### 3.1.3 Institutional System

The analysis of the compiled data based on responses to the questionnaires as well as personal interviews and information gathered from diverse publications, reveals that in Adana Province different approaches are pursued regarding solid waste management practices. Whereas the Adana Greater Municipality applies a highly privatised model, the activities of the Seyhan District Municipality possess the characteristics of a semi-privatised approach and the Yuregir District Municipality represents a non-privatised scheme by undertaking all solid waste management services with its own manpower, technical and material resources.

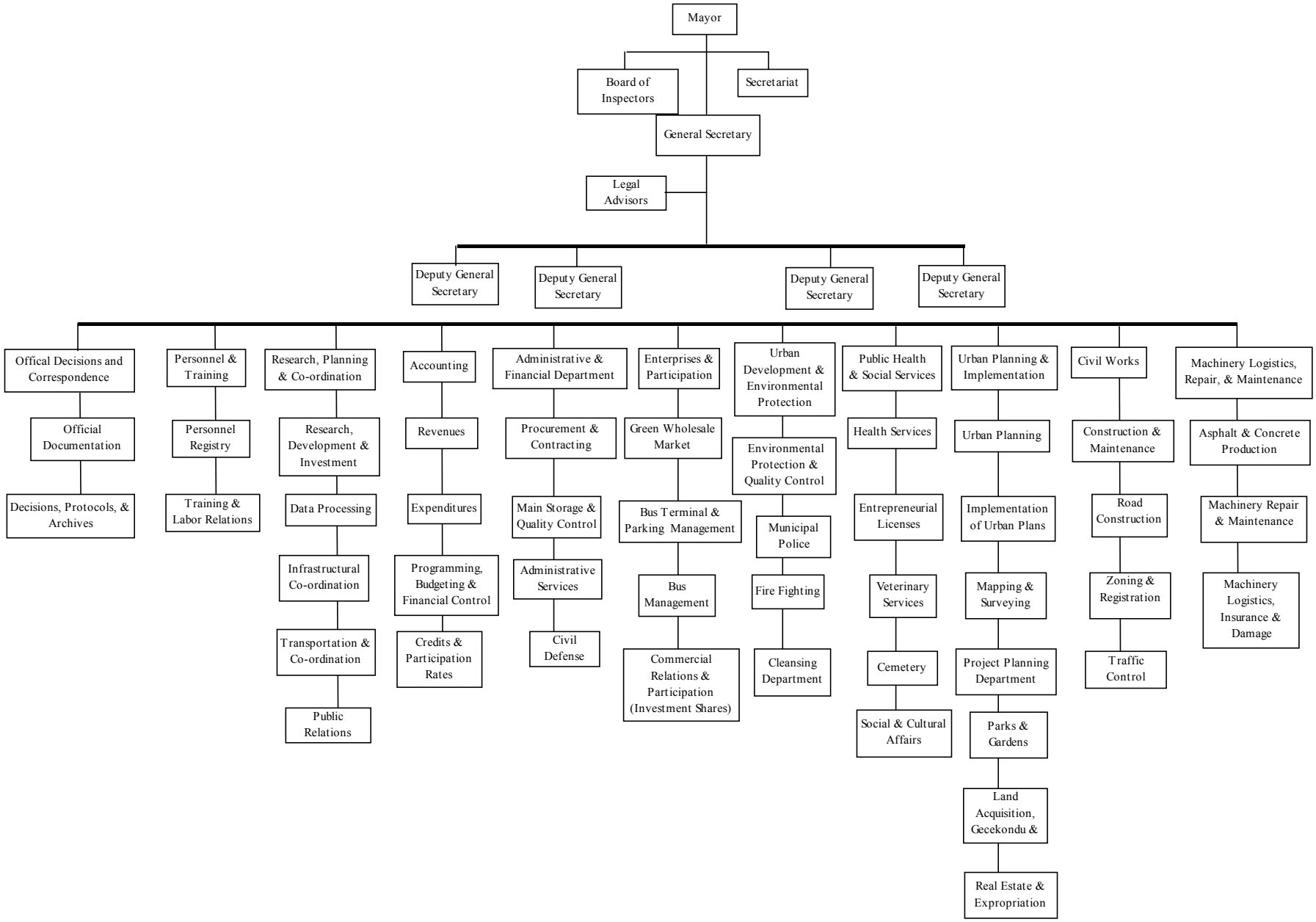


Figure 3-7: Adana GM Organisational Structure

### a. Administration and Organisation

#### a.1 Adana Greater Municipality

The Cleansing Section of the Directorate for Urban Development and Environmental Protection is the responsible unit for solid waste management within the Adana Greater Municipality. This department undertakes cleansing activities as well as fire-fighting, municipal police, environmental protection and quality control operations under the supervision of the Deputy General Secretary of the Adana Greater Municipality. The 6 employees of the Cleansing Section is composed of 1 Director, 1 Deputy Director, 1 secretary, 2 control officials and 1 driver.

The organisation chart of Adana GM is as shown in

#### a.2 Seyhan District Municipality

Waste removal operations are managed by the Cleansing Department of the Seyhan District Municipality by dividing the service area into two main quarters; namely, north and south. While the Department Director, who is assisted by three deputies, is in charge of overall waste management activities, two of the deputies are responsible for cleansing operations carried out in northern and southern quarters, respectively. While these two deputies pay regard to service performances and quality control, the third deputy manages the driver crew by the aid of 1 chief driver and 2 deputy chief drivers and looks after appropriate flow of cleansing fleet with all required logistic measures. Beside those, 10 office personnel provide support services within the Cleansing Department of the Seyhan District Municipality.

The northern and the southern service quarters are each supervised by a control official, while 8 foremen take care of respective service zones in the southern quarter and 15 foremen in the northern quarter. At operational level, the role of foremen is of vital importance. The task of these foremen is not solely restricted to the supervision of the waste disposal labourers of their municipality. They additionally possess the authority and the liability to control the street sweeping and cleansing operations of the contractor. This approach has availed to establish a direct control mechanism over the operations carried out by the hired labourers, since each of them are obliged to work according to the commands of responsible municipal foremen.

#### a.3 Yuregir District Municipality

As the subordinates of the Deputy District Mayor, the Director of the Cleansing Directorate of the Yuregir District Municipality and his two deputies are responsible for regulatory and operational activities of solid waste management with mobile and immobile office staff of their own.

Two hundred and thirty two (232) employees of the Cleansing Directorate are organised under 14 divisions, which are administrated by both deputy directors. One can roughly distinguish between intramural logistic services and extramural operational services, which are separately attached to each of the deputies. While one of the deputies is in charge of waste collection zones and waste removal related management actions, the other deputy is responsible for internal administrative affairs as well as maintenance and logistics.

All the employees of the Directorate, including the Director, are contracted under labourer status. Only a small portion of this staff is occupied with in-house services, whereas the major portion constitute mobile and active group undertaking the

operational works in the field. While the 26 employees are engaged as administrative staff, 7 employees are functioning as controllers, 18 employees are involved in logistics, and 30 employees are working as drivers. The rest of the employees are engaged labourers active in outdoor waste collection services. Thirty (30) of these labourers are street sweepers.

**b. Legislation and Enforcement**

**b.1 Adana Greater Municipality**

The Cleansing Section carries out its functions in line with requirements indicated in the Greater Municipality Law No. 3030. The cleansing and maintenance of main avenues, squares and public open spaces as well as fruit and vegetable wholesale markets along with inter-provincial bus terminal constitute essential tasks of the concerned section. In fulfilling these tasks, the Cleansing Section pursues a considerably privatised model and supervises the cleansing and street sweeping activities commissioned to the contractors; namely, Tugce and As Ertas Cleansing Companies.

**b.2 Seyhan District Municipality**

In accordance with the provisions of the Municipalities Law No. 1580, the Cleansing Directorate of the Seyhan District Municipality applies a modified privatisation approach in providing cleansing and waste removal services to a very extensive area. The municipality deems essential to overtake waste collection and transportation operations by itself. Therefore, only street sweeping and cleansing of market places, which are considered as subsidiary operations within the scope of overall waste management activities, have been contracted to a private company. Although the contractor Lleri Co., Ltd. is associated with a subsidiary operation, the Seyhan District Municipality practices a heavy control mechanism over privatised services and hired manpower.

**b.3 Yuregir District Municipality**

Yuregir District Municipality also fulfils its waste removal and cleansing obligations in accordance with the provisions of the Municipalities Law No. 1580. However, contrary to the rest of the municipalities in Adana, the Yuregir Municipality prefers to manage solid waste collection and street sweeping services by its own manpower, vehicular and spatial resources and availabilities.

**c. Environmental Protection Tax**

The environmental protection tax (cleansing tax) is collected by the district municipalities (DMs) according to building type and scale. Of the collected amount 20% is paid to the greater municipality. Since another 10% is reserved as environmental pollution prevention fund, the amount appropriated for cleansing services of DMs is only 70% of the collected total.

Every year the Undersecretariat of Treasury of Prime Minister's Office publishes the tax amount by group and rank, and every provincial collection committee (made up of representatives from the regional office of the Undersecretariat of Treasury, the province, and every municipality), sets the appropriate tax amount by building type. In Adana Province, the tax amount is set according to 7 groups and 45 rankings (see table below).

Table 3-16: Tariff of Environmental Tax in Adana Province

unit: 1,000 TL/month

| Group | Detail of Group | Rank | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|
| Housing | Area > 300m$^2$ | 7-1 | 100 | 153 | 229 | 312 | 437 | 606 |
| | 251-300m$^2$ | 7-2 | 80 | 123 | 184 | 250 | 350 | 486 |
| | 201-250 | 7-3 | 60 | 92 | 137 | 186 | 260 | 361 |
| | 151-200m$^2$ | 7-4 | 50 | 76 | 113 | 154 | 215 | 298 |
| | <150m$^2$ | 7-5 | 25 | 38 | 56 | 76 | 106 | 147 |
| Schools | No. of students > 750 | 1-5 | 2,000 | 3,076 | 4,606 | 6,282 | 8,807 | 12,232 |
| | 500-750 | 2-5 | 1,000 | 1,538 | 2,303 | 3,141 | 4,403 | 6,155 |
| | 250-499 | 3-5 | 750 | 1,153 | 1,726 | 2,354 | 3,300 | 4,583 |
| | 100-249 | 4-5 | 200 | 307 | 459 | 626 | 877 | 1,218 |
| | 50-99 | 5-5 | 150 | 230 | 344 | 469 | 657 | 912 |
| | 20-49 | 6-5 | 100 | 153 | 229 | 312 | 437 | 606 |
| | < 20 | 7-5 | 25 | 38 | 56 | 76 | 106 | 147 |
| Hospitals | No. of beds > 500 | 1-2 | 4,000 | 6,152 | 9,212 | 12,565 | 17,616 | 24,468 |
| | 300-500 | 2-2 | 2,500 | 3,845 | 5,757 | 7,852 | 11,008 | 15,290 |
| | 150-299 | 3-2 | 1,750 | 2,691 | 4,029 | 5,495 | 7,703 | 10,699 |
| | 50-149 | 4-2 | 800 | 1,230 | 1,841 | 2,511 | 3,520 | 4,889 |
| | 20-49 | 5-2 | 550 | 769 | 1,151 | 1,933 | 2,710 | 3,764 |
| | < 20 | 6-2 | 250 | 384 | 575 | 784 | 1,099 | 1,526 |
| Restaurants | Area > 1000m$^2$ | 1-4 | 2,500 | 3,845 | 5,757 | 7,852 | 11,008 | 15,290 |
| | 500-1000m$^2$ | 2-4 | 1,500 | 2,307 | 3,454 | 4,711 | 6,604 | 9,172 |
| | 250-499m$^2$ | 3-4 | 1,000 | 1,538 | 2,303 | 3,141 | 4,403 | 6,115 |
| | 100-249m$^2$ | 4-4 | 400 | 615 | 920 | 1,254 | 1,758 | 2,441 |
| | 50-99m$^2$ | 5-4 | 250 | 384 | 575 | 784 | 1,099 | 1,526 |
| | <50m$^2$ | 6-4 | 150 | 230 | 344 | 469 | 657 | 912 |
| Stadiums | Area > 5000m$^2$ | 1-3 | 3,000 | 4,614 | 6,909 | 9,423 | 13,211 | 18,350 |
| | 4000-5000m$^2$ | 2-3 | 2000 | 3,076 | 4,606 | 6,282 | 8,807 | 12,232 |
| | 3000-3999m$^2$ | 3-3 | 1,500 | 2,307 | 3,454 | 4,711 | 6,604 | 9,172 |
| | 2000-2999m$^2$ | 4-3 | 600 | 922 | 1,380 | 1,882 | 2,638 | 3,664 |
| | 1000-1999m$^2$ | 5-3 | 400 | 615 | 920 | 1,254 | 1,758 | 2,441 |
| | 500-999m$^2$ | 6-3 | 200 | 307 | 459 | 626 | 877 | 1,218 |
| | < 500m$^2$ | 7-3 | 60 | 92 | 137 | 186 | 260 | 361 |
| Cinemas | No. of seats > 2000 | 1-5 | 2,000 | 3,076 | 4,606 | 6,282 | 8,807 | 12,232 |
| | 1500-2000 | 2-5 | 1,000 | 1,538 | 2,303 | 3,141 | 4,403 | 9,172 |
| | 1000-1499 | 3-5 | 750 | 1,153 | 1,726 | 2,354 | 3,300 | 4,583 |
| | 500-999 | 4-5 | 200 | 307 | 459 | 626 | 877 | 1,218 |
| | 250-499 | 5-5 | 150 | 230 | 344 | 469 | 657 | 912 |
| | 100-249 | 6-5 | 100 | 153 | 229 | 312 | 437 | 606 |
| | < 100 | 7-5 | 25 | 38 | 56 | 76 | 106 | 147 |
| Offices | No. of employees > 300 | 1-5 | 2,000 | 3,076 | 4,606 | 6,282 | 8,807 | 12,232 |
| | 200-300 | 2-5 | 1,000 | 1,538 | 2,303 | 3,141 | 4,403 | 6,115 |
| | 100-199 | 3-5 | 750 | 1,153 | 1,726 | 2,354 | 3,300 | 4,583 |
| | 50-99 | 4-5 | 200 | 307 | 459 | 626 | 877 | 1,218 |
| | 10-49 | 5-5 | 150 | 230 | 344 | 469 | 657 | 912 |
| | 4-9 | 6-5 | 100 | 153 | 229 | 312 | 437 | 606 |
| | < 3 | 7-5 | 25 | 38 | 56 | 76 | 106 | 147 |

Source: Seyhan and Yuregir District Municipality

The following table shows the amount of cleansing tax collected in Seyhan and Yuregir.

Table 3-17: Amount of Cleansing Tax Collected in Seyhan and Yuregir DMs (1994 -1998)

unit: million TL/year

| DM | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|
| Seyhan | 46,597 | 73,900 | 110,464 | 161,421 | 251,798 |
| Yuregir | 15,806 | 24,776 | 41,671 | 56,874 | 136,711 |
| Total in TL | 62,403 | 98,676 | 152,135 | 218,295 | 388,509 |
| Exchange rate | 35,200 | 50,803 | 97,306 | 180,655 | 284,480 |
| US$1,000 | 1,773 | 1,942 | 1,563 | 1,208 | 1,365 |

Source: Seyhan and Yuregir District Municipality

The table above clearly shows that the actual income (in US$) in 1998 is only 70% of 1995. This is attributed to the fact that in spite of the inflation in 1995-1998 that dragged the exchange rate of the Turkish lira down to 1/6 of the dollar, the cleansing fee was raised only 4 times the 1995 rate and the collection rate was still low, though the amount collected in Yuregir DM has increased relatively.

The collection rate is informed 80% in Seyhan and 85% in Yuregir. In contrast with the initial budget, however, the collection rate in 1998 in Seyhan DM only amounts to 56% as shown in the table below. The improvement of collection rate in Yuregir DM was achieved by introduction of Data Base system to manage the tax payment.

Table 3-18: Initial Budget and Collection Rate of Cleansing Tax in Seyhan and Yuregir DMs

unit: million TL/year

| | | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Seyhan District | initial budget | 334,303 | 490,000 | 350,000 | 300,000 | 450,000 |
| | collection rate/budget (%) | 13.9 | 15.1 | 31.6 | 53.8 | 56.0 |
| Yuregir District | initial budget | 75,000 | 135,000 | 85,000 | 100,000 | 170,000 |
| | collection rate/budget (%) | 21.1 | 18.4 | 49.0 | 56.9 | 80.4 |

Source: Budgetary Report of Adana Greater Municipality in 1994, 1995, 1996, 1997 and 1998

The cleansing tax bands chargeable to domestic household ranged from TL 106 thousand to TL 437 thousand/household/month, which is US$ 4.5-18/year/household, if an average exchange rate for 1998 of US$1:TL284,480 is used. The result of POS showed that the average payment was TL 180 thousand/month/household, which is US$ 7.6/year/household. If an average household is taken to consist of five persons each generating 172 kg/year, then the total waste generated is 0.86ton/year/household. Presenting the tax on a tonnage basis gives a range of US$ 5.2-20.9/ton.

The potential of the cleansing tax from household can be calculated to be TL 497,248 million, assuming that the number of population was 1,151,038 in 1998 and average family number was five.

180,000 TL/month/household x 12 months x 1,151,038/5 = 497,248 million

On the other hand, the cleansing tax bands chargeable to commercial/business enterprises such as restaurants and offices ranged from TL 106 thousand to TL 11,008 thousand/enterprise/month, which is US$ 4.5-464/year/enterprise. The result of POS showed that the average payment was TL 440 thousand/month/enterprise, which is

US$ 18.6/year/enterprise. It was difficult to get reliable number of enterprise, therefore the rate of Yuregir DM; domestic building chargeable 65,300: office building chargeable 9,600 was used.

440,000 TL/month/household x 12 months x 1,151,038/5 x 9,600/65,300
= 178,695 million

The table below shows the revenue of Adana GM from the cleansing tax was only 4% in 1998 of the amount of cleansing tax collected in Seyhan and Yuregir DMs. The theoretical amount should be 99,200 million TL, which was calculated by the budgetary amount of both DMs (620,000 million TL) and 16% (0.2 x 0.8 x 100 = theoretical rate for the Adana GM).

The reason why the collection rate was so low is that Seyhan DM has not paid the 20% of collected amount. That is a big financial problem for Adana GM.

Table 3-19: Cleansing Tax collected in Adana GM

unit: million TL

| | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|
| Adana GM | ? | 150 | 253 | 34,288 | 15,991 |
| Rate to collection rate of 2 municipalities (%) | ? | 0.2 | 0.2 | 15.7 | 4.1 |

Source: Financial Department of Adana GM

### d. Financial Status

### d.1 Changes in the SWM Expenses

#### d.1.1 Seyhan District Municipality

The changes in the expenses of the cleansing services of Seyhan DM are as shown in the following table.

Table 3-20: Expenses of the Cleansing Services of Seyhan DM

unit: million TL

| Items | Details | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Initial Budget | | 92,325 | 149,262 | 334,825 | 519,540 | 1,495,200 |
| Actual Expenditure | current expenditure | 96,730 | 207,915 | 335,876 | 619,013 | 1,621,826 |
| | personnel | 5,720 | 13,433 | 21,021 | 467,931 | 1,103,489 |
| | contracted out | 81,593 | 192,074 | 310,503 | 74,758 | 292,369 |
| | materials & supplies | 8,202 | 1,521 | 3,023 | 67,315 | 225,434 |
| | others* | 1,215 | 14,498 | 1,329 | 9,009 | 534 |
| | investment cost | 37,083 | 5,407 | 16,595 | 62,449 | 109,558 |
| | **Total** | **133,813** | **213,322** | **352,471** | **681,472** | **1,731,384** |
| Exchange Rate | US$ 1 to TL | 35,200 | 50,803 | 97,806 | 180,655 | 284,480 |
| Total Expenditure in US$ | **US$1,000** | **3,802** | **4,199** | **3,622** | **3,772** | **6,086** |

Source: Seyhan District Municipality
Note: *: Includes maintenance cost, etc.

As can be seen from the table above, there has been sudden increase in the cleansing service expenses in 1998. In 1997, the personnel expenses made up 69% of the overall cleansing service expenses, a significant increase from 6% of the previous year. In 1998 the expense shared 64% of the total SWM expenses. In addition, expenses for materials and supplies increased from 1% in 1996 to 10% in 1997 and 13% in 1998. This may be attributed to the huge decrease in the volume of services contracted out, from 88% in 1996 to 11% in 1997.

### d.1.2 Yuregir District Municipality

The changes in the cleansing service expenses of Yuregir DM are shown in the following table.

Table 3-21: Expenses of the Cleansing Services of Yuregir DM

unit: million TL

| Items | Details | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Initial Budget | | 61,848 | 119,800 | 98,732 | 276,698 | 460,059 |
| Actual Expenditure | current expenditure | 58,211 | 112,115 | 208,903 | 501,295 | 915,747 |
| | personnel | 35,428 | 69,040 | 180,724 | 440,765 | 779,448 |
| | contract out | 0 | 0 | 0 | 0 | 0 |
| | materials & supplies | 3,800 | 9,820 | 11,390 | 30,378 | 73,870 |
| | others* | 18,983 | 33,255 | 16,789 | 30,152 | 62,479 |
| | investment cost | 989 | 1,311 | 6,895 | 17,885 | 31,000 |
| | **Total** | **59,200** | **113,426** | **215,798** | **519,180** | **946,747** |
| Exchange Rate | US$ 1 to TL | 35,200 | 50,803 | 97,306 | 180,655 | 284,480 |
| Total Expenditure in US$ | **US$1,000** | **1,682** | **2,233** | **2,218** | **2,874** | **3,328** |

Source: Yuregir District Municipality
Note: *: Includes maintenance cost, etc.

The above table clearly shows the actual increase in the cleansing service expenses. This is mainly due to higher personnel expenses, from 60% in 1994 to 84% in 1996. In 1998 the expense shared 82% of the total SWM expenses.

### d.1.3 Adana Greater Municipality

For Adana GM, the expenses for the cleansing services contracted out and the operation of the dumpsite in Sofulu are calculated separately. The changes in these expenses are as shown in the following table.

Table 3-22: Expenses of the Cleansing Services in Adana GM

unit: million TL

| Items | Details | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Initial Budget | current expenditure | 3,938 | 5,237 | 12,577 | 31,936 | 50,400 |
| | contracted out | 16,000 | 20,000 | 130,000 | 260,000 | 775,000 |
| | capital expenditure | 5,050 | 550 | 2 | 401 | 801 |
| | **Total** | **24,988** | **25,787** | **142,579** | **292,337** | **826,201** |
| Actual Expenditure | public cleansing | 3,696 | 38,191 | 206,000 | 378,950 | 737,744 |
| | Sofulu landfill | 2,247 | 8,632 | 12,036 | 21,726 | 93,306 |
| | Administration | - | - | - | - | 39,913 |
| | investment cost | 1,044 | 894 | 0 | 0 | 0 |
| | **Total** | **6,987** | **47,717** | **218,036** | **400,676** | **871,027** |
| Exchange Rate | US$ 1to TL | 35,200 | 50,803 | 97,306 | 180,655 | 284,480 |
| Total Expenditure in US$ | **US$1,000** | **198** | **939** | **2,241** | **2,218** | **3,062** |

Source: Adana Greater Municipality

The table above clearly shows that the cleansing service expenses have significantly increased from 1995 to 1998. The gap between initial budget and actual expenditure has decreased and the actual expenditure is only 1.05 times the initial budget in 1998.

### d.2 Cleansing Service Cost Assumption

The municipalities do not calculate the costs by the type of cleansing service. For the formulation of the M/P, calculations were made in accordance with the following assumptions:

1. Personnel expenses will be calculated according to the number of employees in the following units: administration, collection and haulage, public area cleansing.
2. According to the report "Conceptual Issues and Experiences in Developing Countries, December 1991 by Sandra Cointreau-Levine" (hereinafter the Sandra Report), the cost of collection in the middle income country ranges about US$ 9 to 21/capita/year and about 30 % (US$ 2.7 to 6.3/capita/year) of it is the operation and maintenance (O&M) cost excluding personnel expenses. On the other hand the cost of public area cleansing in the middle income country ranges about US$ 1.8 to 4.2/capita/year and about 10 % (US$ 0.2 to 0.4/capita/year) of it is the operation and maintenance (O&M) cost excluding personnel expenses. Based on the Sandra Report the expenses for materials was calculated by allocating 15/16 of the expenses to collection and 1/16 to public area cleansing activities.
3. Since the Sandra Report also indicates about 30 % (US$ 2.7 to 6.3/capita/year) of the collection cost in the middle income country is the capital investment while about 20 % (US$ 0.4 to 0.8/capita/year) of the public cleansing cost. Thus the expenses for capital was calculated by allocating 15/17 of the expenses to collection and 2/17 to public area cleansing activities.

4. Others will be calculated by the percentage of the total of the personnel expenses and expenses for materials and investment.

### d.2.1 Seyhan District Municipality

#### i. Cleansing Service Cost by Service Type

The 1997 cleansing service expenses of Seyhan DM were estimated as shown in the following table.

Table 3-23: Cleansing Service Cost of Seyhan DM in 1998

| Expenses | Administration | Collection/Haulage | Public area cleansing | Total |
|---|---|---|---|---|
| Personnel | 19 | 470 | (250) | 489 + (250) |
| Direct personnel expenses | 42,876 | 1,060,613 | | 1,103,489 |
| Materials | | 211,345 | 14,089 | 225,434 |
| Investment | | 96,669 | 12,889 | 109,558 |
| Contracting Out* | | | 292,369 | 292,369 |
| subtotal | 42,876 | 1,368,627 | 319,347 | 1,730,850 |
| Others | 13 | 422 | 99 | 534 |
| **Total** | **42,889** | **1,369,049** | **319,446** | **1,731,384** |

Note ( ): employed by private contractor
*: The municipality contracts out only the public area cleansing services to a private collection company. However, the equipment for collection and public area cleansing are owned by the Seyhan DM.

The direct expenses calculated by the number of employees (489 people) in the cleansing section amount to an average of 2,257 million TL/employee/year. The contracting out expenses calculated by the number of employees (250 people) of the private collection company only average 1,169 million TL/employee/year.

#### ii. Unit Cost of Cleansing Services

The collection and haulage, and overall service costs were calculated by unit weight and service population, while the public area cleansing service cost was calculated by unit weight and the length (km) of the road covered.

Table 3-24: Unit Cost of Cleansing Services in Seyhan DM (1998)

| Items | Cost (million TL) | Unit | Amount | Unit Price (1,000 TL) | Unit Price (US$)* |
|---|---|---|---|---|---|
| Collection/haulage | 1,369,049 | ton | 176,426 ton/year | 7,760 | 27.28 |
| | | capita/year | 820,205people | 1,669 | 5.87 |
| Public area cleansing** | 319,446 | ton | 10,186 ton/year | 31,361 | 110.24 |
| | | km/year | 392 km | 814,913 | 2,864.57 |
| Administration | 42,889 | | | | |
| Total | 1,731,384 | ton | 186,612ton/year | 9,278 | 32.61 |
| | | capita/year | 820,205 people | 2,111 | 7.42 |

Note *: US$1.00 = 284,480 TL
**: Park cleansing for 44.1 ha is included.

The unit cost of collection/haulage seems to be sufficient comparing to those of Mersin DMs, but that did not include the depreciation costs fully. The share of direct personnel expenses was about 78% of the collection/haulage cost, and that suggested the necessity to improve the work efficiency.

If the overall costs were to be calculated based on a family size of 5 people, the amount would be US$ 37.10/household/year.

### d.2.2 Yuregir District Municipality

#### i. Cleansing Service Cost by Service Type

The 1998 cleansing service expenses of Yuregir DM were estimated as shown in the following table.

Table 3-25: Cleansing Service Cost of Yuregir DM in 1998

| Expenses | Administration | Collection/ Haulage | Public area cleansing | Total |
|---|---|---|---|---|
| Personnel | 43 | 202 | 30 | 291 |
| Direct Personnel Expenses | 121,877 | 572,540 | 85,031 | 779,448 |
| Materials | | 69,253 | 4,617 | 73,870 |
| Investment | | 27,353 | 3,647 | 31,000 |
| Service Expenses* | | 62,429 | | 62,429 |
| Subtotal | 121,877 | 731,575 | 93,295 | 946,747 |
| Others | 0 | 0 | 0 | 0 |
| **Total** | **121,877** | **731,575** | **93,295** | **946,747** |

Note: *: Some of the collection vehicles were rented by private collection companies.

The direct personnel expenses calculated by the number of employees (275 people) of the cleansing section amount to an average of 2,834 million TL/employee/year.

#### ii. Unit Cost of Cleansing Services

The collection and haulage, and overall service costs were calculated by unit weight and service population, while the public area cleansing service cost was calculated by unit weight and the length (km) of the road covered.

Table 3-26: Unit Cost of Cleansing Services in Yuregir DM (1998)

| Items | Cost (million TL) | Unit | Amount | Unit Price (1,000 TL) | Unit Price (US$)* |
|---|---|---|---|---|---|
| Collection/haulage | 731,575 | ton | 71,432 ton/year | 10,242 | 36,00 |
| | | capita/year | 330,833 people | 2,211 | 7.77 |
| Public area cleansing ** | 93,295 | ton | 2,088 ton/year | 44,682 | 157.07 |
| | | km/year | 78 km | 1,196,090 | 4,204.48 |
| Administration | 121,877 | | | | |
| Total | 946,747 | ton | 73,520 ton/year | 12,877 | 45.27 |
| | | capita/year | 330,833 people | 2,862 | 10.06 |

Note *: US$1.00 = 284,480 TL
**: including park cleansing (14.7 ha)

The unit cost of collection/haulage seems to be sufficient comparing to the appropriate figure (US$ 30/ton) for indicative planning purposes in Turkey[1], but the unit cost of Seyhan DM did not include the depreciation costs fully. The share of direct personnel expenses was about 77% of the collection/haulage cost, and that suggested the necessity to improve the work efficiency.

If the overall costs were to be calculated based on a family size of 5 people, the amount would be US$ 50.3/household/year. The expenses for public area cleansing are also extremely high in comparison to the cost of Seyhan DM. The cleansing activities in markets and parks are considered to make up the bulk of the expenses.

### d.2.3 Adana GM

#### i. Cost of Cleansing Services

The Greater Municipality of Adana cleans major roads and operates the final disposal site. It does not, however, conduct collection and haulage services. The cleansing service and final disposal service are contracting out to private companies.

Table 3-27: Cleansing Service Cost of Adana GM in 1998

unit: million TL

| Expenses | Administration | Public area Cleansing | Final disposal | Total |
|---|---|---|---|---|
| No. of Personnel | 6 | (350) | (7) | 6+(357) |
| Direct Personnel Expenses | 39,885 | | | 39,885 |
| Material Expenses | | 1,492 | 2,238 | 3,730 |
| Investment | | 0 | 0 | 0 |
| Contracting out* | | 735,742 | 91,068 | 826,810 |
| Subtotal | 39,885 | 737,234 | 93,306 | 870,425 |
| Others | 28 | 510 | 64 | 602 |
| Total | 39,913 | 737,744 | 93,370 | 871,027 |

Notes: * The data from Contract Department , total payment for contracting out was 700.9 billion TL, the payment for public cleansing service was 623.7 billion TL and that for final disposal was 77.2billion TL, while the actual expenses for private companies was 826.8 billion TL.

#### ii. Unit Cost of Cleansing Services

For final disposal, the unit cost per final disposal amount and per service population were calculated. For the overall cleansing expenses, the unit cost per collected amount including DMs and the unit price per service population was calculated.

[1] "Study on Appropriate Solid Waste Management Practice" p.32

Table 3-28: Unit Cost of Cleansing Services in Adana GM (1998)

| Expenses | Cost (million TL) | Unit | Amount | Unit Price (1,000 TL) | Unit Price (US$)* |
|---|---|---|---|---|---|
| Public area cleansing | 737,744 | ton | 5,908 | 124,872 | 438.94 |
| | | km/year | 238 km | 3,099,765 | 10,896.25 |
| Final disposal | 93,370 | ton | 270,762 ton/year | 345 | 1.21 |
| | | capita/year | 1,151,038 people | 81 | 0.29 |
| Administration | 39,913 | | | | |
| Total | 871,027 | ton | 266,040 ton/year** | 3,274 | 11.51 |
| | | capita/year | 1,151,038 people | 757 | 2.66 |

Note *: US$1.00 = 284,480 TL
**: Sum of the collection/haulage amount and public cleansing amount in Adana area.

For open dumping, the US$ 1.18/ton final disposal cost is considered reasonable because it does not including investment costs. If a household has an average of 5 people the disposal cost would be US$ 1.18/household/year. The overall cleansing service expenses are US$ 13.30/household of Adana GM. The overall cleansing service expenses including the expenses of the Adana GM are US$ 50.40/household in Seyhan DM and US$ 63.60/household in Yuregir DM respectively. By improving the efficiency of public area cleansing services, the public area cleansing expenses should be curtailed, and the development of a sanitary landfill will be given importance in the future.

### d.2.4 Unit Cost to be Used in Master Plan

The unit costs calculated above are very differ by municipalities and by services. One of the reasons is supposed that some municipalities did not fully pay the necessary expenses in 1998.

In the same way, unit costs by service in 1997 were calculated. The unit costs by service in 1997 and 1998 are summarised as following table.

Table 3-29: Unit Costs by Service (Adana)

unit: US$/ton

| | | 1997 | 1998 |
|---|---|---|---|
| Seyhan DM | Collection/haulage | 17.0 | 27.3 |
| | Public area cleansing | 44.9 | 110.2 |
| | Overall SWM | 19.1 | 32,6 |
| Yuregir DM | Collection/haulage | 26.6 | 36.0 |
| | Public area cleansing | 128.0 | 157.1 |
| | Overall SWM | 36.9 | 45,3 |
| Total of two DMs | Collection/haulage | 20.1 | 29.8 |
| | Public area cleansing | 59.6 | 118.2 |
| | Overall SWM | 24.1 | 36.2 |
| Adana GM | Public area cleansing | 335.0 | 438.9 |
| | Final Disposal | 0.4 | 1.2 |
| | Overall SWM | 7.9 | 11,5 |

"Study on Appropriate Solid Waste Management Practice" suggested that the cost for collection and haulage ranged of US$ 20 to 28/ton, and that for final disposal ranged of US$ 5 to 10/ton. The report pointed out that an indicative unit cost for domestic waste collection and disposal in the medium term is taken to be at least US$ 40/ton. Considering these unit costs in Turkey, the following costs for existing system are used to formulate the master plan.

- Collection and haulage US$ 30/ton
- Public area cleansing US$ 186/ton

### d.3 Financial Assessment

The revenue (cleansing tax) and expenditures of the cleansing services shown above clearly show the critical financial state the solid waste management services is in. Here, it is assumed that 70% of the collected cleansing tax is allocated to each municipal cleansing office.

#### d.3.1 Seyhan District Municipality

The revenue and expenditure of the cleansing services of Seyhan DM are as shown below.

Table 3-30: Revenue and Expenditures of the Cleansing Services of Seyhan DM

unit: million TL

| Items | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|
| Revenue (A) | 32,618 | 51,730 | 77,325 | 112,995 | 176,259 |
| Expenditure (B) | 59,200 | 113,426 | 215,798 | 519,180 | 1,731,384 |
| Balance (A-B) | - 26,582 | - 61,696 | - 138,473 | - 406,185 | - 1,555,125 |
| **Cost-covering rate (% = A/B x 100)** | **55.1** | **45.6** | **35.8** | **21.8** | **10.2** |

The table above clearly shows that the current cleansing tax collection system cannot support the cleansing service expenses. The deficit of costs is covered by other revenue of municipality, and the share of the deficit to the whole revenue of Seyhan DM was 19.9% in 1998.

#### d.3.2 Yuregir District Municipality

The revenue and expenditure of the cleansing services of Yuregir DM are as shown in the table below.

Table 3-31: Revenue and Expenditure of the Cleansing Services of Yuregir DM

unit: million TL

| Items | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|
| Revenue (A) | 11,064 | 17,343 | 29,170 | 39,812 | 95,698 |
| Expenditure (B) | 6,987 | 47,717 | 218,036 | 400,676 | 946,747 |
| Balance (A-B) | 4,077 | -30,374 | -188,866 | -360,864 | - 851,049 |
| **Cost covering rate (% = A/B x 100)** | **158.4** | **36.3** | **13.4** | **9.9** | **10.1** |

The table above clearly shows that the current cleansing tax collection system cannot support the cleansing service expenses. The deficit of costs is covered by other revenue of municipality, and the share of the deficit to the whole revenue of Yuregir DM was 18.8% in 1998.

### d.3.3 Adana Greater Municipality

The revenue and expenditure of the cleansing services of Adana GM are as shown in the table below.

Table 3-32: Revenue and Expenditure of the Cleansing Services of Adana GM

unit: million TL

| Items | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|
| Revenue (A) | - | 150 | 253 | 34,690 | 15,991 |
| Expenditure (B) | 6,987 | 47,717 | 218,036 | 400,676 | 871,027 |
| Balance (A-B) | -6,987 | -47,567 | -217,783 | -365,986 | - 855,035 |
| **Cost covering rate (% = A/B x 100)** | **0.0** | **0.3** | **0.1** | **8.7** | **1.8** |

The table above clearly shows that the current cleansing tax collection system cannot support the cleansing service expenses. The deficit of costs is covered by other revenue of municipality, and the share of the deficit to the whole revenue of Adana GM was 5.0% in 1998.

## e. Privatisation and Contracting System

### e.1 Adana Greater Municipality

Two private companies are separately active in the service areas of the Adana Greater Municipality lying over Seyhan and Yuregir districts. In activities related to the service area within the Seyhan District, the contractor Tugce Co., Ltd. employs 250 labourers plus 50 drivers, whereas throughout the cleansing activities carried out in the service area within the Yuregir District, the contractor As Ertas Co., Ltd. employs 100 labourers and 25 drivers.

Based on annual contracts, the private cleansing companies assign one foreman for each operation zone, who is in charge of respective labourers. Each foreman in return is supervised by a certain control chief. While the As Ertas Co., Ltd. employs one control chief responsible for the operations carried out within the Yuregir District area, the Tugce Co., Ltd., employs 3 control chiefs supervised by a senior control chief due to comparatively wider service area and extended target group.

The Greater Adana Municipality makes its 5 vacuum cleaners and 1 street washer available to Tugce Co., Ltd., as well as 3 vacuum sweepers and 1 street washer available to As Ertas Co., Ltd. For their operations, Tugce Co., Ltd. mobilises its own 2 trucks, 8 tractors and 4 trucks equipped as sweepers for street cleansing, whereas As Ertas Co., Ltd. uses 5 tractors and 2 trucks equipped as sweepers of its own. The contractors cover maintenance and operation costs of all vehicles and equipment.

The waste disposal activities at the Sofulu dump-site is also managed by the Adana Greater Municipality through contracting. The contractor Yengi Insaat Co,. Ltd. is

responsible for dumping and levelling operations with 2 bulldozers, 1 washer, 3 tractors and 1 loader.

The Head of the Cleansing Section is extremely pleased with the achievements and performances recorded in street sweeping and cleansing operations undertaken by the private hand. He mentions that manpower costs reflect a considerable relief that the maintenance, operation and repair costs of vehicles and cleansing equipment are borne by the contractors themselves. Otherwise, it is administratively and legally unmanageable for a municipal official to cope effectively with all service requirements of the machinery pool running under municipal possession and operation.

### e.2 Seyhan District Municipality

The Cleansing Directorate of the Seyhan District Municipality is engaged in waste collection and transportation services with its 125 truck drivers, 17 car drivers and 342 labourers. The contractor, Ileri Co., Ltd. provides 250 labourers to undertake street sweeping operations as well as cleansing of periodically set up local market places, however without any vehicular support. All kinds of waste are picked up and removed by the municipal fleet, which is composed of 44 compactors, 18 trucks and 4 tractors.

The Cleansing Directorate is highly satisfied with the applied privatisation approach. It is not only regarded as a manageable and controllable model, but furthermore as a cost-effective and efficient mode of co-operation between the client and the contractor. The Cleansing Directorate attributes its successful operations and high performance records to the achievements in internal (in house) and external (contractor) supervision, which lead to an integrity in providing required services pertaining to solid waste management.

A prior experience towards privatisation made by the Cleansing Directorate had contributed a lot to formulate the current solution. Short before, the Seyhan District Municipality had established his own company (municipal owned enterprise) in order to contract waste disposal services. However the politicians, members of the Municipal Parliament as well as other influential personalities, had engaged themselves in the management of this enterprise in line of their diverse interests and disturbed wage scale and task assignments among the personnel. These negative impacts had led to the abolishment of the enterprise and search for an alternative model. Currently applied model has found to be the ideal privatisation approach, since it is based on a labourer-hiring type of co-operation rather than contracting. The continuation of such a co-operation is also appreciated by the Cleansing Directorate in regard of stabilisation of the solid waste management activities, due to collaboration of experienced and skilled personnel of the municipality and the contractor.

### e.3 Yuregir District Municipality

The cleansing services of all kind are accomplished by the Yuregir District Municipality with a vehicle pool composed of 14 trucks, 2 pick-ups, 2 street washers and 6 mopeds under municipal ownership, as well as 38 tractors hired from private owners. The only privatisation essence within the scope of activities of the Cleansing Directorate of the Yuregir District Municipality is the seasonal leasing of tractors on

contractual basis as agreed with each individual owner, which are used for transportation purposes.

There reigns strict anti–privatisation intentions and conservative approaches in public service management within the Cleansing Department of the Yuregir District Municipality. The Director articulates this approach by indicating that monitoring and control of own operations as well as evaluation of self–discipline could be achieved much effectively compared with the privatised and contracted operations. This principle is regarded as unavoidable in securing efficient public services, which has been once promised to the citizens by local politicians who are interested and eager to be re-elected.

The prospective outlook related to the management of solid wastes by the Yuregir District Municipality reflects no privatisation attempts, independent from steadily growing target group and expanding service area. Although the administration is aware of the fact that an in–house personnel means almost a triple pay-roll (including social security payments) compared with a personnel of any private company, privatisation is not preferred firstly due to incredible damping rates in bidding. The municipality attaches no reliance to private sector engagements in public services, especially to those tendered for extremely low and incredible offers.

### f. Monitoring and Information Management System

The traditional approach of performance assessment in solid waste removal and street cleansing services is the physical appearance of the public spaces to the naked eye, which is widely applied by the responsible units of the Adana Greater Municipality as well as Seyhan and Yuregir District Municipalities.

The responsible officials extensively rely on the citizen responses and complaints at local and communal levels as public control mechanisms, which reflect a very practical approach in the identification of failures and shortcomings in cleansing and waste removal services. It means that pragmatic and reactive approaches are applied rather that deliberate and active approaches in control and monitoring as well as in information management. Communication and information exchange related actions are mainly performed in verbal terms, rather than in formalised documentary terms. A systematic central monitoring model structured upon an information basis is unfortunately not practised.

Following the general monitoring philosophy as described above, one should distinguish between (1) management related monitoring, and (2) operation related monitoring practices applied by individual municipalities in Adana. At the managerial level, the monitoring of cleansing and waste removal services provided by the Greater Adana Municipality rolls over the sensitiveness of the stakeholders and publicity. There reigns a non-formalised and non-formatted information flow in forms of complaints, which could be interpreted as, “the lower is the size of complaints, the higher is the service performance, or vice-versa. This is also a valid principle for dumpsite activities carried out by the contractor, which run almost without any observation of municipal personnel at the site.

Consequently, an accurate service performance assessment is not achievable under these conditions. Another important issue for management is the fiscal monitoring, which comprises revenues, cash flow as well as financing means. Since each of the municipalities in Adana have one or more units and/or sub-units dealing with fiscal

issues of individual departments, sections, directorates and divisions centrally, a transparent monitoring is not achievable neither by the cleansing Section of the Adana Greater Municipality nor by the Cleansing Directorates of the Seyhan and Yuregir Municipalities.

At the operational level, the Adana Greater Municipality does not seem to execute a strict monitoring over the contractor by mobilising its personnel. The community indicates by local initiatives the level of their satisfaction related to provided services. The Seyhan District Municipality follows a twofold monitoring approach due to the partial privatisation system: (1) firstly, for own personnel within the framework of hierarchical organisation and (2) secondly, for the personnel of the contractor by appointing respective municipal staff for supervision. In case of the Yuregir District Municipality, where no privatisation is applied, the monitoring of waste disposal and street sweeping services is based on an auto-centric mechanism. The public resonance of provided services is an extremely sensitive issue for both district municipalities. They also attach a considerable attention to internal disciplinary order, which is extended to the contractor by the Seyhan District Municipality. At the operational level, both district municipalities are eager to monitor the activities, operations and performances on a daily basis with aid of checklists and wireless communication means. However, a strategic evaluation based on a time-series documentary assessment is regretfully not available.

### g. Human Resources Development

The educational background of responsible personalities occupying relevant posts in solid waste management units of respective municipalities does not usually comply with the nature of expected tasks and assignments. It is also a very prevalent belief that waste management is an inferior professional engagement. Therefore, it is not attractive for qualified and skilled manpower to enter into contractual relations with the municipalities to deal with solid waste management assignments in the long run.

While the technical skills have more opportunity to be improved with aid of short-term vocational training programs offered by diverse organisations, unfortunately management oriented courses, particularly tailored for solid waste sector, do not stand in the current training agenda neither at local nor at national levels.

The management background and long years' experience gained in commercial relations give the impression, that the Adana Greater Municipality is relatively more skilled in coping with contracting and privatising implementations, practising legislative instruments as well as undertaking supervision and control actions. The managerial adaptiveness of the personnel in the Cleansing Section of the Adana Greater Municipality to contracting and privatising practices seems to be more developed when compared with the manpower allocation and mobilisation model pursued by the Cleansing Directorates of the Seyhan and Yuregir Municipalities. In these municipalities, external managerial relations are concealed behind either partial privatisation or non-privatisation practices. Those approaches are the products of operation oriented priorities rather than management oriented mentalities prevailing in the district municipalities.

Since in operational activities there is no need for managerially talented manpower, partial privatisation and non-privatisation models preferred by the Seyhan and Yuregir

District Municipalities might be a consequence of deficiencies in managerially skilled, trained and experienced human resources available at the local level. It might, therefore, be a more pragmatic solution to regulate the smooth run of solid waste management activities within the hierarchical chains of 'command and control' principle, rather than being diffused in sophisticated and complicated management issues. Departing from this logical point of view, it could be claimed that more privatisation attempts might be expected, if more educated, skilled, trained and experienced human resources would be mobilised for solid waste management services.

It is very common that some management concepts are not transparent in the minds of responsible personalities, such as unit costs, comparative analysis, cost-effectiveness calculations, financial analysis, cost-benefit analysis, quantified evaluation techniques, etc. They would prefer to refer to administrative aspects of management rather than dealing with quantitative figures.

The educational shortcomings are tried to be compensated by on the job experiencing and training efforts. The ever lasting learning process based on 'trial and error' method neither functions well, due to reluctance stemming from limited knowledge and experience, political influences on personnel as well as restricted action and manipulation opportunities recognised to the personnel.

### h. Public Education and Cooperation

Like most of other countries in the modern world, district community activities are not so active in Turkey. But it can be pointed out that inside apartment houses, *kapici* (doorkeeper) system is still working and it may be said that the most powerful community activity. Almost all apartment dwellers are hiring *kapicis*, with dwellers common expense. *Kapici* is cleaning staircase, elevator, and other common places, even sidewalks in front of the apartment. Moreover, he is collecting garbage from each apartment and bringing down to the apartment's containers and keeping it and around clean. This is quite Turkish tradition, and has a meaningful way of keeping neighbourhood clean. When public education will be programmed, *kapicis* should be the first people to be engaged.

Concerning education in Turkey, environmental education is given by a number of institutions, organisations and agencies. In formal education, starting from pre-school age, environmental subjects are introduced to children and youth. In higher education, programs directly or indirectly related to environment are offered in many universities. In non-formal education programs, which recruit 1 million persons each year, there are courses that can be included in the context of environmental education and training. In school educational programs have included environmental care issues and in some schools, children collect waste paper for recycling. However, given the importance of the active participation and co-operation of citizens in source separation and recycling, the target of the public education program is to disseminate knowledge and pertaining to SWM issues and request public co-operation.

Extensive education system but inadequate educational contents do not convey appropriate information specifically for factual needs or identified target groups. Society as a whole can barely grasp on the surface the magnitude of the solid waste problems; as a result, limited participation from the population in SWM and modest

public awareness has been observed. However, it should be noted that citizen participation does not happen spontaneously. For participation beyond rhetoric, mechanism should be established, space should be created, and some basic input should be financed.

**i. Guidelines**

When each municipality in Adana is subjected to an evaluation in respect of legislative, administrative, managerial , operational and technical guidelines they apply, one can come across with the following facts.

In the line of legislative guidelines, the Adana Greater Municipality is responsible for the cleansing of main avenues, essential public facilities and open spaces as well as operation of the dumpsite and establishment of a sanitary landfill and material recovery facilities, as indicated in the Greater Municipality Law No. 3030. The District Municipalities in Adana, namely Seyhan and Yuregir, on the other hand, carry out waste collection, transportation and dumping activities, either by themselves or by contracting, as indicated in the Municipalities Law No. 1580.

The administrative guidelines have been also applied with particular organisation models in order to fulfill the solid waste service requirements, as indicated in the legislative guidelines. Since the legislative guidelines are predominantly oriented towards the description of solid waste management assignments for the greater municipalities with a brief reference to administrative structuring in form of highlights, the Adana Greater Municipality has accordingly developed its own administrative unit, which might differ in name and structure, when compared with other greater municipalities' organisation schemes. This is the reason, why two solid waste management units of two different greater municipalities in Turkey are entitled and administrated differently, although they are officially assigned to do the same job. However, the district municipalities reflect more or less similar organisation models.

Regarding managerial guidelines, each municipality has developed own options based diverse by-laws, regulations and instructions. Except personnel management regulations, which is of strictly binding character, the municipalities can enjoy the selection of alternative options offered by the privatisation and contracting regulations. The choice for management models for administrative purposes and preference of management options for operational purposes have been taken up by each municipality in accordance with legislative and managerial guidelines. The results of the assessment carried out in this respect reveal, that the Adana Greater Municipality attaches high priority to privatisation, whilst the Seyhan District Municipality prefers to follow a partial privatisation model. The Yuregir District Municipality stands as the only example, the management of which depends on a non-privatisation choice. A common characteristic of all these three municipalities in regard of information management, fiscal and financial management, decision making and action management is that, those issues are handled in a very traditional manner which require current adoptions and updating for more functional and operational attainments.

Operational guidelines encompassing field activities of solid waste management as well as monitoring and control of services have not been precisely structured on a formal basis. Pragmatic instructions have been developed for field operations and

in-house monitoring while the publicity is expected to be the main watcher of the quality of provided cleansing and solid waste removal services. However, concrete guidelines are not available in this relevant issue regarding public relations and communal cooperation.

Technical guidelines as issued in the regulations related to solid waste management as well as control of medical wastes, harmful chemicals and products, hazardous wastes and water pollution along with solid waste collection, transfer and transportation, dumping and disposal techniques are applied with considerable deficiencies. These deficiencies are more conspicuous in regulatory obligations than in manual and mechanical implementations. Although the Ministry of Environment nowadays circulate an 'Environment Manual for Municipalities', the technical implementations shown in this transcript need to be transferred to the municipal personnel within the framework of an extensive training program. A factual approach also requires to deal with financial aspects of these techniques, which are of vital importance to all municipalities, not only to those located in Adana.

### j. Medical SWM

The Regulation on Control of Medical Wastes, under the Environment Act governs the way "pathological or non-pathological, infected, chemical and pharmaceutical wastes, lacerating and piercing materials and compressed containers" from medical institutions, and other sources of medical waste, are handled. The regulation not only covers hospitals and teaching hospitals of medicine, dentistry, veterinary science, and biomedical sciences, but also centres and outfits that conduct work on blood and its products, medical analysis laboratories and all laboratories that house animals for biomedical research, clinics, medical examination units, polyclinics, dental clinics, and infirmaries. Medical and veterinary surgeries, mobile health units, pharmacies and pharmaceutical repositories, and other similar sources are also covered by the law.

The Ministry of Environment regulates waste management, including medical and hazardous materials, but individual municipalities are responsible for the enforcement of the regulation through supervision and monitoring. The Ministry of Health inspects the hospitals for it's hygiene standards, including the handling of medical wastes.

The following is a brief outline of the medical wastes regulation:

Table 3-33: Brief Outline of the Medical Wastes Regulations

| | Topic | Description |
|---|---|---|
| 1. | Scope & Definitions | Concise classification of different sources, except the term "other similar sources" which may be ambiguous when trying to enforce this law onto sources other than those mentioned, such as home care, terminal care hospices, and old people's homes. Good, clear definitions of infectious, pathogenic, pathological, and domestic waste. The responsibilities and the law under which medical waste is regulated are clearly defined. |
| 2. | Rules for Generators | Obliges generators to train personnel, to develop a system to reduce waste at source, to enforce separate collection (medical from domestic), to store waste temporarily in a way that eliminates risk of harm to both humans and the environment, to document the removal and disposal of medical waste which should be sent to the MoE each year, and to circulate a detailed operating procedure on measures and precautions to be taken by hospital administrators to |

| Topic | Description |
|---|---|
| | the concerned sections and the MoE. |
| 3. Financial Obligations | Obligations are defined but is unclear as to who is responsible for collection of the taxes. The Ministry changes the mode of payment every year; at the time of the study the Greater Municipalities set the tariffs for the cleansing tax, accounting for the variable level of services throughout the nation. Each district municipality collects the Cleansing Taxes from institutions that are obliged to pay under the regulation. The payment methods are "determined by the Ministry (of Environment) each year by consultation with the other Ministries involved." |
| 4. Domestic Waste & Medical Waste | The two must be handled separately using different coloured bags. Specially trained crews should collect medical waste that are clearly labelled, contained in special "biohazardous" red plastic bags, and left uncrushed. Piercing and lacerating materials must be crushed and only microbial waste, human blood & body fluids, and tainted lacerating & piercing instruments are to be autoclaved in steam resistant bags. |
| 5. Hazardous Waste & Radioactive Waste | Radioactive waste is not covered by this law. Hazardous (chemical) waste is divided into "safe" and "dangerous", both of which are clearly defined in composition, but not concentration. Hospitals shall recover the safe chemicals, and any irrecoverable solid wastes shall be disposed of as domestic waste. Hospitals are obliged to recover dangerous wastes that can be recovered, but where recovery is impractical these waste types must be disposed of safely. Mercury compounds and substances containing mercury, under the regulation, must be collected separately. No mention of medical waste with multiple hazards, e.g., radioactive waste that has been infected by biological agents. |
| 6. Storage | Institutions with more than 20 beds are required to have a special building, constructed with heat and chemical resistant materials, to temporarily store medical wastes. These secured storage structures must have separate chambers for domestic waste and for medical waste. All other medial waste generators must have an agreement to store their waste with larger institutions. Infectious waste must not be stored at medical institutions for more than 48 hours. |
| 7. Transportation | "Individually packed by their categories" in "thick, puncture and tear resistant red plastic bags suitable for carrying", medical wastes must be clearly labelled with the international biohazard emblem and transported separately from domestic waste. Waste collection vehicles must be cleaned at least once a day, and in the event of a broken bag, the vehicle must be disinfected. Waste management personnel at the hospitals must wear special protective clothing that is orange for easy identification, provided by management. |
| 8. Incineration and Final Disposal | Municipalities are encouraged to build incineration facilities, that treat only medical wastes, with licensing from the MoE. If incineration is not an option, however, municipalities can be landfilled at a specially allocated part of either a domestic waste landfill, or an industrial waste landfill, or at a secure landfill specially constructed for biological waste. |

Other regulations that govern waste generated by medical institutions are: Water Pollution Control Regulation, Hazardous Waste Control Regulation, Atomic Energy Corporation of Turkey Act, and Solid Waste Control Regulation.

### 3.1.4 Assessment of Present SWM

#### a. Technical System

#### a.1 Municipal SW Generation

In contrast with other economically comparable countries, the household waste generation ratio is small at 461g/person/day (on weighted average of population in income level), as the people mainly live in condominiums.

Kitchen waste constitutes, on average, 73.5% of the household waste amount.

#### a.2 Collection and Haulage

First of all urban SWM aims to handle the waste to keep the living environment; the collection service to attain this objective is fully established. Almost all urban residents receive collection services.

There is no government related separate collection which is essential for waste minimisation and resource-recovery. However, a voluntary source separate collection system through the *"eskici"* is well functioned as well as donation system of recyclable waste.

There is no long-range transfer system, and waste collected is directly hauled to the disposal site. The Yuregir DM intensively uses tractors trailers for collection and haulage, and therefore it's system is not cost effective.

The collection and haulage expenses make up the bulk of the SWM expenses (most of the other countries, it is over 70%.), therefore the improvement of collection and haulage system is extremely important.

#### a.3 Cleansing of Street and Parks

The present cleansing services contribute to make up the city clean.

Although a mechanical cleansing system is being adopted gradually, the cleansing system is mainly labour intensive. It, however, contributes to provide jobs to the unemployed labour force.

#### a.4 Intermediate Treatment

Nothing in particular.

#### a.5 Recycling

Although the recycling activities of public institutions are considerably limited, a recycling system formed by the private sector, which consists of a lot of informal individuals scavengers), is well established and very active.

In particular, the informal collection of recyclable materials by the *"eskici"* at generation sources street waste picker at discharge points is very active. It is assumed that almost 5.9 % of the total waste is recycled.

In the Sofulu dump site, 15 - 40 scavengers are allowed to operate without paying any money to the Adana GM nor to the private contractor. However, both the AGM and

the contractor accepts the activities of scavengers in the site, disposal operations are usually hampered, such as widely scattered working faces, etc.

### a.6 Final Disposal

The present Sofulu disposal site is a typical open dump site that seriously affects the surrounding environment in an adverse way. In particular, the smoke from fires that break out in the site not only affects the surrounding area but also the entire AGM. Fire prevention/extinguishing measures should be urgently adopted.

Since the haulage vehicles entering the site are not properly monitored, there are no records as to the type of waste disposed and the section where it is disposed of.

Infectious medical wastes are not segregated, and are disposed of along with general wastes. Some of the infectious medical wastes, such as intravenous plastic tubes and syringe, are recycled by scavengers.

### a.7 Equipment Maintenance

There is an operation and maintenance (O & M) system for equipment used in waste collection and haulage, and for the cleansing of streets and parks.

There is neither an O &M system nor daily inspection services for the heavy machinery used in the disposal site where working conditions are considerably poor. Consequently, the machinery constantly break down.

## b. Institutional System

### b.1 Operational and Organisational System

The organisations responsible for SWM in both AGM and two DMs (District Municipalities) are not well established.

In particular, the AGM responsible for final disposal and hazardous waste management could not manage them due to the weak organisation.

### b.2 Financial Matters

There is a great tendency for municipalities to receive a greater share of their income from the Central Government, as the local authorities can not take decision on local taxes except for the sign and advertisement fees.

Revenue for SWM is insufficient.

The Cleansing Tax and its collection rate are insufficient, the proportion of the tax compared with SWM costs is extremely low. Because the legal basis of the Cleansing Tax is weak, with payment of this tax being essentially voluntary, and allowed annual increases being fixed at only half the rate of inflation.

### b.3 Contract-out System

In contrast with the AGM, there is a strict anti-privatisation intention and a conservative approach in the public service management within the cleansing departments of the two district municipalities.

### b.4 Legislation

Although laws, regulations, and standards related to SWM are gradually being established, the problem lies in the way they will be enforced.

Although slightly extreme, the conditions in the disposal site will be used as an example. Sofulu is an open dump site where separately collected infectious medical wastes are disposed of together with general wastes.

### b.5 Public Co-operation

As wastes are discharged and collected using mainly communal containers without any form of segregation, the residents are hardly aware of the SWM problems.

Separate collection is indispensable to waste volume reduction and resource-recovery. However, its introduction is predicted to be considerably difficult.

### b.6 Medical Waste Management

In accordance with Law 2872, infectious and hazardous medical waste should be handled separately.

Twenty eight main medical institutions were surveyed to identify medical waste management in AGM The survey results indicate medical waste management system of AGM is still at low level, although the system was clearly explained by law and almost all of the institutions were aware of that. People were sufficiently informed about the system and risks of infectious/hazardous wastes, and the institution had taken precautions and many applied these to their collecting systems.

All institution reported the insufficiency of AGM about the disposal of infectious/hazardous wastes after they are separately collected from their institutions. They are disposed of at the landfill together with general wastes and it is in an awful situation and no precautions present for both human and environment health.

The institutions are ready to cover the necessary expenses, and are willing to help to protect the environment, and the human in general.

The institutions expressed that they were ready to cover the necessary expenses, and to help protecting the environment and the human in, general. However, the municipal authorities claimed basing on the experiences that despite such expressions, whenever their assistance were required for this purpose, the institutions had not behaved the way they express.

### b.7 Industrial Waste Management

Although regulatory and monitoring systems are gradually established in accordance with the legislation related to the handling of hazardous industrial waste, the problem lies in the way they will be enforced. Many of the industrial wastes are disposed of in the disposal site along with other urban solid wastes.