not yet been adopted by the Prime Minister Cabinet.

According to the National Strategy, the key issues relating to solid waste management are to ensure that the standards, in particular the standards of disposal and efficiency of collection services, rise in a sustainable manner within the currency of the NEAP. Priority areas where government attention is recommended include the following:

1. Institutional strengthening and capacity building
2. Strategic waste management planning
3. Continued improvement of existing landfills in larger municipalities
4. Improvement of waste disposal practices in small and medium sized municipalities
5. Construction of new landfill facilities (where required)
6. Rehabilitation of closed dumpsites
7. Landfill pollution abatement
8. Improved special waste management practices
9. Raising public awareness and improving cost recovery.

Similarly, there has been no national strategy for hospital and hazardous waste. However, a national strategy for medical waste management is under preparation in an EU and GTZ-supported project.

The main problems of SWM in Syria, lies not in the presence of clear plans and policies, but in the availability of budgets for previous recommended plans. In spite of the fact that economic policies is socialist in all public services including SWM and there is no privatization of public services, there are some acceptable trials to enter the private sector in collection and transportation of solid waste in some cities such as: Damascus, Aleppo, Tartous. Also there are some directions to allow for private companies to construct plants for recycling, including compost plant or soil fertilizers.

2.2.2 Local Strategic Plans

During the last five years, the attention of local administrative units of SWM has raised, a number of local and regional action programs aimed at training local staff in waste management are currently being coordinated by the Governorates, local administrative units and Ministry of state for the environment.

Also local administrative units increased the role of NGOs (like youth unions, women's unions, sports clubs, various professional unions, children's union and friends of the environment club)

Some local administrative units enter the private sector in some kind of solid waste services such as: collection, transportation and dumping of waste. The informal waste collection and recycling sector plays a weak role in SWM, but there are no regulations by local administrative units for their work.

According to the local administrative law, the decentralization of planning for SWM is a policy issue, but the lack of qualified staff and budgets are the biggest problems. Municipalities of the main cities like Damascus, Aleppo, Homs, Lattakia and Tartous put the following as their priority in SWM:

1. Collection service improvement
2. Increasing of public awareness
3. Increasing of municipalities power like number and kind of vehicles and number of workers to improve the waste collection
4. Improvement of disposal of solid waste or waste recycling to produce compost or soil fertilizer.

Also the problems in the implementation of these policies is in the funding because it is difficult to attract the investments of the private sector in public services especially waste management.

3. Institutional and Financial Framework

3.1 National Institutions for Environmental and Solid Waste Management

Because there is no specific legislation in Syria covering environmental and solid waste issues at the National level. The regulation in force depends on decrees and orders from the president, Prime Minister and the Minister of local administration.

At national level, the Prime Minister and the Ministry of Local Administration deals with the solid waste law or environmental law, also the highest authority for implementing solid waste management strategies and plans is the ministry of local administration, which administers both policy and co-ordination functions.

The higher council for the environmental safety recommends strategic solutions for solid waste and environmental problems. Also, the ministry of state for the environment may suggest some solutions to the problems of solid waste disposal or co-ordinate with the governorates to do researches on solid waste to select the best available solutions for solid waste problems.

At the regional and local levels the governorates (mohafazates) are responsible for implementing SWM strategies and plans, but the actual management of solid waste depends on the local municipalities.

3.1.1 National Organizations for SWM

3.1.1.1 The Higher Council For Environmental Safety (HCES)

The H.C.E.S has the primary responsibility of setting the national policy on environment and for coordinating environmental management activities within the government. The HCES is an inter-ministerial body, over which the Prime Minister presides. It is comprised of the Ministers of local Administrations, Irrigation, Agriculture and agrarian, Reform, Transportation, Media, Industry, Electricity, State planning, Health, Petroleum and Mineral Resources, Housing and Utilities and the Environment.

The main mandate of HCES is to: Issue national policies and plans for the environmental protection including SWM, take necessary actions to stop, prevent and impose restrictions on polluting activities, and to set standards for pollution control.

3.1.1.2 Ministry Of Local Administration (MOLA)

At national level, the highest authority for solid waste management is the MOLA. The mandate of the Ministry is to:

Supervise the implementation and execution of local administration law and follow upon and develop the administrative units.

- ♦ Co-ordinate between Governorates, the local administrative units and the central system.
- ♦ Propose general policy for the local administrations according to the country's needs and establish plans and programs.
- ♦ Monitor and assess the execution of local programs.
- ♦ Co-ordinate between the local planning and the general policy of the country and consider the social and economic aspects.
- ♦ Issue necessary legislation, rules, decisions and administrative instructions for proper and efficient policy implementation.
- ♦ Provide technical, administrative and financial support for the local administrative units and organize seminars, forums...etc.

Figure 2 shows the MOLA structure.

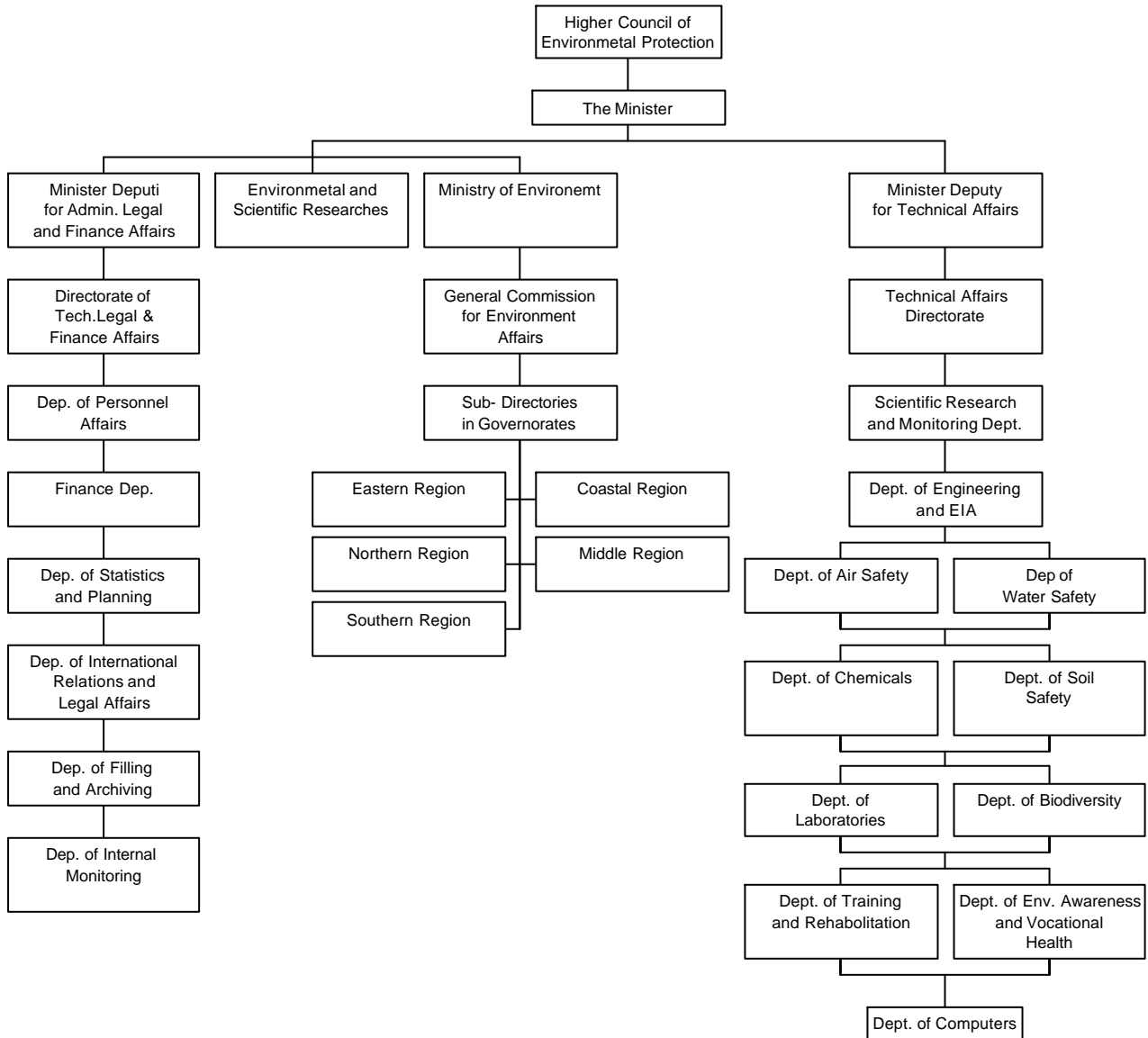
3.1.1.3 Ministry of State for the Environment MSE

M.S.E is established in 1991 by presidential decree No. 11 and the lead Ministry within Government on environment, with policy formulation, inter-sector co-ordination, regulatory and research functions. The objectives and responsibilities are defined in the degree as follows:

- ♦ Identify the existing environmental problems, and perform the needed studies and research.
- ♦ Prepare the needed plans, legislation and programs for conserving the environment within the general policy of the country.
- ♦ Raise environmental public awareness through different types of media
- ♦ Perform environmental monitoring on all activities within the Syrian land, interior, seawater and air to minimize the risks that might result from the handling of different materials that would effect human health, environmental safety and natural resources and propose solutions for eliminating the risks.

Figure 3 below shows the present structure of the MSE adopted on the 21st of February 1999

Figure 3- Structure of the Ministry of State for the Environment



3.1.2 Regional and Local Organizations Responsible for SWM

3.1.2.1 Governorate (Mohafaza)

The governor is head of Governorate (Al-Mohafaza), he primary follows the Prime Minister and Minister of local administration, and relates to all the ministries. He is responsible for implementing the general policy of the country. Because MSE is not an executing or enforcing agency, it currently relies on the governor and Governorate. The Governorates are responsible for implementing environmental policies and regulations at the regional level. Typically they achieve this through their directorates.

3.1.2.2 Governorates Councils and Executive Offices of Mohafazat

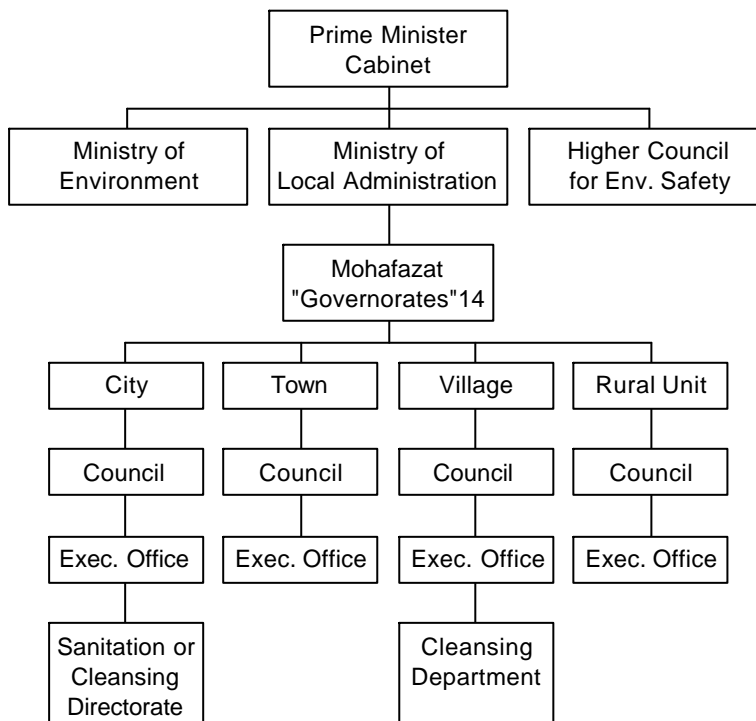
Mohafaza council and it's executive office supervise the works of councils and executive offices of the cities, towns and villages which exist inside the Mohafaza. Also they are responsible for planing and implementing regional SWM strategies.

3.1.2.3 Cities, Towns and Villages Councils and their Executive Offices

They are responsible for the technical and financial aspects of SWM and for the planing and implementation of local SWM strategies. Daily follow up including all aspects of collection, transportation and disposal are administrate directly by the sanitation directorate or cleansing directorate or department which is related to the local municipality.

Diagram 3 below shows the structure of SWM

Figure 4- Solid Wate Mnagement and Organization



3.1.3 Local Authorities for Solid Waste Management Operations

Municipalities have all the authorities for SWM operations. There are three forms of organizational structure for SWM in municipalities according to the size of the city and the number of staff working in SWM. The first form is the directorate, in the capital city (Damascus), the second form is the department, within the Health Affairs Directorates in the main cities like Aleppo and Homs, the third form is the section, within the Sanitation Department for cities like AL-raka and other small cities and towns. The availability of funds is not related to the form of structure, but rather to each city's needs.

Damascus city has a separate entities for SWM which are the Directorate of Cleansing, and the Directorate of Compost Plant and Landfill. Heads of those directorates relate directly to the governor of Damascus city, because Damascus city is a governate by itself.

In the other main cities like Aleppo and Homs, a department within the Health Affairs Directorate "Sanitation Directorate" is responsible for the SWM. In small cities and town the SWM is the responsibility of a section within the Public Health Department "Sanitation Department". Health Affairs Directorate or Public Health Department consists of several divisions; (cleansing, public health control, slaughterhouse, burial, and insects' extermination). In these conditions SWM tasks are divided over two divisions;(the Health Division is responsible for employers and the Mechanical Engineering Division or Vehicles is responsible for the vehicles' maintenance and operations). The head of SWM tasks follows the head of the directorate or department, and head of directorate or department follows the Mayer. Also there is some interference between the directorates or departments within the municipality like in Aleppo, the SWM vehicles operations follows the Cleansing Department at the Sanitation Directorate and Vehicles Directorate.

Heads of directorates and departments are appointed by the Minister of Local Administration and are suggested by the Mayer, this implies that there is a weak political interference in SWM operations, also there are a member of executive offices that have responsibility for SWM operations' supervision.

There are no separate budget lines for SWM operations and they interfere with the tables of the local administrative unit's budget (a more detailed description is given in section 3.2).

The coordination between actors in SWM is weak, NGOs help local governments in public awareness campaigns, formal private sector is involved as contractor for local government operations of SWM, the informal sector has no link with the other actors and sometimes it is considered a nuisance.

There is no clear mechanism for receiving complaints from the clients regarding SWM system and structure or service levels like missed collection and illegal dumping. But the people complain via general public participation components, like parliament, local administrative councils, media, and complaint offices, which exist in the municipalities or complaints sections which exist in the Cleansing Directorate of Damascus City or Health Affairs Directorate of Aleppo City Council.

3.2 Staff/Management (salaries, employment, training)

Concerning salaries and incentives for workers in SWM, these are generally included in the grade of salaries, wages and incentives for workers in the government sector plus the compensation of SWM works, which it is value about 100% of the original salary. This equals about 50% over the income of workers in SWM compared with the workers in other fields. For example, the monthly income of a fresh ordinary government worker is about 2,500 Syrian pounds SP (50\$), whereas the monthly income of a cleanliness worker is 3,700 Syrian pounds (75\$). This salary increases every two years at the rate 7-9%.

As for a fresh engineer, the monthly salary is about 3,800 SP for work in the government (77\$) whereas he would receive 5,200 S.P for working in SWM (104\$). Moreover, the workers of SWM take a nutritious meal every day, which consists of two eggs and a cup of milk, and they have full a health insurance. Furthermore, a cleanliness worker is not prevented from collecting valuable objects from the waste he collects.

The level of education of employers working in SWM is not good, generally there is only one or two engineers in the Cleansing Department or Sector, and they are not qualified for working in SWM. Only in the Cleansing Directorate of Damascus City there is acceptable education level of staff.

There is no extra training or exchange visits or budget for training, only in the last three years METAP did some training course in environment protection for some engineers and staff from MSE and local administrative units in Aleppo, Damascus, and Homs. It included some issues of SWM like medical waste and pollution of SW.

Employment of SWM generally includes normal laborers for sweeping and garbage collection, skilled labor for work with compactors and in the compost plants, drivers for vehicles, and supervisors for laborers and engineers as heads of sections or directors. In addition to the above staff there are mechanical laborers and skilled mechanical supervisors at the workshops. The number of staff of SWM at selected cities is as follows:

Table 3. SWM Staff for the Selected Cities

City	SWM organization	Number & kind of staff		
		Normal workers	Engineers	Workshop workers
Damascus	Directorate of cleansing	3000	9	250
	Directorate of plant and landfill	150	1	-
Aleppo	Cleansing department	1300	2	150
Homs	Cleansing section	550	1	70
Lattakia	Cleansing section	450	1	50
Al-raka	Cleansing section	150	-	20

3.3 Reasons for Private Sector Involvement in SWM

Listed below are the main reasons for private sector involvement in SWM on contract basis with the local government according to the government's general contracts law. This law determines the fiscal and legal contractual relations between the local government and the private sector in service provision:

- Lack of capacity of local administrative units to manage SW operations such as the insufficient number of laborers in municipalities for SWM.
- Economical reasons such as the increased cost of maintenance and operations of some kinds of solid waste equipment in the public sector.
- The spread of peri-urban areas which require special manual methods for garbage collection which are not available in the municipalities.

More details regarding this issue can be found in section 4.1.2.

3.4 Financial Resources (funding, budgeting, fees, etc.)

3.4.1 Sources of Funds

The main source of financing municipalities comes from the share of the municipality of the Central Government's taxes and fees. The other source comes from the local municipalities' fees, such as the fees of building-licenses, road-construction, as well as from the cleanliness-fees imposed on residential, commercial, industrial buildings and other economic activities.

Municipalities in Syria do not have the authority to change their shares of the central government's fees and taxes, which are collected by the Ministry of Finance. They are given their shares according to the rate of the sum collected from the city of the municipality.

As for the local fees of municipalities, such as building-fees, their value is specified through regulations issued by city council, following the agreement of the Ministry of Housing and Utilities and they are

collected directly by the financing directorates or sections in municipalities. In the case of the fees of road construction and paving, only the cost of construction is taken into consideration.

As for the cleanliness fees system, it consists of two elements: Tariffs for households and service fees for commercial establishments according to the general financial Law No (1) for the year (1994). This law has specified the maximum and minimum limits for the fees. The fees are fixed, and do not get adjusted regularly or according to inflation rates or other factors, any changes require the issuing of a new law.

The local administrative units can ask for assistance, loans and grants from the central government or other organizations or persons. In addition to the above- mentioned, there are fines imposed by the municipalities on discrepancy of regulations in the field of solid waste or other activities of the municipalities, the maximum values of these fines are specified by a national public law. Municipalities can't raise these fines over the limit of 500 Syrian pounds (10\$).

3.4.2 Budget Cycle

The local administrative unit (city council) which is responsible for S.W.M is an independent financial unit. The cleansing division of the municipality does not do any accounting or budgeting; these functions are centralized in the city council. Every year the cleansing division makes a request for the necessary staff and equipment and other needed items and this request is studied by the city council. This means that the cleansing division has no insight on its expenditure and income from the collected fees.

The city councils prepare their budgets according to estimates of expenditures and revenues, then the budget needs approval from the Governorate councils and the Ministry of Local Administration to be taken into consideration with the general budget of the state.

If the expenditures are more than the revenues, the local administrative unit may receive assistance or loans from the central government. There are no special tables for SWM budget in the local administrative unit's budget.

Generally the budget divides to two parts Expenditures and Revenues as described in the following sections.

3.4.2.1 Expenditures

These include the following tables:

- First table; Salaries, wages and remittances of all workers in the local Administrative unit
- Second table: current administrative expenditures (general administrative unit expenditures, fuel, electricity, maintenance of vehicles, buildings and roads, medical expenditures, communication bills. The prices of lands are taken from citizens for general service. The expenditures of the first and second tables include expenditures on all local administrative unit activities, of which S.W.M. is considered one
- Third table: investment projects, it includes all new construction projects such as; roads, buildings, landfills ...etc. this also includes the purchasing of new vehicles
- Fourth table: transfer expenditures, it includes the sharing of local administrative units with social activities in the city or town.
- Fifth table: claims and demand liabilities.

3.4.2.2 Revenues

These include:

- Sixth table: revenues of the municipality from its royalty of the central government's taxes and its local duties and penalties. It also includes the cleansing duty on the houses and service charges from private economic and commercial establishments for waste collection and disposal as well as the electricity of the streets and swage network maintenance.
- Seventh table: revenues of the general investment of municipality and revenues of its funds and properties.
- Ninth table: deposits and trusts.
- Zero tables: unusual revenues like loans, assistance's, grants and subsidies.

It must known that usually there is no equilibrium between the revenues from tariffs and service charges and real SWM expenditures. More details regarding this point are presented in next section.

3.4.3 Fees

Financing Law No.1 for the year 1994 determines two kinds of fees:

- 1- cleanliness fee for households.
- 2- service fee for commercial establishments.

This law specifies its aim to cover the services of municipalities in the field of SWM for cleanliness fee (tariffs), lighting public streets and the maintenance of roads and pavements and drainage for service fee.

The Law specified the minimum and maximum limits for fees as following:

- 1- cleanliness fee:
 - ♦ For residential houses in cities of Governate center;
250 SP (5\$) to 500 SP (10\$)/ year
 - ♦ For houses in other cities and towns;
75 SP (1.5\$) to 100 SP (2\$)/ year
 - ♦ For houses in villages;
25 SP (0.5\$) to 100 SP (2\$) /year.

- 2- service fee for commercial establishment :

- ♦ For different star hotels;
500 SP (10\$) to 25000 SP (500\$) / month
- ♦ for private hospitals;
500 SP (10\$) to 20000 SP (400\$) / month
- ♦ For different star restaurants;
200 SP (4 \$) to 15000 SP (300\$) / month
- ♦ For commercial & industrial centers;
200 SP (4 \$) to 5000 SP (100\$) / month

- ♦ For professional offices & shops;
100 SP (2\$) to 5000 SP (100\$) / month.

The city councils decide on the cleanliness fees and services fees. To determine the level of cleanliness fee for households the following considerations, among others, are taken into account. a) district, and level of income of the area the house is located in; b) kind and form of building; villa, villa-townhouse, ...etc; c) Total tax income for the area; d) Ability to pay.; and e) Social level of the area.

Table 4. gives examples of cleanliness fees in Damascus, Aleppo and Homs

	Homs	Damascus	Aleppo
1. villa	300SP(6\$)/year	500SP(10\$)/year	250SP(5\$)/year
2. villa - townhouse	250SP(5\$)/year	350SP(7\$) /year	200SP(4\$)/year
3. Central Area Class1	200SP(4\$)/year	250SP(5\$)/year	150SP(3\$)/year
4. Downtown or Medium Income	150SP(3\$)/year	150SP(3\$)/year	125SP(2.5\$)/year
5. Slum areas	75SP(1.5\$)/year	75SP(1.5\$)/year	75SP(1.5\$)/year

The service fee is on different commercial, industrial and economic activities, which includes SWM, electricity in the street, maintenance of streets and sanitary drainage network and other public services of the municipality. In determining the level of service fees, the following considerations, among others, are taken into account; a) General classification of the enterprise, like the classification (number of stars) for the hotels and restaurants; b) Classification of the Ministry of Health for the

hospitals; c) Classification of commercial or industrial chambers or professional unions for commercial and industrial enterprises; and, d) location, size, power of activity, income and number of laborers in the centers or shops.

Table 5. Examples of Service fees for some commercial establishments in Damascus, Aleppo and Homs

	Damascus	Aleppo	Homs
1. Different star hotels	500-18000SP (10- 360US\$) /Month	450-6750SP (9—135 US\$) /Month	500 –15000SP (10—300 US\$) /Month
2. Private hospitals	2500—10000SP (50—200 US\$) /Month	900-2700SP (18—54 US\$) /Month	1000-2000SP (20—40 US\$) /Month
3. Restaurant	400-- 9000SP (8—180US\$) /Month	225—900 SP (4.5—18US\$) /Month	1000—7000SP (20—140 US\$) /Month
4. Shops	200—2500SP (4—50US\$) /Month	270—2700SP (5.4—54US\$) /Month	200—1000SP (4—20 US\$) /Month

The municipality collects the Cleanliness Fees and the Service Fee directly and separately. They aren't collected with other bills and are entered into the incoming revenues of municipality's budget directly.

There is no study for the real cost of the fee of cleanliness imposed on houses, or for the fee of services imposed on the commercial or economic activities. The value is decided through a minimum and a maximum value specified in Law No.1 for the year1994 according to several considerations unrelated to the real cost, which is not analyzed at all. Furthermore, there is no feed back mechanisms for the cost and the fees which are not "year marked" for public cleansing. They are spent on all expenditures of the municipalities.

All the collected local fees are kept within the municipality. The incoming fees related to SWM do not cover the real cost of the services generally. Revenues are less than expenditures; they generally do not reach more than 50% of the expenditures on SWM.

For examples: In Damascus, the cost of SWM is about 500million SP (10million US\$)/year. The revenues collected from the cleanliness fee is about 18 million SP (360,000US\$), the revenues from the service fee for SWM equals about one third of total service fee's, which is about 50million SP (1million US\$), that means that cost recovery is about 13.5% in Damascus city.

In Aleppo, the cost of SWM is about 300million SP (6millionUS\$)/year. The revenue from the cleanliness fee is about 45 million SP (900,000US\$), the revenue from the service fee for SWM (equals about one third of total service fee's) is about 80 million SP (1,6million US\$), that means that the cost recovery is about 41.75% in Aleppo city.

In Homs, the cost of SWM is about 125million SP (2.5millionUS\$)/year. The revenue from the cleanliness fee is about 6 million SP (120,000US\$), the revenue from service fee for SWM (equals about one third of total service fee's) is about 25 million SP (500000US\$), that means that the cost recovery is about 25% in Homs city.

The influence of the clients on the fee structure via members of the City Council newspapers as public participation components are low.

4. Private Sector's Profile

4.1 Formal Sector

4.1.1 General Information (activities, number, size, etc.)

Although, in general, the SWM works in cities are being carried out by the cities councils, some works in some cities (Damascus, Aleppo, Tartous) are entrusted to the private sector for economical reasons or due to the lack of capacity of the municipality.

In general, there are no big private companies for service provision or construction, but there are some big governmental companies for civil construction works in Syria. Also there are no national companies-government or private, specialized in the field of S.W.M but there are some contractors with specific contracts with the government to carry out the works of construction and services including S.W.M, such as waste collection, street sweeping and waste transportation etc.

The contractors supply the laborers and equipment that are needed for the work and that are requested by the local government's administrations. Those contractors are organized in a work union, which is the Syndicate of Syrian Contractors and the Syrian Chamber of Commerce. Every local contractor, whatever his activity is, who wishes to work with the government must join the syndicate of contractors and the Syrian chamber of commerce to be able to have contracts with the government. There may be cooperation among contractors, but it is not organized.

In Damascus, the formal private sector executes 8% of solid waste collection, 5% of solid waste transportation from the city to the main collection site, and 100% of solid waste transportation from main collection site to final disposal site. In Aleppo, formal private sector executes about 35% of cleansing and SW collection, 100% of SW works at final disposal site and it will execute 100% of solid waste transportation from transfer station to new final disposal site. In Tartous it executes 40% of solid waste collection.

Studying the private sector in SWM of Damascus and Aleppo reveals the following:

In Damascus:

1. Contractor for waste transportation into final disposal site (100% of SW transfer) The extent of work of this contractor is the transportation of the municipal garbage from collection site beside the city to final disposal site in Jaronea which is located 40 Km from Damascus city. The contract price is 150SP /ton (3US\$/ton). The total contract amount is about 40million SP/year (800,000US\$/year), but in the last year the contract was done with total contract amount of 35 million SP/year (700,000US\$/year) lump sum value, because of the increase in competition between the private companies. The contractor offers dump trucks with drivers and wheel loaders for carrying the garbage. He earns about 20-30 percent of contract amount.
2. Contractor for cleansing the city area (It equals about 5% of total SW collection in the city). One contractor for cleansing one of the slum city area. The content of the contract is collection of garbage in contracted area and street sweeping (manual) of the same area. The contractor offers 50 laborers with average salary of the laborer about 250SP/day (5US\$/day). The contractor earns about 20 percent of contract amount.
3. Contract for garbage collection of Kassion mountain area (It equals about 3% of total SW collection in the city). The content of contract is street sweeping (manual), garbage collection and garbage transportation to the collection point at the lower side of the mountain by animals. The contractor offers 30 laborers with an average salary for the laborer of 248SP/day (5US\$/day), and 30 donkeys or horses with average salary of the animal 100SP/day (2US\$/day). The contractor earns about 25 percent of contract amount.
4. Contract for garbage transportation from the narrow roads down town (It equals about 5% of SW transportation from the city to the main collection site). The contractor offer 25 very small open boxcars with drivers with amn average salary of the unit 600SP/ day (12US\$/day). The contractor earns about 27 percent of contract amount.

-
5. Contractor for garbage sorting beside compost plant. Contractor employs some laborers to recover some recyclable substances by partial sorting some quantity of the garbage (about 100ton/day) and he pays 60000SP/month (1200US\$/month) to city council.
 6. Contractors for cleansing the city area between 1995-1998 (It equals about 35% of total SW collection in the city). Damascus City had more than three contracts to employ 500 laborers for street sweeping and garbage collecting from year 1995 to the beginning of 1998 with an average salary for the laborer of 250 SP/year. Those contracts did not get renewed because the local government got new employers at cleansing directorate.

In Aleppo:

1. Contractors for cleansing of the city area in the last year. Three contractors are working for the cleansing of city area. Cleansing of 35% of city area is entrusted to these contractors. The content of the contracts is street sweeping (manual) of the contracted areas and collection of garbage in the same areas. The contractors offer about 320 laborers with an average salary of about 6500 SP/month (130US\$) and 100 tricycle motorbikes with their drivers with an average salary of about 14000 SP/month (280US\$) and some equipment with operators (such as shovel loaders and dump trucks). The city council empties the containers using its own compactors. The total contracts amount are about 3,750,000 SP/month (75,000US\$/month). The contractors earn about 15% of total contracts amount.
2. Contractors for cleansing of the city area from 1994 to mid of 1999. More than four contractors were working on the cleansing of the city area every year. The content of the contract was as follows; collection of garbage in contracted areas, street sweeping (manual) of the same areas, street washing of the same areas and emptying of containers of the same areas. The contractors offered laborers, tricycle motorbikes with their drivers, equipment with operators (such as shovel loaders and dump trucks) and hired the compactors (7 tons vehicles) from the city council. The total contracts amount were 90million-100million SP/year (1.8-2millionUS\$/year).
3. Contractors for the operation of SW dumping site (It equals 100% of SWM work at dumping site). The extent of work of this contractor was the operation of the SW dumping site (leveling of garbage). The contractor was renting two dozen shovels with drivers to the city council. The contract amount was about 300,000 SP/month (6,000US\$/month).

An example of the General Profile of a Formal Private Contractor:

1. Name: Mr. A.S
2. Entrusted area: east sector of Aleppo city.
 - ♦ Area: 2.85 square Km
 - ♦ percent of industrial & slum area: 45%
 - ♦ population: 138949 inh
 - ♦ garbage weight production daily: 100.8 ton/day
 - ♦ contract amount: 1.5million SP/month (30000US\$/month)
3. Laborers and equipment offered by the contractor for the work and price of each unit:
 - ♦ No of laborers: 85
 - ♦ salary of laborer/month: 6500 SP/month
 - ♦ No of motorbike with driver: 30
 - ♦ salary of unit/month: 14000SP/month
 - ♦ No of hours for the wheel loader work: 5hours/day:
 - ♦ price of one hour work: 650SP/one hour work
 - ♦ No of dump truck trip per day: 10 trip/day
 - ♦ price of one trip: 600SP/one trip
 - ♦ No. of containers: 160
 - ♦ price of one containers emptying: 50SP

Of course, each laborer has a handcart and road sweeping instruments such as a broom, a fork, etc.

4. Equipment hired from the city council: the contractor hired 3 compactor vehicles of MAC 7 ton from the city council from the beginning until the end of the contract with a unit price of 15,000SP per month; paid to Aleppo City Council.
5. Duration of contract: from 1.5.1998 -1.8.1999.
6. Collection method: Laborers of the contractor collect garbage in an area by motorcycles and handcarts to fill containers nearby. Garbage in the containers is loaded into the compactors and is transferred to the final disposal site. The compactors are timeworn and usually can work 3 or 4 days a week. Laborers continue to collect garbage on the street and transport them to the open stations. Open stations are the properties of the city council with 500 square Meters. Garbage collected in the open station is loaded on the dump truck owned by the contractor by means of the his own wheel loader. The dump truck goes to the dumping site and dumps garbage down. Normally 10 trips are required to clear off the garbage in the open station.
7. Working time; the working time of the contractor is as follows:
 - ♦ Normal day shift: 7:00 to 14:00
 - ♦ Night shift: 18:00 to 20:00

(2 motorcycles with 6 men for each for waste collection and street sweeping at night).
8. Other matters; the city council inspects the contractor's work each morning to calculate the number of laborers and motorcycles as well as at night from 16:00 to 22:00. If garbage was found uncollected, the city council collects it and requires reimbursement from the contractor.

4.1.2 Contracting Arrangements

Law No.1 has granted the government the right of contracting with contractors (tenders) from the public or private sectors to supply requirements needed by the government. These requirements may be equipment or services. The law has not given any advantages or exemptions to certain works, but it has granted facilities in the procedures of contracting with companies subsidiary to the public sector and with specialized companies. It has also specified the mechanisms for issuing the contracts and tenders related to S.W.M as follows:

The side requesting the contract organizes an application form for the required jobs. It describes in it the quality of the required job, its size, estimated value and the reasons of demanding it. Usually, the reason in the case of SWM, is the incapability of the city council to perform the job. The application is then submitted to the financial official, who is, in the case of the city council, the head of the city council himself. His initial agreement is given after getting the agreement of the directorate of financial affairs with a financial credit available for the jobs, itemized according to the budget of the city council. There is no minimum time requirement for contracts.

A tender document is prepared specifying the terms, which must exist in the contractor, and the works which must be carried out, with a detailed list of the prices of these works according to estimated value. The tender document is signed by different offices, namely; the office responsible for SWM, the financial office (which ensures the existence of the financial credit in the budget), the legal office (which ensures the legality of the terms and procedures), the contracts office (which decides the mode of announcing the tender, its date and duration), and the head of the city council. This tender is then announced in the central and local newspapers. However, the law has given the government the right of not announcing the tender in newspapers in case immediate action was needed. Moreover, the law has given the government the right to enter a direct contract with a contractor (without tendering) in a few cases;

When the value of the contract is less than 500.000 SP (10.000 \$).

When an existing specialized company is needed of a specific job.

When immediate interference is requested.

For special technical or financial causes.

If the contract is with a public sector company, in this case the agreement of the prime minister cabinet is needed.

Contractors apply for the tender; the winner is chosen according to the considerations of price and excellence.

Before assigning the work to the winning contractor, the transactions should be legalized by the head and the executive office of the city council for the contracts of less than 500.000 SP. For contracts that are between 500.000 and 5.000.000 SP the agreements of the Ministry of Local Administration and the State council are required. The agreements of Ministry of Local Administration and the Economic Committee in the Presidency of the Cabinet are needed if the contract value is over 5.000.000 Syrian pounds.

The winning contractor is then given the order to start work under the supervision of the office responsible for SWM in the City Council, and he is paid according to the monthly tables (lists), according to the tender document.

A contractor must submit a bid-bond estimated at 5-10% of the value of works. 5% is discounted as an insurance amount from the monthly payments, which is refunded after performing the works according to the assigned terms.

In general, in Syria, there are no international bidders in the field of SWM but there are a few international companies, which have supplied special vehicles for SWM according to external contracts, such as: Mack Company (American)-Frigh liner (American) -MAN (German) for supplying compactor trucks. Johnson Company (English)- Ilveco Company (Italian) for supplying sweepers. Buhler Company (Swedish) for supplying the compost factory in Damascus.

Both cities of Damascus and Aleppo have received two vehicles for collecting garbage of the style of Mitsubishi and Isuzu as Japanese gifts with the participation of Shinwa Company.

The financial official in municipalities is the Head of City Council.

4.1.3 Cost/Revenue Analysis

In reality, the performance of the private sector in SWM is like the public sector in that, the solid waste is collected without any kind of sorting and is dumped in final disposal sites, for this, there is no cost/revenue.

Private sector involvement in SWM benefits the municipalities by two ways;

1. Decreasing the expenditure on SWM; the contract amount is less than the expenditure of municipality for same work within 10 to 30 percent, because private sector administration is more efficient than public administration.
2. The private sector involvement improves the SWM due to its better performance, efficiency and cost-effectiveness, this improvement helps the municipalities in the collection of cleansing and service fees.

The above points are supported by a study conducted in 1998, on the “Activity of the Private Sector in SWM of Aleppo”.

4.1.4 Income/Employment

This section was covered in section 4.1.1

4.2 Informal Sector

4.2.1 General Information (activities, numbers, size, etc.)

Activities of the informal sector in Syria are very weak, irregular and non-organized. Its activities are distributed as follow;

1. Scavenging activities by the villagers around the cities looking for food for their animals. This results in refuse being scattered around the waste containers.
2. Some poor people scavenge on the waste containers of the main cities to collect valuable substances, such as, plastic products, cans and metals, so they scatter refuses around containers. There are about 100 scavengers in Damascus, 100 scavengers in Aleppo, 50 in Homs and 30 in Lattakia.
3. Some people including children collect reusable materials such as plastic products, plastic bottles, glass, metal, copper, cast iron and so forth, from the dumping sites of solid waste of the main cities like Aleppo (100 scavengers), Homs (60 scavengers) and Lattakia (40 scavengers). Those scavengers cooperate according to the kind of material collected in every city.
4. In Aleppo, about 100 informal private laborers, collect waste from houses in high-income districts and dispose them in the containers after recovering recyclable material to be sold.

The recovered material from the waste is sold to dealers, who are specified according to the kind of substance (plastic, metal, glass etc). The dealers sell the reusable substances to the small recycling enterprises that exist in Aleppo and around Damascus.

4.2.2 Links With the Local Government

There is no link between the informal sector and the local government. The informal sector consists of scavengers mainly, and they are considered a nuisance, because they scatter garbage around containers and cause difficulties in front of vehicles at the final disposal site. Only in Aleppo City, the informal sector that collects waste from the high-income houses and disposes of it in the specified containers is considered a helper to the public sector in SWM.

This sector is not organized and is not represented by any institution, but there is some kind of cooperation between scavengers at the final disposal sites.

4.2.3 Cost/ Revenue Analysis

The selling prices of reusable materials are as follows;

- | | |
|-----------------------|----------|
| 1. White plastic | 8 SP/kg |
| 2. Colored plastic | 3 SP/kg |
| 3. Plastic bottle | 4 SP/kg |
| 4. Glass | 2 SP/kg |
| 5. Papers and cottons | 1 SP/kg |
| 6. Metals | 8 SP/kg |
| 7. Copper | 40 SP/kg |
| 8. Cast iron | 1 SP/kg |

The informal sector in Syria is formed from scavengers, those scavengers are work in the main cities, and the scavenger earns about 200 to 500SP/day according to age, sex, experience and city.

The Scavenger can collect about 30-50 kg of reusable garbage daily, and there are about 800-1000 scavengers in the cities of Syria. With this information only, analysis for cost/ revenue cannot be carried out. It is known, however, that the informal sector earns about 250000SP/day (5000US\$/day) from reusable substances, and recycles about 50 tons of solid waste/day in the whole of Syria. In addition to 10 million SP/year (200m000US\$/year) that results from the informal sector's working in the collection of garbage from some houses of Aleppo City.

4.2.4 Income/Employment

The scavenger's income is about 200—500 SP/day for an adult, and 100-300SP/day for a child, because this work is usually carried out by the family, there is no employment in this sector.

The laborer who collects waste from houses of high-income area in Aleppo earns also about 15000SP/month, he collects 75 SP/month from every house (usually every laborer works with 100 houses). He also sells the valuable material he recovers from the waste he collects.

5. Practices

5.1 Solid Waste Generation/ Composition:

5.1.1 National Level

5.1.1.1 Solid waste composition and characterization

There is no national study for solid waste, but we can estimate quantities, composition and characterization of national solid waste from local solid waste studies, depending on following factors;

- 50% of Syrian inhabitations are living in rural areas and they are working in agricultural and animal production.
- 9% of Syrian inhabitations are living in Damascus city, which it is capital city.
- 11% of Syrian inhabitations are living in Aleppo, which it is second city.
- 5% of Syrian inhabitations are living in Homs & Hama which they are big agricultural cities.
- 2.7% of Syrian inhabitations are living in Lattakia & Tartous which they are big coastal cities.
- 2.3% of Syrian inhabitations are living in Deir-ez-zor & Al-raka which they are big desert cities.
- 20% of Syrian inhabitations are living in medium and small cities.
- The main industrial investment is in small cities around Damascus and in Aleppo and in Homs.
- The average of municipal waste generation from every inhabitation in rural areas is about 0.3kg/day, because some of organic waste are used as animals food, and there is reused for some kind of waste.
- The average of residential waste generation for Damascus is about 0.52kg/capital.
- The average of household waste generation for Aleppo is 0.46kg/capital.
- The average of household waste generation for Homs, Hama, Lattakia and Tartous about 0.42kg/capital.
- The average of residential waste generation for medium and small cities about 0.39kg/capital.

The average composition of municipal waste without demolition & industrial waste is as follows;

Table 6. Composition of Municipal Solid Waste

Waste fraction	Percentage of total waste
Food waste	72.46
Paper and cardboard	4.97
Plastic	5.08
Textile	1.85
Wood	0.45
Glass	0.56
Metal	0.75
Leather	0.50
Other combustible waste	3.06
Other non combustible waste	10.32

The average density of municipal waste is over than 300kg/m³, and the moisture content is 60-65% at temperature degree 105C, because high organic content of solid waste.

5.1.1.2 Solid Waste Generation

The average generation amounts of residential waste are 6600ton/day, that means, the one inhabitant generation is about 0.4kg/day.

The average generation amounts of commercial waste are 500ton/day.

The average generation amounts of industrial waste are 900ton/day.

The average generation amounts of public facilities waste1000ton/day, it includes street waste, park waste, school waste and public offices (institutional) waste.

5.1.2 Local Level

5.1.2.1 Solid Waste Composition and Characterization

1- Damascus: the average density of municipal waste without demolition and industrial wastes is 205kg/m³ and the moisture content is about 53%at 105C and average of residential waste generation is 0.52kg/capital at collection site.

2- Aleppo: the average density of household waste is about 250kg/m³ and the moisture content is about 60.5 at 105C and the average of household waste generation is 0.46kg/capital at source.

3- Homs: the average density of household waste is about 325kg/m³ and the moisture content is about 62.5 at 105C and the average of household waste generation is 0.43kg/capital at source & 0.46kg/capital for municipal waste at collection site.

4- Lattakia: the average density of residential waste is about 348kg/m³ and the moisture content is about 63 at 105C and the average of household waste generation is 0.417kg/capital at disposal site.

5- AL-raka: the average density of municipal waste is about350kg/m³ and the moisture content is about 64 at 105C and average of residential waste generation is 0.39kg/capital at disposal site.

Table 7. The Average Composition of Household Waste

Waste Fraction	Percentage of Total Waste				
	T				
Food waste	52	65	71	72	76.5
Paper &cardboard	13	11	7.4	4.5	5
Plastic	11	10	8.8	7.5	5
Textile	5	4	3	2.8	1
Wood	1	0.5	0.5	1	0.1
Glass	1.5	1.5	0.4	1	0.4
Metal	1.5	1.3	0.9	1.7	1.5
Leather	1	1.5	1	0.7	1
Other combustible waste	8	4	2.5	2	3
Other non combustible	6	1.2	4.5	6.8	6.5

5.1.2.2 Solid Waste Generation / Type of waste

The following table presents the amounts of waste generated for each type of waste in the five selected cities:

Table 8. Solid Waste Generation by Type

The city	Nb. of inhabitants	Household waste Tons/day	Commercial waste Tons/day	Public facilities waste Tons/day	Industrial waste Tons/day
Damascus	1500000	800	45	260	30
Aleppo	1800000	840	85	200	250
Homs	630000	270	55	120	110
Lattakia	360000	150	30	70	30
Al-raka	180000	70	8	20	5

5.2 Solid Waste Collection & Transfer

In big and medium cities, about 20-40 of municipal wastes are thrown directly by citizens to streets, in front of houses or to corners of streets or squares, about 60-80 of municipal wastes are put within containers which are distributed in the streets of cities by municipalities. Laborers of formal collection system collect street's garbage by handcarts to containers nearby or to small open stations inside cities. Garbage in the containers is loaded into the compactors mechanically and is transferred to the final disposal site. (Usually the size of container is 1.2m). The garbage collected in the open stations is loaded on the dump trucks by means of the wheel loader mechanically of course. The dump trucks go to the final disposal site and dump garbage down.

In small cities and rural regions, the municipal wastes are put in the streets in front of houses and it are loaded on the tractors by laborers, the tractors go to the final disposal site and dump garbage down.

The role of informal system was previously described in section (5.2). Prices paid by clients for waste collection and disposal services were described in section (3.4.3).

Some specific notes about waste collection & transfer of selected cities:

- ♦ Damascus:
 - ♦ the compactors and dump trucks empty their loading garbage into big open station beside the city, another dump trucks owned by the private sector transfer the garbage from station to final disposal site.
 - ♦ the size of containers are 1.2m³, 0.7m³, 0.2m³.
- ♦ Aleppo:
 - ♦ the laborers use the handcarts and motor tricycle to collect street's garbage.
 - ♦ the laborers from informal sector collect the garbage from some buildings of high income area by door to door collection scheme and they separate valuable waste and throw refuses inside containers. Every house pays about 75SP/month for this service.
 - ♦ the size of containers is 1.2m³ and 0.4 m³.

5.3 Treatment and Disposal of Solid Waste

Generally, all final disposal sites in the cities of Syria excluding Damascus are open dumps without any facilities to decrease pollution. There are no informal disposal options.

In Damascus, the solid waste is covered by soil in a new dump site (50hectares) without any other treatment, there is a composting plant with a theoretical capacity of 700ton/day(Buhler-Miago concept), but it actually treats 400ton/day of solid waste, also there are three incinerators beside the landfill site with a total capacity 2ton/day for hospital hazardous waste.

In Aleppo, the new sanitary landfill and sanitary transfer station are partially constructed (more than 90% of works are finished) but they are not in use. Also there is an old compost plant with a theoretical capacity of about 80ton/day (Siloda concept), but it has been closed down the last couple of years due to the production of a low quality and in very low quantities (5ton/day) compost product.

In Homs there is no any modern facilities, and in Lattakia, there is an old compost plant with a theoretical capacity of 100ton/day of solid waste, but its actual capacity is less than 30ton/day and most of the time it is out of order. Also there are two old small hospital incinerators, one in the national hospital with a capacity of 300kg/week, which is out of order at the moment, the second is in the university hospital with a capacity of 30kg/hour.

In Hama, there is an old compost plant (Dano concept), and has the same problems as the Aleppo composts plant, and in Al-raka and all the other cities, there are no facilities for solid waste treatment.

5.4 Recovery

5.4.1 Formal Recovery Activities for Solid Waste

In general, there are no formal recovery activities for recyclable wastes, it exists at a very low scale in Damascus only for recyclable wastes in final disposal site. 5ton of recyclable waste per day are collected and sorted manually at disposal site before covering the waste by soil.

However, there are formal recovery activities for organic waste in some cities as following;

Damascus; about 150 ton of compost/day

Lattakia; about 10-15 ton of compost/day

Hama; about 5-10 ton of compost/day

Aleppo; less than 5ton of compost/day

The price of compost is about 350SP/ton (7US\$/ton)

5.4.2 Informal Recovery Activities for Solid Waste

The main activity of the informal sector is the recovery of recyclable wastes. They scavenge on the garbage in containers and at the final disposal sites of the main cities as following;

Damascus; about 5ton of recyclable waste per day

Aleppo; about 15 ton of recyclable waste per day

Homs; about 5-7 ton of recyclable waste per day

Lattakia; about 3-5 ton of recyclable waste per day.

Some scavengers take some kind of food waste from containers to their animals, this kind of recovery of organic wastes equals about 1% of municipal wastes.

5.5 Hazardous waste

5.5.1 National Level

The rapid increase in population, compounded by an increased per capita consumption of goods, and the use of increasing amounts of non-reusable products, has resulted in vast quantities of garbage lying in open dumps besides of the cities without any credible plans to treat it. Moreover, industrial expansion, with poor planning for industrial waste disposal has added to the problem and today solid hazardous waste is mixed with municipal waste and most industrial liquid waste is discharged to the sewer system.

Furthermore, there exists no characterization and classification in Syria of hazardous waste and in general the producers of industrial waste, as well as, most of the staff involved in waste management do not know how to distinguish between municipal and hazardous waste. In addition the producers and staff are not aware of the need to separate hazardous waste from other waste.

The medical waste, which is the important source of hazardous waste in Syria is collected together with domestic waste in most of the country (except for Damascus) it is also dumped with the other kinds of waste in final disposal dumps. According to some studies (WHO, IPC Program for Syria, Integrated

Medical Waste Management Plan for Syria and some local studies of general solid waste), the amount of hazardous medical waste is 0.4-0.5kg per bed/day and about 2.3kg per bed/day is non hazardous waste. The total number of hospital beds in the country is about 19000beds, which means, that the total amount of hazardous medical waste is about 7600-9500kg/day.

Industrial waste is generated by a various number of enterprises. The most dominating type of these industries including their type, production, locations and potential environment problems is listed below:

Table 9. Most Dominating Industries in Syria

Type	Local site	Production	Hazardous waste quantity	Potential environment problems
Tanneries	Aleppo + around Damascus	7000000 hides/year	10000ton/year	Chemical and heavy metals
Liquid batteries	Aleppo + around Damascus + Homs+other main cities	300000 units/year	10000ton/year	Solid waste containing high concentration of heavy metals
Dry batteries	Around Damascus	6800000 units/year	1000ton/year	Solid waste containing high concentration of heavy metals
Textile and dyeing	Most of main cities		4000ton/year	Dyes, chemicals, pieces of fabrics
Refineries	Homs + Baniyas	12500000 ton/year	1500ton/year	Molding sand
Asbestos	Aleppo	15000 ton/year	50ton/year	Dusts (low hazardous waste)
Chemical fertilizer	Homs	350000/ye	60ton/year	Chemical substances
Cement factories	Aleppo + Tartous + around Dam	4838000 ton/year	40000ton/year	Low hazardous waste
Slaughterhouse	All main cities	3000000	18000ton/year	Low hazardous waste
Others (metal plating, car repair workshops, etc	All main cities		7000ton/year	Chemicals &heavy metals
Total	(Hazardous industrial waste: 33650) +(Hazardous medical waste 3300ton) = 36950ton/year +48050ton/year Low hazardous waste			

5.5.2 At the Local Level

Table 10. Hazardous Waste Generation in the Selected Cities

City	Industrial hazardous waste	Medical hazardous waste ton/year	Total hazardous waste ton/year	Low hazardous waste ton/year
Damascus	100	1000	1100	2200
Aleppo	15350	550	15900789	62000
Homs	1000	190	1190	1200
Lattakia	100	200	300	800
Al-raka	20	100	120	150

6. Performance Assessment and Analysis

6.1 Legal and Policy Environment

At the moment, there is no specific legislation in Syria covering environmental issues (include SWM), either on the national level or on a local level. General legislation that exists lies with the sectors' ministries such as Ministry of Local Administration and Ministry of Housing and Utilities. The regulation in force depends at the moment on decrees and orders from the Prime Minister and the Minister of Local Administration and general recommendations from The Higher Council for the Environmental Safety and the Ministry of State for the Environment.

An Environment Law is pending at the moment in the parliament in its eighth draft, it might be adopted by the parliament in the near future. The law provides provisions within wide areas, but there is lack of solid waste definitions. Solid waste can be defined in several ways. One of them is the following definition:

“substances or objects, listed in,which are disposed of or are intended to be disposed of or are required to be disposed of by provisions of national law”.

The definition is used in the Basel Convention for the control of trans-boundary movements. The EU Council Decision 93/98/EEC, has adopted hazardous wastes and their disposal, and the definition as well.

Solid waste and solid waste management are not defined or mentioned explicitly or specifically in the draft Syrian Environmental Bill as an item concerning environmental regulation, there are no details concerning solid waste management in the Bill.

According to presidential orders and decrees and the law of Local Administration, the municipalities are obliged to collect solid waste, and are empowered to issue the necessarily rules and regulations on collection, transportation and disposal of waste. The law of Local Administration gives the municipalities and its councils the right to make decisions, rules and regulations regarding solid waste management. However, the Ministry of Local Administration has not issued any rules or regulations concerning solid waste management in the Mohafazat actually there are no specific laws to support an institutionally sustainable SWM till this moment.

Law No.1, 1994 (the law of Service Tax), gives the Local Administrative Councils the right and power to impose levies (tariffs for households and service charges for private enterprises) and fines or penalties for mismanagement of solid wastes, as it deems suitable to support the financial sustainability of SWM. However, they can not increase the value of the penalty more than a maximum sum of 500 SP (10US\$) according to the general criminal law. So the general criminal law limits the power of the imposed fine in some conditions.

According to the present legislation, SWM is the main responsibility of the municipalities and there are no provisions for the involvement of the private sector in SWM as a contractor with the local administrative units according to the general contracting law. This means that the private sector is not enabled to get involved in SWM independently from the public sector. Sometimes, there are difficulties to involve the private sector in SWM due to the deficiency of the general contracting law to govern all aspects of SWM.

During the last few years there has been some successful examples of the involvement of the private sector in the collection and transportation of solid waste in some cities, but there are also other unsuccessful examples due to absence of well qualified companies in SW services. Furthermore, there are some directions of SWM plans to allow the private companies to construct waste recycling plants, including compost plants or soil fertilizers, since the government has failed in managing public recycling plants.

According to the local administrative law, the decentralization of planing for SWM is a policy issue, and in the existing policies there is enough decentralization for SWM activities. The local administrative units have the right and power to make the decisions for SWM activities but the lack of qualified staff and budgets are the big problems that hamper the improvement of the services.

In spite of the increased role of some form of NGOs (like youth union, women's unions, sports clubs, various professional unions, children's union and friends of the environment club ...etc.) in the public awareness programs.

The informal waste collection and recycling sector plays a very weak role in SWM, and there is no regulation by local administrative units relating to the informal sector.

Citizens' complaints are received by the general public institutions, such as; the Parliament, Local Administrative Councils, media, and complaint offices, which exist in municipalities. But public participation usually may affect the quality of the collection service, and the selection of final disposal sites in some conditions.

6.2 Institutional Sustainability

6.2.1 Local Government

Solid waste management (collection, transportation and disposal) is the responsibility of the municipalities. Planning for SWM is the responsibility of the governorates and local administrative units but requires the approval of the Local Administrative Ministry. Sometimes this mechanism leads to duplication in SWM planning activities in some conditions due to the absence of an accepted national solid waste strategy.

During the last few years, five Environmental Directorates were established in the government as the executive bodies of the Ministry of State of the Environment. These Directorates undertook a few studies on solid waste within an integrated pollution control program funded by METAP-EU- UNDP without coordination with the cleansing departments of the municipalities. This caused some overlapping and duplication of planning for SWM between the municipalities and the Ministry. But as the governor is the decision-maker for the Governorate on SWM issues, which are the sole responsibility of municipalities, it did not influence the budget or daily work of SWM in the municipalities.

- ♦ ***Private formal sector:***

Small Private sector companies are involved as contractors for the local government in some operations of SWM, especially the collection and transportation of SW. However, the absence of well qualified private companies in SWM, their involvement is not very effective, and thus the relations between them and the government is not strong. Generally, the Private formal sector is not organized in true companies and its activities are still weak and sporadic.

During the last few years, the private formal sector has improved its position in waste collection in some areas of solid waste in some cities like Damascus, Aleppo and Tartous. Also it was involved in the cleansing services of some isolated projects like the airport or some big hospitals. The future tendency for the private sector is to get involved in the final disposal of solid waste, especially in the recycling operations.

- ♦ ***Informal sector:***

Individuals working in the informal sector, generally, have no link with the government at all, and sometime they are considered a nuisance because of their involvement in recovering material from the waste containers and thus scattering refuse around containers. Furthermore, their presence at the final disposal sites cause difficulties for the dumping vehicles.

Nevertheless, in Aleppo, some individuals from the informal sector are involved in the collection of waste from houses in high-income areas. These individuals recover valuable material from the waste they collect and dump the refuse in the designated containers. Thus, they help the formal sector indirectly by collecting garbage from door to containers.

Generally, the informal sector is very weak because it isn't organized and it has irregular activities.

- ♦ **Management capacity of SWM:**

Employers of SWM are generally unskilled laborers working in street sweeping and garbage collection. Skilled laborers work on compactors and in the compost plants, drivers for vehicles, supervisors for laborers and engineers as heads of sections or directories. In addition, there are mechanical laborers and skilled mechanical supervisors at the workshops.

The numbers of unskilled laborers are usually adequate in most big cities (except in Damascus and Aleppo) and not so adequate in small cities and towns. However, there is a deficit in the technical and skilled laborers, professional workers, professional officers and well-qualified engineers. Also there is a lack of a comprehensive organizational structure.

There is also a shortage in vehicles, especially compactors, dump trucks, and mechanical street sweepers in most cities except in Damascus and Aleppo.

The methods used for street sweeping and waste collection are "old fashioned" and do not include any sorting activities.

Funding for SWM is suffering from revenue shortages and lack of investment in SWM in most cities.

The major lack of management capacity appears in the management of the waste final disposal sites and treatment plants. Currently, in all the Syrian cities, except for Damascus, all types of waste are dumped together in open dumps without providing even a soil cover, which causes catastrophic environmental pollution.

6.2.2 Technical Assessment (effectiveness of existing practices)

- ♦ **Collection Rate:**

The collection rate differs from city to city; it is very good in the capital, good in the main cities (Aleppo, Homs, Lattakia), acceptable in other governorates' center cities and not acceptable in most small cities. In Damascus it is about 90% and serves about 85% of the population, due to the irregular collection from very low-income areas especially slums.

In Aleppo it is about 80% and serves about 75% of the population. Coverage is bad in poor surroundings and slum areas and some areas are not covered at all.

In Homs and Lattakia, it is about 80% and serves about 80% of the population due to bad coverage in low-income areas. Whereas, in Al-raka, the coverage is about 60% and serves about 70% of the population, leaving out the rural like areas in the city. As for the other medium and small cities, the coverage is about 40-60%.

The formal sector covers more than 99% of the collection system in most cities, only in Aleppo the informal sector covers about 2-3% of collection system.

- ♦ **Recovery Rate:**

The recovery rate of formal activities is very weak since there are no recycling plants in cities except in Damascus, as was mentioned in section (5.4). Moreover, the compost plant of Damascus works with low capacity, due to its high cost of operation (15,000,000 SP = 300,000US\$/ year), and the generated income is low (1,500,000SP=30,000US\$/year), due to the low selling price of the produced compost (175SP/ton=3.5US\$/ton). Also the recovery rate of the private formal sector is about 0.5% in Damascus only.

As for the informal sector, its recovery rate is estimated according to the number of scavengers as 0.5-1% of the collected waste per day, plus 1% as animal feed. The informal sector earns about 100million SP (2millionUS\$/year) in the main cities from selling the recovered waste materials.

- **Disposal Rate:**

- Percentage of treated waste in sanitary landfills: 0%.
- Percentage of incinerated waste:
 - at the national level; less than 2.5ton from more than 9,000ton per day
 - at the local level; Damascus and Lattakia: 0.2%.
- Percentage of recycled waste:
 - at national level; less than 500ton from more than 9000ton per day =5.6%
 - at the local level; Damascus 36%, Aleppo 1.1%, Lattakia 10%.

Most of the solid waste is dumped into dumpsites.

- **Management of hazardous waste:**

Only at Damascus hospital waste is separately collected and treated. In Aleppo, tanneries waste is separately collected but it is dumped with the other waste.

6.3 Financial Sustainability

6.3.1 Cost analysis of collection and disposal

As there is no true informal sector in SWM, the exact cost analysis of collection and disposal for formal sector of five cities is presented in following table.

Table. 11 Cost of Solid Waste Collection and Disposal

City	Amount of SW ton/year	Total cost		Cost of collection		Cost of disposal	
		Million SP/ year	SP/ ton	Million SP/ year	SP/ton	Million SP/ year	SP/ ton
Damascus	400000	500	1250	430	1075	70	175
Aleppo	500000	304	608	300	600	4	8
Homs	200000	125	625	120	600	5	25
Lattakia	100000	70	700	64	640	6	60
Al-raka	37000	17	459	16	432	1	27

NB; 1US\$=50SP

The figures in table 11 above give the following analysis:

1. The cost of waste collection in the Capital City (Damascus) is higher than all other cities due to the long inter city roads network and also due to the increased political and human activities of the City.
2. The cost of waste disposal is higher in cities that have compost plants due to the failure in selling the produced compost.
3. The cost of waste disposal at Aleppo is so low due to the involvement of the private sector in the waste disposal in the dumpsite
4. The cost of collection at Al-raka is lower than other cities due to the wide rural area in this city.

6.3.2 Rate of cost recovery

The formal recovery rate is different from one city to the other, it is between 15 to 45%. On average it is equal to one third of the total cost. This implies that there is a partial cost recovery, and all the funds meant for SWM functions are actually used for SWM.

As was mentioned earlier, there is no clear informal sector and recovery rate for informal sector. A scavenger may earn between 200 to 500SP/day according to age, sex, experience and city. One Scavenger can collect about 30—50 kg of reusable garbage daily.

6.4 Barriers to Progress in Solid Waste Management

Progress in SWM needs improvement, six essential elements for its improvement is listed below;

1. Issuing of legislation, regulations and standards for solid waste management and the environment in general.
2. Planning, including both strategic and operational planning for SWM.
3. An operation of solid waste management services activities.
4. Funds for development SWM.
5. Public awareness and coordination between actors in SWM.
6. Monitoring of progress, receiving feedback for improvement.
- 7.

Some actions have already been taken to improve SWM such as;

1. The Ministry of Local Administration has issued new organizations for SWM administration for some cities, but they are not operational due to lack of human resources.
2. The parliament is currently pending the 8th draft of an environmental bill.
3. Some city councils have formed local commissions to suggest some solutions for the barriers and constraints such as; the in-appropriate landfill sites and the current waste disposal methods.
4. Aleppo and Homs councils are undertaking some SWM studies in coordination with METAP and EIB by a Danish company COWI for future planning.
5. GTZ is studying industrial solid waste for national planning.
6. Within LIFE program, which is financed by The European Commission, an integrated medical waste management study for future national planning is included.
7. There is a tendency to involve private sector in recycling of waste.
8. There are some trails to increase public awareness for solid waste.

Analysis of the existing situation and the activities of the different actors in SWM in Syria, reveals the main barriers and constraints for SWM progress as following;

1. Lack of specific legislation in SWM causes disturbances in the administrative and technical works, especially when leaders are changed. Also it causes disturbance in planning.
2. Deficiency of public awareness about SWM and environmental requirements, deficiency of necessary penalties and the small value of SW mismanagement fine.
3. Weakness of public administration and management capacity of local government for SWM.
4. Shortage of budget for improving of SWM.
5. Shortage of skilled personnel that are required for the tasks.
6. Inadequate private sector involvement in SWM and low capacity and quality of available private sector companies who are Interested in SWM.

To overcome those barriers and improve the institutional and regulatory environment, these steps must be taken;

1. The Parliament must issue the pending environmental law.
2. A clear and comprehensive set of standards, regulations and orders, for SWM must be issued by the Prime Minister's Cabinet.
3. A national study for the final disposal management of solid waste should be undertaken. The concept of shared disposal sites between two or more neighboring cities, should be considered by the Minister of Local Administration.
4. Charges must be calculated to cover the total expenditures concerning solid waste management. In accordance with the "polluter pay" principle the costs of waste disposal must be borne by the waste generator. It is recommended that a technical committee be established in the Ministry of Local Administration to identify fees and tariffs in different cities and towns.
5. Establishment of the administrative infrastructure, institutional strengthening and capacity building of the environmental and waste organizations, should be continued, taking into consideration that the human resources match the environmental and waste tasks appointed to them.

These steps are the responsibility of the Prime Minister's cabinet, the Ministry of State for the Environment, Ministry of Local Administration, Ministry of Housing and Utilities, Governorates and City Councils.

For reaching the goals or targets defined in SWM strategies the following is needed:

1. An environmental administrative organization that has the responsibility for SWM on the national and local level.
2. Skilled human resources who are required for the task.
3. Set of laws and regulations and standards of SWM.
4. The use of economic instruments (cleansing levies, service charges and pollution taxes) to cover SWM from cradle to grave.
5. Raising public awareness regarding SWM issues to accept the new solid waste regulations and rules.
6. Enforcing of SWM requirements.
7. Openness and freedom of solid waste information.

The above points are very important for good SWM, because SWM requires the following six basic organizational functions:

1. Planning, including both strategic and operational planning, and general programming and control.
2. Operations, to ensure the provision of solid waste management services, to regulate those services, and /or to deliver the services.
3. Financial, focusing primarily on accounting system.
4. Commercially, where the focus is on generating and collecting revenues from customers.
5. Administrative support, including the management of human resources and the management of supplies and assets, legal services, public relations etc.
6. Monitoring, monitoring of progress, correction of faults and feedback to correct and amend (if necessary) the aims and intentions of the organization in light of practical experiences.

In Syria, the SWM strategies are not in an acceptable form due to the deficit of the above necessary points, and the bad execution of some organizational functions as well as the existence of important obstacles.

7. Conclusions and Recommendations

From an environmental point of view solid waste management strategy is quite simple. Its principal objective is to reduce the amount of waste and the environmental burden resulting from its disposal, this objective needs improvement of collection and treatment of waste in final disposal sites.

Top priority should be given to the application of cleaner technology as a preventive strategy to help secure a reduction in waste production, e.g. through more efficient use of less environmental hazardous products. The ideal solution would be to encourage enterprises to employ cleaner technology, thereby minimizing or eliminating waste production. Not much has as yet been achieved on this front.

Recycling should be given top priority, as well, among the different types of waste management as it allows the best possible use of waste as a resource. Recycling is defined as the reprocessing of the waste materials as the original purpose or for other purposes, including organic recycling but excluding energy recovery, by a production process. Organic recycling is defined as the aerobic or anaerobic treatment under controlled conditions and using micro-organisms of the biodegradable parts of packaging waste, which produces stabilized organic residues or methane.

Re-using, as an (informal) consumption of waste, is in many countries an effective –but is not problem free- way to reduce the amount of disposed waste.

Sanitary landfill as final disposal site for solid waste should be considered as well as incineration of hazardous waste, which should be considered as the third best alternative.

Solid waste management (collection, transportation and disposal) is the responsibility of the governorates and municipalities and their councils. So far, there has been no accepted national environmental strategy or coordination of these activities. Similarly, there is no national strategy for hospital and hazardous waste management. However, a national strategy for medical waste management is under preparation and the priority areas, where government attention is recommended include the following:

-
- ♦ Institutional strengthening/capacity building
 - ♦ Strategic waste management planning
 - ♦ Continued improvement of existing landfills in larger municipalities
 - ♦ Improvement of open dumping practices in small and medium sized municipalities
 - ♦ Construction of new landfill facilities (where required)
 - ♦ Rehabilitation of closed dumpsites
 - ♦ Landfill pollution abatement
 - ♦ Improved special waste management practices
 - ♦ Raising public awareness and improving cost recovery.

At the moment, no organized sorting or segregation of wastes exists, including hospital waste, oil and chemical and other hazardous waste. All solid waste, including household, hazardous waste construction/demolition waste and other industrial waste, are generally disposed of in the same dumpsites.

There are no specific laws in Syria governing the management of solid waste. A draft parliamentary bill concerning environmental issues is pending. The second chapter in the bill provides the right to the High Council for the Environmental Safety in co-ordination with the relevant authorities to issue an integrated classification for all waste, and define how to manage it properly. The environmental law will, when it is in force, give power to the relevant authorities to set up executive ministerial regulations and rules concerning solid waste management.

Solid waste and solid waste management are not defined or explicitly mentioned in the English version of the 5th draft of the environmental bill as an item with high priority concerning environmental regulation. No detailed regulations for solid waste management and disposal have been defined. The draft version of the bill does not provide definitions for “solid waste”, “solid hazardous waste”, “solid waste management”, “recycling”, “recovering” etc.

Environmental solid waste management is a very complicated issue, and it will possibly take several years to set up executive ministerial and rules concerning it. It is possible that the adoption of the environmental bill alone will not make any important legal changes concerning environmental issues in solid waste management in the forthcoming years. The bill should be supplemented with a comprehensive set of regulations and standards so as to be effective. The only legislation presently dealing with environmental waste problems is the protection of water resources from pollution. Legislation forbids untreated waste to be dumped in fresh water bodies but it is rarely enforced.

The lack of regulation at national level and comprehensible definitions on solid waste management may lead to different interpretation of these definitions while issuing and implementing future governmental regulations. The gap between Syria’s current environmental legal framework concerning solid waste management and the legal framework which is needed to manage solid waste in an environmentally acceptable way is enormous and seems to be unacceptable from a local, regional and global environmental point of view.

Now there are strategic directions for regulatory reform, institutional development and municipal capacity building, those directions depend on actions of national and municipal government and actions of international community.

7.1 National Government actions

7.1.1 Prime Minister Cabinet and Parliament level

1. Issue the environmental law by parliament, and if possible changes should be made to the draft environment bill, it is recommended that solid waste management, disposal of solid waste and waste prevention be mentioned/dealt with as specific tasks/issues and incorporated in the law.
2. As mentioned above, it is expected that a draft bill on environmental legislation will be passed by parliament in the near future. The second chapter in the bill provides the right to the high council for Environmental safety in co-ordination with the relevant authority to issue an integrated classification for all waste, and to define correct management. The environmental law will, when it is in force, give

the power to relevant authorities to set up executive ministerial regulations and rules about solid waste management. Adoption of the environmental bill will possibly not make important any legal changes concerning environmental issues in waste management in the forthcoming years unless these issues are addressed.

3. Issue regulations and standards, which are related to environmental problems by the Prime Minister Cabinet and all Ministries responsible for these problems. It is recommended that a clear and comprehensive set of regulations and standards be provided as soon as possible. The necessary environmental regulations and standards, to ensure a comprehensive approach to environmental problems concerning solid waste management, must be covered. Requirements for hazardous and standards must be formulated.
4. Determining Environmental levies on polluters. Consumer charges and environmental levies are found to be useful when one wishes to influence a large number of polluters/waste producers simultaneously. High levies on solid waste disposal can help promote the recycling of several categories of solid waste. Consumer charges are commonly applied to the collection and treatment of municipal solid waste.

Disposal charges are direct taxes or fees on solid waste, often hazardous waste, either at the point of generation or disposal. A principal objective of these taxes is to provide industry with an economic incentive to employ waste management practices such as waste reduction, recycling and incineration, which are more environmentally desirable than land disposal. Principle of “polluter pay” is very important. It is recommended that economic instruments be more effectively used in the future.

5. Planning for public awareness about solid waste management and acceptance for the regulations and strategies on national level.
6. Determining tools for enforcing environmental requirements. As mentioned above, one of the first major steps in implementation environmental regulations are to gain acceptance among the majority of polluters. One way of doing this is to undertake on-site inspection of polluting enterprises. With the aid of the environmental officers it is usually possible to get most of the polluters to comply with the rules. Nevertheless, even with the most accepted regulations there will still be some enterprises that will disregard or neglect environmental regulations. The environmental authorities should therefore be able to rely upon the juridical system for help in solving the most difficult cases. The penalties must be in accordance with the environmental crime/offence.

Assignment of legal liability for pollution is often used in the area of hazardous waste management. All responsible parties should be held liable for damages due to the release of hazardous waste into the environment from inactive waste sites. The fee levied must be equal to the damage sustained; the level of the fee can be determined by settlements or by court judgement.

7.1.2 Ministry of State for the Environment:

1. An environmental administrative organization is necessary. The establishment of a ministry for environmental protection at the national level that can accord political (high) priority to the environment as a topic is considered a major step. Policy formulation, inter-sectors co-ordination, regulatory and research functions are some of the issues an environmental ministry must deal with. Ambitious political action plans and targets for a better environment are necessary, but environmental politics must address issues at level, which can be complied with/understood by the enterprises concerned.
2. Openness and freedom of information is very important for work's improvement. Administrative freedom of information must also apply to environmental administration. In environmental cases there will always be more than one part involved.

7.1.3 Ministry of Local Administration

1. Continue the establishment of an administrative infrastructure in the political levels under the government, Governorenates and city councils. Ascertain that the environmental authorities have a

clearly defined mandate in order to eliminate an overlapping of responsibilities between national and local authorities.

2. Establishment of professional personnel to match the SWM tasks and continue to give priority to the education of a professional corps of SWM officers, both at national and local level.
3. Prepare a set of regulations and SWM plans. It is necessary to implement an administrative tool to implement SWM plans, the plans can, for example, show how, where, and who may deposit treated or reused waste for two or more neighboring cities. The plans can also include measures for waste reduction, recovery and recycling, and supply information on disposal methods and costs. The detailed regulations and standards must be formulated in a manner that facilitates their administration.

Standards must apply to all aspects of solid waste management including waste storage, collection, transport, transfer, recycling, resource recovery, treatment and final disposal. They must include the technical and operational standards, which apply to solid waste storage, collection, transport, transfer and disposal as well as the management, operation and maintenance of solid waste facilities the standard must also include regulations on waste reductions of constituents and certain production methods.

4. Easing the arrangements for the private sector's involvement in SWM services and issue the licenses and permits and ensure the safe treatment and waste disposal practices. The permit system ensures that services meet the required standards.

7.2 Municipal Government Actions

1. Improve the administrative infrastructure of municipalities (or Governorates and city councils). It is this part of the governmental apparatus/system that will allow, through their knowledge of the individual pollutes, changes in behavior and enable processes to reduce solid waste generation and improve solid waste collection and disposal.
2. Training the personnel to match the SWM tasks.
3. Planning for SWM, using local waste surveys and drawing up solid waste management plans, which can then be used to plan the collection and the disposal of all types of solid waste.
4. It is recommended that the charges be calculated to cover the total expenditures concerning solid waste management. In accordance with the "polluter pay" principle the costs of waste disposal must be borne by the holder or the previous holder of the waste.
5. Planning for hazardous solid waste accordance to "Cradle to Grave" principle. This principle requires a comprehensive set of standards, regulations and requirements applicable to hazardous waste management from the point of generation to the final disposal site.

7.3 Private Sector Actions

Establishment special companies for SWM, they must have well qualified employers and administrative infrastructure for SWM.

7.4 Donor/International Community Actions

1. Helping to form NGOs.
2. Studying the recycling projects especially specific soil fertilizer at agriculture cities like Aleppo, Edlep, Hama, Homs.
3. Funding the recycling projects especially compost and specific soil fertilizer (Anaerobic Digestion Plant).
4. Studying the industrial and hazardous waste at big industrial area like around Damascus, Aleppo and Homs.
5. Funding the industrial and hazardous waste management projects at big industrial area.
6. Funding specific program for public awareness.

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Plan Bleu – Centre d'Activités Régionales / Blue Plan – Regional Activity Centre
PNUE-Plan d'Action pour la Méditerranée – UNEP-Mediterranean Action Plan
15, rue L. Van Beethoven – Sophia Antipolis – F-06560 Valbonne – France
Tél. : +33 4 92 38 71 30 – Fax : +33 4 92 38 71 31
E-mail : planbleu@planbleu.org
Site web : www.planbleu.org