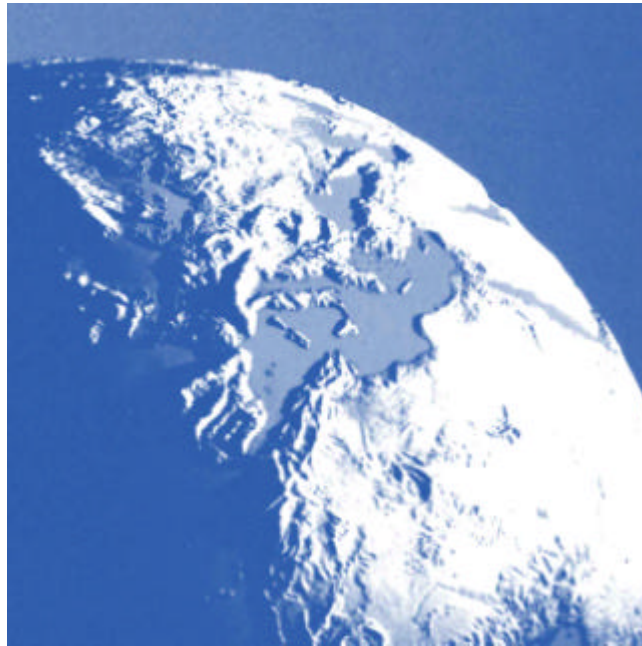




POLICY AND INSTITUTIONAL ASSESSMENT OF SOLID WASTE MANAGEMENT IN FIVE COUNTRIES

Cyprus, Egypt, Lebanon, Syria, Tunisia



Cedare



**Blue Plan
Regional Activity
Centre**

**Sophia Antipolis,
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Regional Study on

Policies and Institutional Assessment of Solid Waste Management in Cyprus

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Introduction

Due to the absence of a legal and institutional framework, today in Cyprus there is no integrated solid waste management system established. All practices that exist are followed by the municipalities for the collection and disposal of waste.

However, changes are taking place due to the accession of Cyprus to the EU. The harmonization process with the EU directives on waste is becoming a priority for the government authorities, which have until 2003 to adopt them in the country's legislation.

Information on current waste management practices in the country and as well as the EU directives are presented. Additionally the institutional and financial frameworks is pointed out as well as the major actors involved in solid waste management. Their level of involvement and actions in the system is also presented.

In this study there is also reference on private recycling companies, which are responsible for all recycling efforts in the country. Statistical data on quantities recycled and other important information about these companies are included.

Through this study, apart from current practices, future plans are presented, paying special attention to problems, which need to be addressed as well as to issues, which need to be further developed.

1. General Country Information

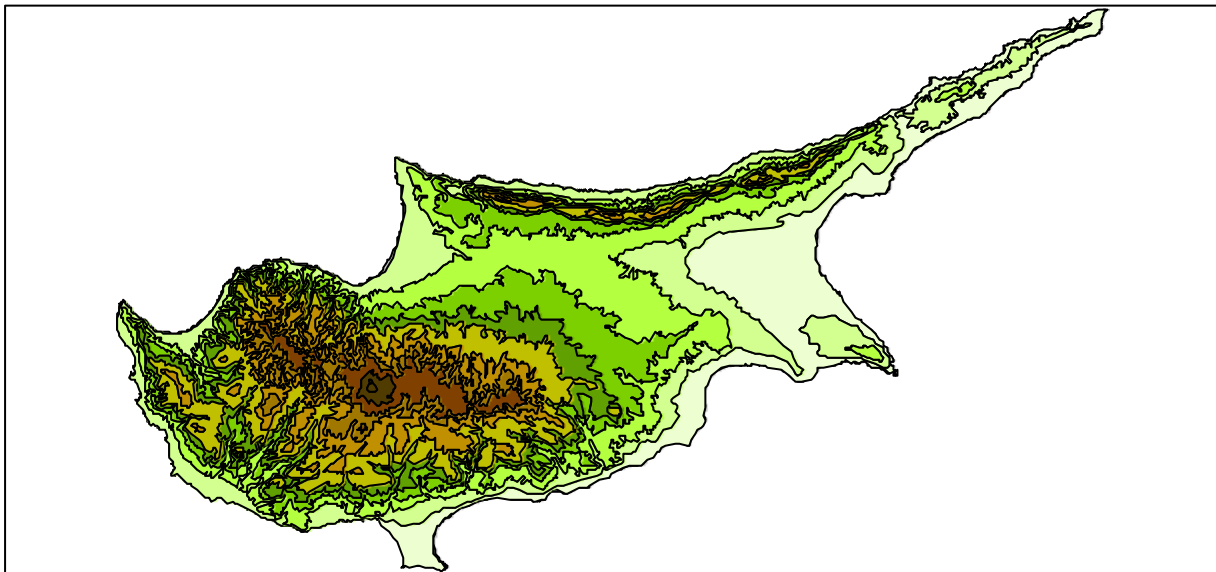
1.1 Physical geographical environment.

Cyprus is situated at the northeastern part of the Mediterranean basin, 33° east of Greenwich and 35° north of the Equator. It is the third largest island in the Mediterranean with an area of 9251 square kilometres out of which 47% is arable land, 19% is forestland and 34% is uncultivated land.

There are two mountain ranges, the Troodos range in the central part of the island with a height of 1952 metres and the Pentadaktylos range in the north of the island, rising to a height of 1085 metres. Most of the rivers, which flow only in winter, have their sources in the Troodos mountains and only one significant river has its source in Pentadaktylos. (See Map 1)

Figure 1-

Map1 - The Topography of Cyprus



The climate is typical Mediterranean with mild winters, long, hot dry summers and short autumn and spring seasons. Sunshine is abundant during the whole year, with an average duration of sunshine of 11,5 hours per day in summer and 5,5 hours in winter. The average maximum temperature in July and August ranges between 36°C on the central plain and 27°C on the Troodos mountains while in January the average minimum temperature is 5°C and 0°C respectively. Due to the aridity of the climate, evapo-transpiration is high, which, on an annual basis, corresponds to 80% of the rainfall.

1.2 Demographic Development

The island of Cyprus is divided into 6 administrative districts, Nicosia, Limassol, Larnaca, Paphos, Famagusta and Kyrenia. The capital is Nicosia. Kyrenia and significant parts of Nicosia and Famagusta are under Turkish occupation since 1974. (See Map 2).

Figure 2-
Map 2 - The Administrative Districts of Cyprus



The total population of the island according to 1992 reached 774,5 thousand inhabitants. Today in the year 2000, population is estimated to be around 800.000 thousand inhabitants. Nicosia is the most populated district concentrating 39% of the total population. The population per administrative district is shown below:

Table 1. Population by district

DISTRICT	POPULATION	PERCENTAGE %
NICOSIA	300973	39,0
LIMASSOL	172827	22,3
FAMAGUSTA	110139	14,2
LARNACA	103964	13,4
KYRENIA	33828	4,3
PAFOS	52854	6,8
TOTAL	774585	100

Source: Census 1992, Department of Statistics

Data on population structure show that the population is getting "older". The table below demonstrates the population structure from 1975. Cyprus however is in a better situation than other EU countries.

Table 2. Population Structure per age (%)

Age Range	1975	1995	1996
0-14	25,4	24,9	24,6
15-64	64,5	64,0	64,3
65+	10,1	11,1	11,1

Source: Economic Indices 1997, Planning Bureau, 1998.

The pattern of the population has been following a high urbanisation path. While only 35% of the population lived in the six main cities in 1960 this figure had risen by 1992 to 67% of the unoccupied areas. The highest concentration of population is in the capital Nicosia where 255,000 of the population live. A further 255,000 live in the Limassol and Larnaca areas. Following the pattern of Western Europe, counter urbanisation is expected to take place over the next 30 years, with increasing numbers of people living in rural areas and commuting in towns to work as both road infrastructure and communication networks are improving.

1.3 Population literacy and education levels

High literacy and education levels are recorded in Cyprus. The pattern of literate and educated population has increased during the last decade and today has reached the following levels:

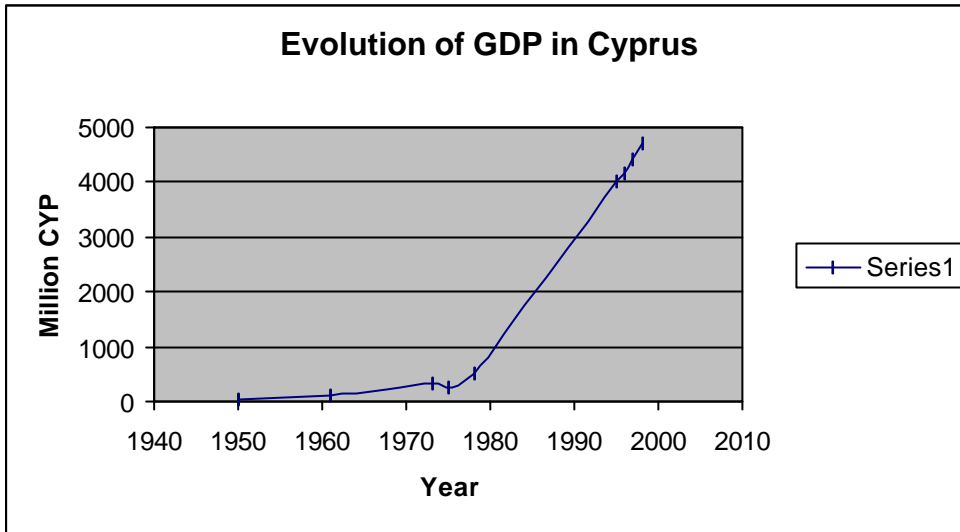
Table 3. Population Literacy and Education level

	Literacy %	Primary Education %	Secondary Education %	University %
Men	98	96	91	45
Women	90	96	94	

1.4 Economic conditions

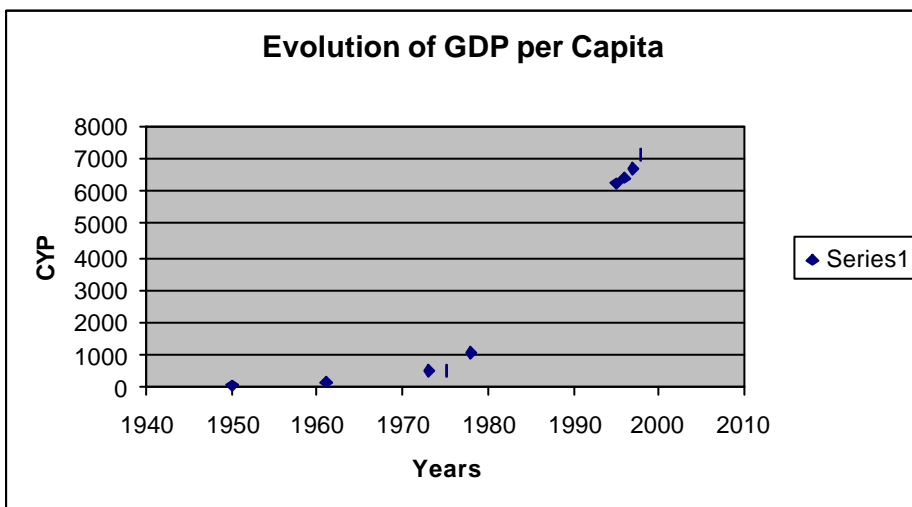
The performance of the economy in Cyprus has been remarkable over the past 20 years, following the Turkish invasion. In the last decade emphasis has been placed on the service sector, away from agriculture. Real Gross Domestic Product (GDP) has been growing at high levels, i.e. at an average rate of 7% between 1976 and 1989 (See Figure 1,2). Also nearly full employment has prevailed and relative price stability has been attained.

Figure 3- Evolution of GDP in Cyprus



Source: Recycling in Cyprus, Cyprus Recyclers' Association, 2000

Figure 4- Evolution of GDP per Capita in Cyprus



Source: Recycling in Cyprus, Cyprus Recyclers' Association, 2000

- **The Cyprus economy 1960-1974:**

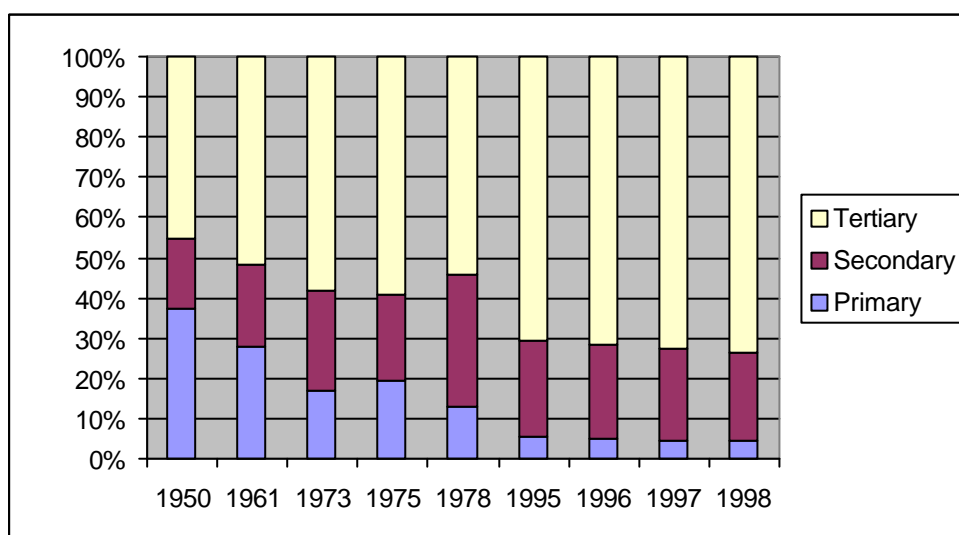
The new Government of Cyprus had to deal with a small economy highly dependent on unstable primary production such as dry land cultivation. The main exporting sector was mining. Manufacturing was very small and concentrated on the processing of agricultural products. Many of the problems facing the economy at that period still prevail now, such as the small number of consumers and producers and the dependence of some of the main sectors on external factors. Lack of infrastructure was obvious during that period. In effect, a large percentage of economic activity was concentrated on building roads and developing new plans for potable water and irrigation projects.

The Cyprus economy 1974-Today:

The economic development of Cyprus and the attainment of high living standards of its people are directly related to the availability of fresh water, needed for drinking, agriculture, industry and tourism. The performance of the economy of Cyprus has been remarkable over the past 20 years, following the Turkish invasion. In the last decades emphasis has been placed on the service sector, away from agriculture. Real Gross Domestic Product (GDP) has been growing at high levels, i.e. at an average rate of 7% between 1976 and 1989. Also nearly full employment has prevailed and relative price stability has been attained.

As already mentioned, the services sector, plays the most important role in the economy, in that way reflecting the transition of the Cyprus economy from exports of minerals and agricultural products, particularly copper, asbestos, citrus and manufactured products to an international tourist center and a regional information provision center during the decades of 1980 and 2000 (See Figure 3).

Figure 5- Distribution of GDP among the sectors of the economy



Source: Recycling in Cyprus, Cyprus Recyclers' Association, 2000

1.5 Socio-cultural setting

The official language spoken in Cyprus is Greek. Concerning the prevalent religions in the country is Greek Orthodox and Muslims who constituted 17% of population in 1974. There are minorities of Armenians, Maronites, and Catholics.

1.6 Political Structure

The political system in Cyprus is presidential democracy. The president is elected directly from the people of Cyprus and its term is five years.

The Members of the Parliament are elected from the six administrative districts of Cyprus (Nicosia, Limassol, Larnaca, Pafos, Famagusta and Kyrenia).

After 1974, the Members of the Parliament as well as the President are elected from the Greek Cypriot population of Cyprus since the Turkish Cypriots have moved to the Turkish occupied areas of the country.

2. Policy Framework

2.1 Current Waste Management Practices

In Cyprus today, there exist only practices, which should be followed by the municipalities when collecting and disposing solid waste. These practices deal mostly with the matters of hygiene and collection frequencies.

The municipalities have the full responsibility for the collection and disposal of waste but they still have to get government approval for any important and financial decisions they make. The only source of income for waste management is the collection fees, which the municipalities receive from households and from the services and the industrial sectors. Borrowing money from banks is not an unusual way for financing the municipalities' projects. Borrowing money from banks is unavoidable since municipalities do not receive any foreign donations to be used for waste management purposes. Their budget has to be approved by the government.

There is no solid waste management system in the country. With the accession of Cyprus in the EU however, there are the directives related to solid waste management, which Cyprus has to transfer to the country's legislation by the year 2003. The current waste management practices implemented in Cyprus are presented in more detail in Chapter 5.

2.2 Harmonization of Cyprus with EU Legislation.

The most important EU Directives which Cyprus has to transpose to national legislation are the *Framework Directive on Waste*, the *Packaging and Packaging waste (94/62/EC)* and the *Proposal on Landfill (COM (97) 105)* and the *Hazardous Waste Directive*.

- ♦ Framework Directive on Waste
- ♦ Packaging and Packaging Waste
- ♦ Proposal on Landfill
- ♦ Hazardous Waste Directive

In the following sub-section, the directives, which have to be transposed, are presented in more detail.

2.2.1 Framework Directive on Waste

With this Directive, the European Union tends to succeed in reducing the generation of waste, in increasing recycling and reuse, and finally in ensuring that waste is disposed of without endangering human health or causing harm to the environment.

Council Directive 75/442/EEC on Waste, as amended by Council Directive 91/156/EEC, provides the basic framework for waste management in the European Union. The Directive requires Members States to ensure that waste is covered or disposed of without endangering human health or causing harm to the environment. Member States are also required to prohibit the abandonment, dumping or uncontrolled discharge of waste.

To meet these goals in the European Community a control mechanism must be established. In accordance with the *polluter pays principle*, the costs of waste disposal must be borne by the holder or the previous holder of the waste. The *polluter pays principle* states that who ever is responsible for the disposal of waste must be charged for any harm done to the environment.

Community awareness is high in the priority list of the European Community. Therefore, great importance is given in the availability of information to the public. If information can successfully reach the public then community awareness increases. As a result the public is empowered and people can influence decision making in the highest level of the government. Therefore, access to information can lead to the empowerment of people who can be an important actor in environmental policy making.

The following are the implementation considerations for the Framework Directive on Waste:

1. The EU waste management system presuppose adequate administrative systems on national, regional, and local levels, as well as adequate infrastructure for safe collection, sorting, transport, recycling, materials and energy recovery, and disposal of all types of waste.
2. When preparing national laws, particular attention should be given to the EU definitions particularly in establishing 'waste' types/ categories, the definitions of 'management', 'holder', 'collection and recovery' and to the hierarchy of waste treatment principles as well as the principles of polluter pays, proximity and self-sufficiency.
3. Competent Authorities should be designated for the purposes of the Waste Framework Directive, the Waste Shipment Regulation, and other relevant waste-related directives. Administrative structures will be needed at the local, regional and national level.
4. Proper implementation will require the consultation and co-operation of industry, trade, and consumers at large. The public must be informed.
5. Waste Management Plans on a regional basis or incorporated into strategic national waste plans should be drawn up at an early stage.
6. Systems for licensing of waste disposal operations and for waste recovery operations will need to be set up, as well as registries or licensing systems for professional waste collectors or transporters, or professional brokers of disposal and recovery services.
7. Clear economic measures, such as taxes, charges and deposit systems would encourage waste minimization.

2.2.2 Packaging and Packaging Waste

Directive 94/62/EC implements the Union's strategy on packaging waste. It aims to harmonize national packaging waste management measures, to minimize environmental impacts of packaging waste and to avoid the erection of barriers to trade within the European Union.

The Directive covers packaging and packaging waste, industrial commercial or domestic, regardless of the materials used and its main provisions are the following:

1. No later than 5 years after the Directive comes into force, Member States are required to take measures to achieve the recovery of between 50% and 65% of packaging waste, and the recycling of between 25% and 45% of such waste.

2. Member States wishing to exceed these targets must inform the European Commission, who will consult Member States before assessing whether such proposals are compatible with the Directive.
3. An obligation will be placed on Member States to ensure that packaging may only be placed on the market if it complies with certain essential requirements - packaging complying with these essential requirements is guaranteed free circulation within the Community.
4. A requirement for information to be collected to enable the development of packaging and packaging waste management policies.

The Directive sets the prevention of production of packaging as the first priority. Reuse, recycling and other forms of recovery are accepted as equally valid fundamental principles. Recycling includes reprocessing and organic recycling (composting), but does not include incineration.

2.2.3 Proposal on Landfill

The proposal requires new and existing landfills to be more tightly controlled under a detailed permitting procedure. The Directive aims to decrease the amount of waste going to landfill and to introduce strict standards where landfilling takes place. Under the proposal co disposal (the mixing of hazardous waste with municipal waste in the same landfill) would be phased out. Prices for landfilling disposal must cover the costs of closing the landfill site as well as management, and also must cover at least 50 years of care after closure of the site.

The Directive aims to reduce the quantity of biodegradable municipal waste sent to landfills in order to reduce the EU's total methane emissions. The Directive also introduces minimum distances for the location of landfills from residential areas.

The implementation considerations of the Directive are the following:

1. As landfill is the most common and least expensive type of solid waste disposal, and standards are often lacking, it would be advisable for countries to align new legislation governing the operation of landfill sites with the proposed Directive. Attention should be given to eventual amendments made to the proposal by the Council and the European Parliament.
2. The requirement of the Directive should be integrated with the national waste strategies and management plans in compliance with the Waste Framework Directive. Such national plans must identify the sites, which fall outside the scope of the Directive.
3. An effective strategy to minimise the waste to be landfilled will require the participation and active support of all economic and social actors. Economic incentives and educational campaigns will be needed.
4. Special provisions in the budget at national or at other level of administration should be developed to ensure the transparency and the availability of the after-closure funds to be set up under the directive.

2.2.4 Hazardous Waste Directive

This Directive defines measures, which, in addition to the Waste Framework Directive, have to be applied when dealing with hazardous waste. Hazardous wastes are those listed in Council Decision 94/904/EC which sets up an exhaustive list of hazardous wastes known as the Hazardous Waste List.

The principal aim of the Council Directive 91/689/EEC is to formulate a common definition of hazardous waste and introduce greater harmonization of the management of such waste. The Directive requires Member States to draw up plans for hazardous waste management, either as part of the general plans drawn up under the Waste

Framework Directive or separately. Member States are also required to ensure that every site to which hazardous waste is delivered is registered and identified, and that hazardous wastes are packed and labeled in accordance with Community and international standards. In addition, Member States must ensure that hazardous wastes are not mixed with other categories of hazardous wastes or non-hazardous wastes.

The Directive also tightens some of the permitting and control procedures of the Waste Framework Directive where hazardous waste is involved for establishments and undertakings carrying out their own waste disposal and those which carry out waste recovery operations. Procedures of hazardous waste are also brought under the obligation of periodic inspections. Furthermore, producers of hazardous waste along with professional waste transporters are required to keep records of the hazardous waste they handled for inspection by the competent national authorities. In order to achieve this Member States must require:

1. Registration and identification of every site where hazardous waste is delivered.
2. Packaging and labelling according to Community and international standards when such waste is collected transported and temporarily stored.

The implementation considerations for this Directive are the following:

1. The management of hazardous waste requires specific and stricter licensing and control procedures.
2. National rules for the correct identification and classification of hazardous waste would have to be developed, as well as requirements and guidelines for the environmentally sound recovery and disposal. National competent authorities will need to have the technical expertise to test for hazardousness of waste.
3. Technical capabilities and adequate infrastructures will have to be put in place to avoid the risk of inadequate recovery.
4. A centralised data bank would have to be created in order to fulfil the obligation to supply information to the EU Commission concerning hazardous waste management and disposal contractors.

2.3 The Consequences of Harmonization on Current Solid Waste Management System

As mentioned above, today in Cyprus there is no solid waste management system. By transferring the aforementioned EU directives a solid waste management system will be established in the country. Within the framework of such a system, recycling will be promoted largely on the residential and commerce sectors. As it can be understood, apart from the legislative changes, institutional changes from the central government level up to the municipality and community levels will take place.

Great changes are expected to occur in the collection system of waste since currently there is no separation of waste. Additionally sorting, transfer and compaction stations will be established something quite new to the country since there exist no such establishments today.

2.4 Plans and Strategies

It is important to note that there is no recent comprehensive study dealing with the design of a solid waste management in the country. The government is currently undertaking such a study, which is still at its preliminary phase with no published results.

The last published study on introducing a waste management system in Cyprus was carried out in 1994 (with a supplement in 1999) and is called "Recycling of Municipal Solid Waste in the Main Urban and Tourist Centres of Cyprus". It was conducted by Carl-Bro Environment a/s in association with NV Consultants. Within the framework of this study, an evaluation of current waste management practices and waste quantities is done and a solid waste management system is proposed. A preliminary evaluation of such the system is performed.

This study today is being revised due to problems with its findings (the accuracy of future waste quantities is questioned, and the system proposed needs revisions). As aforementioned, new study on planning the solid waste management system of the country defining the role of each actor, the logistics of such a system as well as the economics started at the beginning of this year, 2000. This study is funded by the Cyprus Government.

Another study sponsored by the Cyprus Recycling Association was conducted on recycling by the national consulting firm "Environmental Management Consultants LTD" It was completed in April 2000. The purpose of the study was to identify the financial and social contribution of recycling to Cyprus and to provide guidelines for the growth of the recycling sector. More importantly the study aimed at identifying the problems that the recycling sector is facing and at emphasizing the importance of the sector to the welfare of the country. Through this study, the contribution of the sector was emphasized. In the consequent chapters the conclusions of this study shall be presented.

Additionally another study is being conducted within the framework of the European Programme "LIFE" and includes recycling efforts in some municipalities in Cyprus. The purpose of this program, called LIFE HOUSEHOLD RECYCLING INITIATIVE, is the development of a recycling system in Cyprus. The goals of the program are the establishment of a legal framework in relation with the European Directives; the development of an institutional framework which, will be responsible for the implementation and monitoring of the recycling program; the successful co-operation with all other interested parties; and the increase of community awareness on recycling.

This programme began on the first of January 2000 and will be completed within 18 months from the day of its commencement. The partners in the programme are the Educational Institute of Cyprus, the Municipalities of Ayios Dometios and Latsia in the greater Nicosia area, Geroskipos in the greater Pafos area, Polis Chrysochous in the Pafos District, the Federation of Ecological Organisations of Cyprus, and the Recyclers' Association of Cyprus. There are also partners from abroad.

For the first stage of implementation an initial goal is to implement a pilot program for the collection, and sorting of different types of paper, plastic, glass, and aluminium. After the success of the pilot program, full implementation of the scheme will be conducted by the involved municipalities. This study is still at its very early stages, starting only in March 2000 with no results published yet.

Bearing in mind what has been reported in this paragraph one can see that there are still no concrete plans of how to implement a waste management system in the country, although the deadline for the transfer of the EU directives is approaching (2003).

3. Institutional and Financial Framework

3.1 Actors Responsible for Implementing SWM

- **Government:** At the national level, governmental authorities have the responsibility for planning and for organising the solid waste management system. The *Ministry of Agriculture, Natural Resources, and Environment* is the competent governmental authority dealing with solid waste management. The *Ministry of Interior* is also involved because it is the competent government authority, which comes with direct contact with the municipalities. Therefore, co-operation between the two ministries is necessary.
- **Municipalities:** At the local level, the responsibility of implementing solid waste management systems falls into the municipalities. Each municipality is responsible for waste collection in its own areas, and the municipalities are also the ones that own and maintain collection equipment. The waste is collected by municipality employees 2-6 times per week depending on the season and on the amount of waste in each specific district. The municipality employees collect the waste from the curbside where it is placed by the residents, either in plastic bags or in various plastic containers.

Households, shops, industries, and restaurants are charged with a fee for having their waste collected by the municipality. This waste collection fee is established by the board of the municipality and it depends on the type of the premises served. Each municipality is free to fix the charges.

At each municipality a complaint mechanism exists, where the public can make complaints related to SWM. Each complaint is filed and examined for possible improvement of the system.

The municipalities then have the responsibility for transferring the waste to the existing landfills. There are two main landfills in the island one in Kotsiatis serving the greater Nicosia area and the Vati, which serves the greater area of Limassol. Other smaller communities have dumpsites for disposing their waste where in some case the waste is burned.

The following is a detailed list of the municipality's responsibilities according to Municipal law:

- Cleaning of the area.
 - Keeping it in a good hygiene state.
 - Collecting, treating, and disposing waste.
 - Preventing the accumulation of waste in any public or private area.
 - Providing public waste containers where they are needed and maintaining them clean.
 - Preventing the illegal transport of waste.
 - Setting and collecting collection fees from residents.
- **Private sector:** There are private recycling companies in Cyprus, which recycle paper, plastic, glass and metals. The only recycling efforts in the island are basically conducted by the private recycling companies. Their sources of collection are mainly the industries, large commercial and government organisations. Concerning the metals particularly, collectors of old appliances or used metals is another source of material. It

is important to note here that the recycling companies do not collect any solid waste from the residences since this would require great investments on both equipment and labour force. More details concerning the operations of the private recycling sector are presented in Chapter 4.

4. Private Recycling Sector Profile

4.1 Private Recycling Companies in Cyprus (the Formal Sector)

Today in Cyprus there are several private companies dealing with recycling. Most of these companies recycle paper, plastic, glass, iron, aluminium, and several other metals. Only some of these recycling establishments produce raw materials or secondary products. Mostly, recycling in Cyprus is limited to the collection and to the initial treatment of materials before they are exported to other countries for further recycling. As aforementioned, the main sources of material for the companies are the industry, large establishments and collectors. The recycling companies most of the time, collect the material by using their own trucks. They do not get contracts to collect municipal waste from the municipalities.

It is important to emphasize that the private sector does not collect the recyclable material from the residential sector as this would need extensive financial resources for additional equipment as well as for labour force.

The recycling companies are private companies registered in the industry registry not as recycling industries (as there is no such category in the registry) but according to the material they process (paper, glass, metals etc). The treated material produced by the recycling companies is exported mainly to Greece, Israel and Europe.

It is important to note at this point that the private recycling companies operate completely on their own with no support from the government or recognition of their role in the existing solid waste management system.

The *Recyclers Association* was formed by 11 recycling companies in 1997 with the purpose of promoting recycling in general in Cyprus and at the same time gain support and recognition for their work and contribution to the both the economy and the environment of Cyprus. Therefore, it was an organized attempt by the recycling companies in Cyprus to be recognised by the government as an isolated industrial sector with different elements and problems from the rest.

4.2 Quantities of Recycled Materials by the Recyclers Association

The data presented in the following table were taken from the *Recyclers Association* and represent all the operations of the members of the association for the last 5 years. It must be noted again that most of this data do not represent secondary products but quantities of waste that went under some initial treatment.

The quantities of the recycled paper represent the operations of three recycling companies. After the paper is collected it goes under a compaction process before it is exported to other countries. The largest paper quantities are collected from banks, governmental offices, and printing companies. From the table below it can be noticed that there is an increasing trend in paper recycling.

The data on plastic recycling represent only one recycling company, which is the only member of the association that treats plastic. After treatment the raw material that is produced is sold to several industries for production of secondary products. Like in the case of paper, plastic recycling has also been increasing in the last 5 years.

There are two recycling companies, which treat glass. One of these companies produces secondary products for sale in the domestic market. The major sources for glass collection are hospitals, restaurants, and beverage industry. As seen in the table below, the quantity of recycled glass has decreased over the last two years. The reason for this decrease was the high domestic treatment cost accompanied by the low international price of glass.

Today, there are five companies treating iron. The major collection sources of iron are public auctions for used cars and equipment, and collectors (informal sector). The majority of the materials collected are scrapped cars (35%) and domestic appliances (5%), which are cleaned from any other foreign materials, compacted, and shipped overseas. From the table below it can be seen that the amount of treated iron has been increasing.

The same recycling companies that treat and collect iron also collect and treat aluminium, copper, bronze, cast iron, and car batteries. The major collection sources of these materials are the same as of iron. As seen in the table, there has been an increase of treated aluminium over the last two years. The same trend stands for copper. The reason for the increase of treated copper is the increase of its price in the international market. The opposite stands for bronze where its price in the international market has decreased over the last 5 years and caused a decrease in the quantity of treated bronze.

Cast iron is only directed towards the domestic market and a decrease of treated quantity is noticed from the table below. Despite the fact that there is a decrease in the international price of used car batteries over the last 5 years the collected quantity of car batteries didn't follow the same trend. The amount of collected car batteries has been fluctuating over the years. Used car batteries are collected and exported.

4.3 Size and Economic Viability of Recycling Companies

The size of the recycling companies that are members of the Recycler's Association varies from small to medium size (4 to 12 people). The main reasons for the small size of the companies is first the small market of Cyprus, secondly the financial barriers that these companies face today due to the lack of any support of the government and finally in some cases difficulties to find labour when needed. In the table below, the average cost for treating the various recyclable materials is presented in the table below:

Table 4. Average Cost for Treating Recycled Materials

MATERIAL	COST (Buying, treatment, export) (Euro)
Paper white	112
Paper brown	56-64
Plastic	320
Glass	35
Iron	50
Aluminium	640
Copper	1072

Source: Recycling in Cyprus, Cyprus Recyclers' Association, 2000

The costs mentioned above in the case of some materials such as brown paper and glass and sometimes in iron may exceed the selling price. This is an economic barrier that the private recycling companies cannot overcome since there is no provision from the government to support such companies in case of low international prices.

Table 5. Quantities of Recycled Material by the Recyclers Association

Year	Paper (t)	Plastic (t)	Glass (t)	Iron (t)	Aluminium (t)	Copper (t)	Bronze (t)	Cast Iron (t)	Car Batteries (t)
1995		425	390						
1996	4514	655	600	20200	1939	720	230	750	1750
1997	5110	855	500	21180	2055	900	210	950	2223
1998	5688	950	350	29368	1786	1550	110	650	1747
1999	5924	1005	330	30916	1854	1480	180	600	2125

Source: Recycling in Cyprus, Cyprus Recyclers' Association, 2000

4.4 The Informal Recycling Sector

There are individuals and families who collect recyclable waste from the landfills and deliver it to the private recycling companies. Door to door collection by the informal sector is not conducted because the current SWM system does not force or encourage the public to sort their recyclable material. They mainly collect waste metals and in particular waste iron. The sorting of waste is taking place in the two main landfills of the country, specifically the one in Kotsiatis and Vati. After they sort the waste material they deliver it to recycling establishments and receive a fee depending on the weight of the material they have delivered.

Although it is mentioned by the recycling companies that the contribution of the informal sector could become significant (in some cases reaching even 50% of the iron treated) there are no data available on the number of people occupied informally with recyclable waste collection, or on their overall contribution to recycling in Cyprus.

4.5 SWOT Analysis of the Private Recycling Sector

The SWOT analysis for the recycling private sector is presented here below:

STRENGTHS	WEAKNESSES
<p>Many of the recycling companies survived under difficult circumstances with no government support.</p> <p>They are market leaders and makers</p> <p>They have skilled and experienced personnel.</p>	<p>Dependence on recycled material international prices.</p> <p>No government support.</p> <p>Difficulty to find labour</p> <p>Expensive equipment couples with small size companies.</p>
OPPORTUNITIES	THREATS
<p>Their experience gained useful for the future</p> <p>Their role will be definitely upgraded in presence of a solid waste management system.</p>	<p>The decline of some recycled material international prices.</p> <p>The continuation of current situation (no SWM established, no government support)</p> <p>Increased competition in case of the establishment of SWM system.</p>

5. Practices

5.1 Solid Waste Compositions and Characterization

The last waste characterisation study was performed in 1999 within the framework of the supplementary report of *"Recycling of Municipal Solid Waste in the Main Urban and Tourist Centres of Cyprus"* and was conducted by Carl-Bro Environment a/s in association with NV Consultants. The projections of waste characterization for year 2007 (based on the findings of 1999) are shown in the table below:

Table 6. Future Amounts of Different Waste Fractions in Cyprus, 2007

Districts waste fractions	Glass t/year	Paper t/year	Card- board t/year	Metal t/year	Plastic t/year	Textile t/year	Wood t/year	Garden waste t/year	Organic waste t/year	Other types of waste t/ year	Total t/ year
Nicosia	2.254	35.306	18.217	4.319	22.724	12.583	1.878	17.465	60.659	12.395	187.800
Limassol	1.618	25.342	13.076	3.100	16.311	9.032	1.348	12.536	43.540	8.897	134.800
Larnaca	976	15.284	7.886	1.870	9.837	5.447	813	7.561	26.260	5.366	81.300
Paphos	751	11.769	6.072	1.440	7.574	4.194	626	5.822	20.220	4.132	62.600
Paralimni	764	11.976	6.179	1.465	7.708	4.268	637	5.924	20.575	4.204	63.700
Cyprus in total	6.363	99.677	51.430	12.194	64.154	35.524	5.302	49.308	171.254	34.994	530.200

Source: Recycling of MSW in the Main Urban and Tourist Centres of Cyprus, Carl Bro as and NV Consultants, 1999

Table 7. Future percentage amounts of different waste fractions in Cyprus, 2007

Districts/waste fractions	Glass	Paper	Card board	Metal	Plastic	Textile	Wood	Garden waste	Organic waste	Other types of waste	Total
	T/y	T/y	T/y	T/y	T/y	T/y	T/y	T/y	T/y	T/y	T/y
Nicosia	0.42%	6.7%	3.4%	0.8%	4.28%	2.37%	0.35%	3.3%	11.4%	2.3%	35.4%
Limassol	0.3%	4.8%	2.4%	0.6%	3.07%	1.7%	0.25%	2.36%	8.2%	1.67%	25.4%
Larnaca	0.18%	2.9%	1.5%	0.35%	1.85%	1.02%	0.15%	1.4%	4.9%	1.01%	15.3%
Paphos	0.14%	2.2%	1.14%	0.27%	1.42%	0.8%	0.11%	1.1%	3.8%	0.8%	11.8%
Paralimni	0.14%	2.2%	1.16%	0.27%	1.45%	0.8%	0.12%	1.11%	3.8%	0.8%	12.1%
Cyprus in Total	1.2%	18.8%	9.7%	2.29%	12.08%	6.7%	1%	9.3%	32.3%	6.6%	100%

Source: Recycling of MSW in the Main Urban and Tourist Centres of Cyprus, Carl Bro as and NV Consultants, 1999

5.2 Residential, Commercial and Industrial Waste

The collection of residential and commercial wasteS is conducted by the local authorities, the municipality or the community with specific trucks designed to compact the waste. These trucks go directly to the landfills where they unload the waste. In isolated and remote rural areas the collection of waste is conducted by an appointed individual of the municipality. No further information is available concerning this practice. However, it is important to note that the common practice in the country is that waste be collected by the municipality.

The information presented in the following paragraphs of this section concerns specifically the municipality of Nicosia and is quite representative of the practices in other large municipalities of the country.

The collection of solid waste from the residential and commercial sectors is done twice a week (Monday & Thursday, Tuesday & Friday). For any special voluminous waste such as used furniture are collected by special trucks every Wednesday.

To serve the waste collection needs of Nicosia there are 15 collection teams (15 drivers and 30 waste collectors) and 2 other groups for the special collection needs (for Wednesday). For the cleaning of streets there are 20 other employees working full time. The waste is transferred by the same trucks to the Kotsiatis landfill.

Every week 697 tonnes of solid waste from the municipality of Nicosia reach the Kotsiatis landfill consisting of the 25% of total solid waste reaching the specific landfill.

The salaries of the Nicosia municipality employees for the collection and disposal of waste are the following. The salary of these workers of the municipalities is slightly higher than the rest of the municipality employees working at the same working scale.

- Waste truck drivers: Euro 285 / week
- Waste collectors: Euro 261/ week
- Street cleaners: Euro 258 /week.

Concerning the waste produced by industry this is collected in the same scheme as the residential and commercial solid waste twice a week (Monday & Thursday, Tuesday & Friday, or Wednesday).

The tax for the waste disposal is Euro 88 /year for every household. For the industrial sector the waste disposal tax depends on the size and waste generation of the specific industry. This money collected by the municipality is mainly used for the operation of the waste disposal system.

In general the existing collection system in the country concerning the collection of municipal solid waste could be assessed as efficient since the streets and neighbourhoods in both large municipalities and smaller communities are quite clean with no waste leftovers.

5.3 Hazardous Waste

The hazardous waste in Cyprus is generally disposed of together with other, less harmful waste. Some industries collect and store the waste in a responsible manner, whilst others lack knowledge about which waste is to be considered as hazardous and consequently should be treated separately.

Cyprus does not possess the facilities required for the effective collection and treatment of hazardous waste. Environmental legislation does not exist to extent necessary for the protection of the environment.

Solid hazardous waste is generated at hospitals and at bleaching and dyeing enterprises, which are equipped with internal treatment processes generating ashes and sludges respectively.

The hospitals generate both waste, similar to household and commercial waste, and hazardous waste (biological and infectious wastes). Hospital waste is incinerated by using the existing pyrolysis ovens. During the pyrolytic treatment the amount of waste is reduced.

A study that was conducted by the competent authorities in the past on hazardous waste in Cyprus was the first attempt to start dealing with this matter. Since there have not been any significant developments in the management of hazardous waste, a new study is planned to be conducted by the government that will analyse not only the composition of hazardous waste on the island but also the impacts of hazardous waste on the environment. The study will also present a hazardous waste management system for the country.

The only development concerning the management of hazardous waste in Cyprus is the construction of an industrial establishment, which will recycle, used car batteries and waste oils. Until now, car batteries and waste oils were exported to Indonesia, Greece, and Belgium. The construction of this recycling unit an important first step in the management of hazardous waste in Cyprus.

5.4 Disposal Facilities

Today in Cyprus there are two landfills in operation. The *Kotsiatis Landfill* and the *Vati Landfill* and they are located near the two largest cities on the island, Nicosia and Limassol respectively. At this time no composting is taking place in the country.

The *Kotsiatis Landfill* is located 17 km from Nicosia and the nearest housing area to the landfill is the small village of Kotsiatis just 1,5 km from the site. The nearest surface water recipients are two small streams passing by the landfill to the north and south at a distance of approximately 1 km. There are no reported ground water resources in the area. The potential for enlargement of the landfill is great since there is no development in the area and there is easy access by secondary roads.

The existing landfill occupies an area of 2 ha. The landfill appears to be well operated and equipped with sufficient machinery in the form of compactors, bulldozers, and dumpers and a staff of 5 workers. Covering of the compacted waste is done on regular basis using soil excavated at the site.

The entrance is fenced and a watchman supervises the gate, however, the total perimeter of the landfill is not fenced. There is no weigh bridge at the entrance and no formal registration of waste entering the landfill is conducted.

The entrance is not equipped with a liner, hence no collection and treatment of leachate is conducted. Leachate or surface water runoff, for instance at the tipping front, has never been observed at the landfill.

There are provisions in the landfill to free the biogas produced from the waste decomposition process but the biogas not yet collected and used in any way.

The *Vati Landfill* is located 10 km from Limassol and the nearest housing area is 2 km from the site. The landfill is situated in a hilly terrain for industrial purposes. Above the landfill there are situated several aerated ponds used for the treatment of sewage water from Limassol. The potential for enlargement of the landfill is great since there is no development in the area and there is easy access by secondary roads.

The nearest water recipient is a small stream passing by the site and at a distance of 2 km it connects to a bigger stream, which is dammed up for irrigation purposes 5 km away from the landfill. There are no reported ground water resources in the area.

The existing landfill occupies an area of approximately 1 ha. The landfill appears to be well operated with sufficient machinery and staff. Covering of the compacted waste is done on a regular basis using soil excavated at the site.

Only part of the perimeter is fenced along the access road and no specific entrance or gate has been established to the landfill. Nevertheless, scavenging is no problem at the landfill. There is no weighbridge and no formal registration of waste entering the landfill is conducted.

The *Vati Landfill* is not equipped with a liner, therefore no collection and treatment of leachate is conducted. Leachate or surface water runoff could be detected forming a small pool. The hilly terrain makes things worse, especially concerning leachate control and soil erosion or even landslide of waste. In the Vati landfill there are provisions to free the biogas produced from the waste decomposition processes.

A third landfill, the Ayia Marinoudha Landfill in Paphos, was closed down due to the end of its lifetime. The fact that the new highway from Limassol to Paphos was planned to pass over the landfill, contributed to its closure as well.

6. Performance Assessment and Analysis

6.1 Critique on Current Legislation Concerning SWM

Today in Cyprus there is no solid waste management system. The reason for this is the absence of a legal and institutional framework to set down the basic foundation for the formulation of a solid waste management system.

Any related legislation that exists deals mostly with matters like hygiene and collection frequencies of waste. Mainly, the purpose of the Municipal Law is the prevention of the accumulation of waste in the streets or anywhere else in the urban and tourist areas.

Currently, there is no sorting of waste taking place and all waste is being disposed in landfills in quite an uncontrolled way. Recycling is not a practice established by the current legislation either. It is estimated that today approximately 1.800.000 tones/ year of waste is generated in Cyprus and 17% of this is being recycled.

With the establishment of a solid waste management system in the country (something which will be done in the near future within the framework of the EU harmonisation process in the country) other methods of disposal will be exploited and practiced apart from landfilling. Additionally a waste management system of hazardous waste treating this waste separately from the municipal solid waste will be implemented.

6.2 Problems Faced by the Private Recycling Sector

There are several problems that the Private Recycling Sector is facing today. The most important problem that recyclers are facing today is the lack of economic and technical support from the government. The only funding that the private recycling sector was receiving was 2% on the exports of each company. This was a support not intended only for the recycling sector but for all industries, which export their products. This 2% refund on exports stopped in 1999 after the implementation of the Free Trade Agreement.

The absence of an organised institutional and legal framework is the second problem that the sector is facing. If an organised institutional and legal framework were established, then the implementation of a waste management system would have had a positive effect on the role of the private sector as a major actor in the management of solid waste.

As aforementioned, the private sector is working completely on their own resources. The companies treating paper (particularly brown paper), glass and plastics face problems since the international price for these recycled materials sometimes cannot cover their costs.

Another problem that the private recycling sector is facing is the high cost of freight and other additional port fees that need to be paid for exporting cargo. In addition, the fluctuation of the international prices of recycled goods makes matters worse. During the last 5 years the low prices of recycled goods caused financial problems to the recycling companies.

Employing workers to work with waste is another problem that the private recycling sector is facing. It seems that local people do not find this type of work attractive even when the salary offered is higher than in other similar

positions (Above Euro 260 per week). To solve this problem recycling companies tried to employ foreign workers but getting a residence permit for foreign workers proved to be an additional barrier.

The highest costs for a recycling company is the machinery. Most recycling establishments purchase second hand machinery, which are cheaper than new ones. The government policy is to endorse companies that purchase only new equipment. As a result recycling companies cannot take advantage of this government subsidy.

Community awareness on recycling is the final problem that the private recycling sector is facing. Several recycling companies voluntarily invested money in programs to promote recycling in several city areas. Special recycling bins were placed in specific locations for the disposal of different materials. The lack of awareness and interest of the public resulted in the complete failure of the program. The bins were used as regular disposal bins and no sorting was conducted by the public.

6.3 Future Plans and Strategies

As aforementioned in previous chapters there are no concrete plans or strategies leading to the implementation of a solid waste management system.

The government announced that a comprehensive study of such a system was to begin 2000, however no results have been published yet.

Concerning the LIFE programme mentioned Chapter 2, there are no published results yet since the programme began in the beginning of 2000.

6.4 Conclusions Concerning the Institutional and Legislative Framework

As can be easily perceived from what is presented in this chapter, the current legislative framework is not adequate to create conditions for the establishment of a solid waste management system. The situation, however, is bound to radical positive changes with the harmonisation of EU legislation due to the accession of Cyprus to the EU. The new laws according to the Waste Management, the Packaging and the Hazardous Waste directives will enable the creation of both solid waste management system as well as the creation of hazardous waste management system.

Concerning the institutional framework, changes need to take place at all levels. The central government as the main decision maker for solid waste management issues need to become mobilised in order to create the necessary mechanisms both regulatory and institutional for the establishment of a solid waste management system.

At the municipality level, although the collection and disposal systems could be considered quite efficient, great changes need to take place in order to implement a solid waste management according to the requirements set by EU directive. Concerning the collection, new collection trucks need to be purchased in order to collect the various separated recyclable materials. Then investment on sorting and transfer stations need to be made in both equipment and personnel. And finally, investments need to be made for publicising the new system in order for the citizens to participate in a responsible thus effective way.

The private recycling companies can become more involved than they are today in the new waste management system contributing in that way with their know-how and past experiences. At the same time new perspectives within the new system will appear.

7. Conclusions and Recommendations

7.1 Role of Each Actor Involved in Solid Waste Management

7.1.1 Role of the Government

At the national level, governmental authorities have the responsibility for planning and for organising the solid waste management system. After implementation the government is also responsible for monitoring. Therefore, the role of the government is multifunctional; it includes planning, enforcing, and monitoring any kind of management system. The government is making efforts for both the harmonisation of EU directives as well as for planning the new solid waste management system. The coordination of all the different Government Bodies is considered to be one of the major problems in developing an SWM system since it causes delays in the decision making process. However these efforts need to intensify since there are time restrictions set by the EU for the establishment of an SWM system.

7.1.2 Role of the municipalities

The current role of the municipalities is the collection of waste and the prevention of waste accumulation in the streets. As aforementioned, the current waste management practices are conducted in an efficient way. However, as mentioned before, the new solid waste management system will bring great changes to the current system. Some municipalities are starting to realise the extension of these changes and are participating in projects such as the LIFE programme. On the other hand, most of the municipalities are not showing any signs of willingness to change. This is one of the factors, which hinder further development of an integrated SWM system. The municipalities consider as a major problem the lack of finances

7.1.3 Role of the private sector

The private sector plays an important role on the management of solid waste even though there no solid waste management system established. As mentioned in section 3.3, the private sector is responsible for all recycling efforts on the island. Currently the role of the private sector has a positive effect on the state in financial and in ecological terms. The role of the private sector will be much bigger in the future when these recycling companies are used by the government as a starting point in implementing a solid waste management system. The private sector considers as the most important difficulties the lack of government support and the lack of legislative framework.

7.1.4 The role of the citizen

The role of the citizen can be considered to be quite inactive. There are some organised groups such as the environmental non-governmental organisations, which try to promote recycling and environmentally sound solid waste management methods. The citizens have not been asked officially to participate in a widespread campaign for recycling. At the same time a significant part of the population does really comprehend the importance of actions like recycling, reuse or reduction at source.

7.2 Barriers to Progress in Solid Waste Management

The implementation of a solid waste management system in Cyprus is still at its very early stage. The legal and the institutional framework have a lot of gaps that make the implementation of a waste management system problematic. The problems are:

- **Lack of legal framework:** The absence of legal framework does not create the conditions necessary for the implementation of a solid waste management system. In that way the role of each is not clearly defined and the executive bodies (such as the municipalities) do not have clear guidelines of how to proceed to changes.
- **Inadequate institutional framework:** The decision making process at the central government is moving at slow pace while the changes need to be implemented in a short time period. The municipalities on the other hand are not moving towards the implementation of any changes before they are forced by the law to do since they would require large investments.
- **Inadequate opportunities for government funding:** The government has not economically supported the private sector, which is responsible, for all recycling conducted on the island. In addition, the construction of new modern landfills and treating facilities will depend on the amount of money that the government will provide.
- **Recycling initiatives are very limited,** and no incentives motivating residents and companies have been initiated neither at state nor at local level. Similarly, the recycling market has not been developed.
- **Low community awareness and as a result no public pressure to the government (lobby):** The voice of the people can be a powerful tool and can cause changes even in government policies. This can only be achieved if there is high community awareness. When people are familiar with the importance of recycling for example, they can lobby the government for a change in policy in this matter.

7.3 Necessary Steps to Improve the Institutional and Regulatory Environment.

After analysing the regulatory and institutional environment of the solid waste management system in the country the following steps need to be taken:

- **The establishment of a legislative framework,** which sets the conditions for a solid waste management system according to EU guidelines and directives. This step is the responsibility of the central government. The process has already began and needs to be completed by the year 2003 according to the deadlines set by the EU for the completion of Cyprus harmonisation process.
- **The planning and design of a solid waste management system** where the roles of each actor is defined clearly. This is mainly the responsibility of the central government with significant contributions from the municipalities, the private recycling sector and non-governmental organisations. The cooperation of all the actors is necessary in order to come up with a system can be operational and effective. This step is bound to happen in the next 2-3 years.

- **The planning and design of a hazardous waste management system.** This is also mainly the responsibility of central government also with the contribution of the municipalities, the industry organisations and local recyclers. This step will take place by the year 2003.
- **Incentives to municipalities to go through the necessary changes to create an SWM system.** Economic and financial incentives should be given to the municipalities in order to implement the necessary changes in the current solid waste management system.
- **Education of the public.** In order for a solid waste management system to operate efficiently the cooperation of the public with the responsible authorities is essential. For this to be achieved, campaigns promoting the new system are necessary having a double purpose, to inform the public about the new system and at the same time increase environmental awareness. This step will also take place. It not easy to estimate the results of such a campaign since it depends on the public's reaction. Having in mind the small size of the country and the high level of education of the people, one can expect satisfactory results in the participation of the public in a solid waste management system.

As it was seen from this analysis, the solid waste management needs to go through drastic changes in order to follow EU guidelines. Although the decision for going through with these changes has been taken, the legislative and institutional actual changes are still at their very early steps. The actors such as the central government and the local authorities need to mobilize as fast as possible in order to go through this shifting as smoothly as possible.

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