

Data 5

Education Book

5 Separate Collection Experiment and Education Booklet

5.1 Preface

In the manual “Environmental Manual for Municipalities”, 1998, of MoE, the Ministry expresses their intention of more than 90% of municipal solid waste (MSW) recycling by mean of reuse, recycling and recovery. Turkish Solid Waste Regulation amended in September 15th, 1998, obligates a separate collection to municipalities. Furthermore, in the SWM M/P of the target cities the recovery of kitchen waste (may be by composting), which shares more than 65% in current composition of their MSW, is one of the most important issues. In this context to identify the feasibility of the separate collection is an indispensable subject of this study.

Proving the appropriateness of these undertakings is a major issue, the study team proposed the improvement of the existing compost plant in Mersin, and its production method, through **the separate discharge and collection of compostable and non-compostable waste**, to determine whether it is possible to improve compost quality.

Taking the above into account, in January 1999 the study team drafted a plan. The plan was approved by JICA and the budget for the work items done by the team was allocated by JICA.

Consequently, the study team conducted a separate collection experiment which is indispensable to waste volume reduction, resource recovery, and in particular, for the improvement of the standard of living. The experiment was implemented in a selected housing complex with a population of approximately 1,000 in Mersin.

However, no experimental pilot project can be realised without considering public participation. Therefore, before the implementation of the separate collection a public education and co-operation were promoted. To effectively promote measures for separate collection experiment and in order to deepen understanding of the necessity to separate waste among the residents, several assemblies and meeting were carried out. Training and instructions were conducted by the team, and reinforced through complementary materials, e.g., leaflets, presentation using visual materials and projector, education book, and separate collection demonstration in situ.

The citizen training was carried out focusing especially towards the separate collection, waste minimisation and resource recovery through meetings in the community.

As mentioned above, an educational booklet targeting community residents, and especially children of MGM and AGM, was designed by the study team.

This booklet outlines many practical steps to reduce, reuse and recycle the solid waste and motivate residents and children interest and concern with the socio-environmental problems and their active participation in SWM issues for the preservation of natural resources and improvement of the life quality of the population.

The goals of the education booklet is aimed to continuously introduce public co-operation and participation as a mean of promoting minimisation and recycling the waste through separate collection system in the whole city and change people attitudes for a better living environment.

Recycling of solid waste is taken into program of environmental education in some schools, but separate collection system, which make easy to recycle waste as resources, is not well established. Therefore, it is considered that the use of the present book in school education programs will contribute more to promote the separate collection and recycling.

The authorities can encourage public participation and devise a separate collection system, unique to the local culture and common practices. To effectively promote measures for separate collection, it is necessary to improve and strengthen systems to carry out these measures by continuously fostering human resources to fulfil the role of such promotion in a well-planned manner.

5.2 Experiment of the Separate Collection in Mersin GM

5.2.1 Background

The MoE intends to achieve 90% of MSW recycling. In order to realise this target it is indispensable to recover the organic waste especially kitchen waste which shares more 60% of the MSW in the target cities, Adana and Mersin.

The MoE states in the Environmental Manual for Municipalities that composting is the most suitable method of the organic waste recycling for the MSW. In Turkey two composting plants have been constructed and being operated in Izmir and Mersin Greater Municipalities. However, the performance of the two plants could not be sufficient. It might be main cause of poor performance that both municipalities do not apply separate collection system for composting.

As concluded from the results of the interviews with the farmers in the first study work in Turkey, the quality of composts produced at the present Mersin composting plant is very poor, which is mainly why farmers stop to use the product. Therefore, the improvement of compost quality by **the experimental separate collection**, etc. has been carried out as pilot project in the second and third study works in Turkey.

5.2.2 Plan of the Experiment

The results of the pilot project will determine whether it is possible to improve the compost quality currently produced at the existing plant. Compost quality improvement will be carried out the selection of an area and the separate collection of compostable (kitchen waste, garden waste, etc.) and non-compostable (glass, plastic, metal, etc.) waste items, and using the former waste type for compost production. A separate collection campaign will be held in the selected area to raise public awareness and consequently encourage public co-operation.

Using the compost produced through this pilot project, a study planned to be carried out to determine the marketability of the product in Adana and Mersin, and to ascertain product demand and the appropriate price. Taking the above into account, in

January 1999 the study team drafted a plan of the experiment of which main works and the roles of the study team and Mersin GM are summarised in the table below. The plan was approved by JICA and the budget for the work items to be done by the team was allocated by JICA (Table 5-1).

Table 5-1: Outline of Experiment on Separate Collection in MGM

Items	Outline	Equipment & Materials	Responsible Body
Separate Collection	Gain residents' co-operation	Installation of a notice requesting for co-operation	JICA
		Preparation of pamphlets	JICA
		Holding assemblies and meetings	Mersin GM
	Implement separate collection	Distribution of plastic bags	JICA
	Installation of containers for separate collections	JICA	
	Collection of segregated waste	Mersin GM	

5.2.3 Implementation Schedule for Separate Collection Experiment

The pilot project of separate collection has been conducted in the third study works in Turkey (May 10 to June 9, 1999).

The experiment of the separate collection has been conducted according the following schedule (Table 5-2).

Table 5-2: Implementation Schedule for Separate Collection in MGM

Activities	May				June	
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2
Separate Collection (May 10 – May 9)						
1. Gain Resident's Co-operation						
a. Installation of notice/signboard	■					
b. Distribution of leaflets No.1 & No.2	■					
2. Implementation of Separate Collection						
a. Distribution of plastic bags		■		■		
b. Installation of waste bins		■				
c. Installation of containers		■				
d. Waste separation at source		■	■	■	■	■
e. Collection of C & NC wastes		■	■	■	■	■
f. Monitoring of separate collection activities		■	■	■	■	■
3. Assemblies and Meetings with the Residents						
1. Meeting with building managers of the GSHC	■	■				
2. Meeting with the residents of the GSHC		■	■		■	

5.2.4 Public Education to Gain Resident's Co-operation

5.2.4.1 Objectives

Public education and co-operation are important components of any integrated SWM program. In view of limited resident participation in SWM and modest public awareness of waste problems in Mersin GM, there is a need to inform the public of the SWM problems, e.g., increasing waste volume, inappropriate handling procedures, etc.

With the exception of isolated demonstrative experiences, e.g., waste separation at household level, which is done informally by the “eskici”, such activities are not frequently found to have considered to sensitive participants through inductive talks and education on appropriate solid waste management and segregation.

Incentives toward waste minimisation and recycling are the basic requisites of improving solid waste management accompanied with participation in waste collection, transportation, disposal and stabilisation costs as well as increasing public awareness in these issues. However, the functional dissociation of those actors active in solid waste production and haulage is the main reason of modest public awareness in Mersin GM.

Therefore, the main objective of the public education and co-operation programs is to raise public awareness on SWM issues through the proper waste handling practices (reuse, reduction and recycling), to promote common responsibility for sustainable development and particularly the city environment in co-operation with the citizens.

In order to achieve the objectives, the followings are proposed:

- Raise public awareness on SWM issues.
- Introduce public co-operation and participation to promote separate collection system for composting.

5.2.4.2 Experiment to Promote Separate Collection System for Composting

The main objective of the pilot project “Compost Quality Improvement and Separate Collection” is to investigate a possibility of the introduction of a separate refuse collection system and gain public co-operation.

Public education and co-operation on SWM is meant to let the public know all about the production and management of refuse. This is achieved by providing information about the origins, linkages and consequences of the problem on solid waste, with the objective of enlightening the minds of the public and eventually, gaining their co-operation and support.

With this in mind a separate collection was introduced at a selected housing complex (Güven Sitesi) with a population of 5,140. In the separate collection experiment residents were asked to separate compostable wastes (kitchen waste and garden waste) and non-compostable wastes (glass, plastic, metal, etc.), and place them into separated containers installed at the housing complex. Then the district municipality (YDM) will collect the waste separately from other municipal wastes and bringing them to the existing composting plant for the production of improved compost.

The category kitchen wastes was placed into plastic bags differentiated with by green colour and logo “Only Kitchen Waste” (for compostable waste) provided by JICA for the experiment. Other wastes (non-compostable) were placed in available plastic bags at source such as shopping bags. These waste bags were placed into two containers, differentiated by colour and material (for compostable wastes: plastic containers with logo “Only Kitchen Waste and Garden Waste” provided for the experiment; and for non- compostable: existing silver/metal containers) installed at the housing complex.

As being the beginning of any separate collection implementation in Mersin GM, the result of the experiment was very effective, and the participation and co-operation of both residents and collection workers were successfully achieved.

5.2.4.3 Main Campaign Tools used in the Experiment to Promote Separate Collection

To achieve the main objectives of the pilot project various campaign tools were used. Table 5-3 tabulates the campaign tools used in the pilot project “Compost Quality Improvement and Separate Collection” to promote public awareness and co-operation. Samples of signboard and leaflets for promotion of public awareness and co-operation are shown in Figure 5-1.

Table 5-3: Campaign Tools for MGM

Campaign Tools	Purpose
Signboard	A 3.00m x 5.00m size signboard was installed in GSHC announcing the implementation of the pilot project for separate collection and encouraging public co-operation as shown in the sample below.
Leaflets	2,000 leaflets were distributed among the residents of GSHC to inform and request their co-operation for the separation collection experiment. Two types of leaflets were produced: 1000 regarding general information on separate collection and requesting co-operation, and other 1,000 informing the residents how to separate and dispose the waste appropriately and requesting their co-operation. Both types of leaflets are shown in the next pages.
Plastic bags for kitchen waste	45,000 green plastic bags especially designed (with logo: “Only Kitchen Waste”) to collect food waste from the households were distributed in GSHC. The distribution was made according the following plan: 25 buildings x 10 floors x 4 apartments = 1,000 apartments 1,000 apart. x 30 days = 30,000 + 50% = 45,000 bags The doorkeepers made the distribution of the plastic bags every 3 days under the supervision of the building representatives.
Container for kitchen waste and garden waste	Green plastic containers (cap. 750 lit.) with logo “Only Kitchen and Garden waste” were provided and installed in the streets of the housing complex, one container every 2 buildings (see Section 7.3) . The existing containers (for other wastes) were reinstalled together with the new containers for kitchen and garden wastes.
Plastic waste bins for kitchen waste	250 plastic bins (approx. 50 lit. each) were installed at the staircase landing area of every apartment building (10 buckets x 25 buildings = 250) which was used by the householders to discharge the kitchen waste into them.
Education booklet	As part of the experiment and complementary material to promote the separate collection, 2,000 education booklets has been prepared and distributed among the residents of GSHC (1,000), MGM (500), AGM (400), MoE and JICA Ankara Office (50), others (50).

Signboard

**THE COMMUNITY OF GÜVEN SITESI
IS CONTRIBUTING WITH OUR CITY ENVIRONMENT**

Pilot project for waste separation at generation source
and waste recovery

From May 10 to June 9, 1999

**YOUR CO-OPERATION IS NECESSARY TO BEAUTIFY
MERSIN CITY!**

Promoted by:
MERSIN GREATER MUNICIPALITY & YENISEHIR DISTRICT MUNICIPALITY

Supported by:
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Leaflet (1)

**THE COMMUNITY OF GÜVEN SITESI
IS CONTRIBUTING WITH OUR CITY
ENVIRONMENT**

“Separate Waste Collection for Waste Recovery”

A separate waste collection program is to be conducted in your housing complex for waste recovery and contribution to your city environment. Therefore, you are requested to separate your garbage into two categories at home:

• Kitchen waste	In the green plastic bag promoted by MGM & YDM and provided by JICA
• Other waste	In a separate bag (paper, textile, plastic, leather & rubber, metal, bottle & glass, ceramic & stone and miscellaneous)

For this purpose plastic bags will be distributed and provided to you to dispose your kitchen waste. Also, containers for kitchen waste will be installed in your housing complex to dispose the garbage separately into them.

Your active participation and co-operation in source separation is very important for the welfare and life quality of your community and city environment.

For more information, please ask to your housing complex management office.

The future of our city environment depends on our effort. Our co-operation in waste separation will offer better clean environment to future generation

Thank you very much for your cooperation
Promoted by
Mersin Greater Municipality & Yenisehir District Municipality
Supported by
Japan International Cooperation Agency (JICA)

Leaflet (2)

**THE COMMUNITY OF GÜVEN SITESI
IS CONTRIBUTING WITH OUR CITY ENVIRONMENT**

“Separate Waste Collection for Waste Recovery”

From May 10 to June 9, 1999

IMPORTANT

1) Please separate your wastes into two categories:

• Kitchen waste	In the green plastic bag promoted by MGM & YDM and provided by JICA
• Other waste	In a separate bag (paper, textile, plastic, leather & rubber, metal, bottle & glass, ceramic & stone and miscellaneous)

- 1) Kitchen wastes must be disposed in a plastic bag separately from other wastes.
- 2) **Do not mix kitchen wastes with plastic, aluminium sheet or other miscellaneous items** because they are collected as compostable materials.
- 3) Before disposing of leftover food, drain the liquid out of it as much as possible.
- 4) If no doorkeeper (kapici) collect your garbage, please dispose your plastic bag containing kitchen waste into the plastic container “Only for Kitchen Waste”. Other wastes will be disposed in the existing container.
- 5) Garden waste should be disposed in the green colour container “Only for Kitchen Waste and Garden Waste” installed at your housing complex.
- 6) For the safe disposal of wastes that cannot be recycled in an environmentally friendly manner, please consult your building manager or MGM.
- 7) Co-operate for the proper way of garbage disposal.

The future of our city environment depends on our effort. Our co-operation in waste separation will offer better clean environment to future generation

Thank you very much for your cooperation
Promoted by
Mersin Greater Municipality & Yenisehir District Municipality
Supported by
Japan International Cooperation Agency (JICA)

Figure 5-1: Signboard and Leaflets for Promotion of Public Awareness and Co-operation

5.2.4.4 Public Education through Meetings and Assemblies

To effectively promote measures for separate waste collection experiment and in order to deepen understanding of the necessity to separate wastes among the residents, several meetings and assemblies were carried out during the second and third study works in Turkey with the building representatives, householders and doorkeepers of Guven Sitesi Housing Complex (GSHC).

Training and instructions were carried out by the team and counterpart, and reinforced through complementary materials, e.g., pamphlets, presentation using visual materials and projector, education books, and separate collection demonstration in situ.

Among the series of meetings, the relevant one's were carried out before the implementation (May 6th) and during the implementation (May 10th-commencement day, May 12th and June 2nd) of the experiment.

The meetings were consisted on the followings:

- Explanation why is necessary to separate wastes.
- Instruction for proper discharge of compostable and non-compostable wastes.
- Appropriate use of plastic bags, dustbins, waste bins, and containers for compostable and non-compostable wastes.

The most effective meeting was held on May 12th on the job training, because the residents understood on the practice what should and should not discharge into the separate waste bins and containers for compostable and non-compostable wastes, and how to participate properly.

On June 2nd a final meeting with the representatives was held providing information on the progress results of the residents participation and waste separation levels, destination and final product of their compostable wastes, and how well they are co-operating to encourage a continuous promotion of separate collection in GSHC, and influence other areas.

During the meetings the representatives of the complex demonstrated high interest on the separation activities and appreciation for selecting GSHC as the site to carry out the experimental project.

For the sustainability of the pilot project, it is expected that the active participation and efforts made by the residents of GSHC should influence and promote positively other areas as well as all over the city and take initiatives for a real source separation in Mersin.

5.2.4.5 Outline of the Experiment on Public Education

Public education is not an absolute: it is highly dependent on various intrinsic features of a given society, and therefore was planned and implemented taking into account the characteristics of GSHC. Table 5-4 shows rough guidelines of the public education on separate collection implemented in GSHC, bearing in mind that specific and details of long-term education programs will be devised and undertaken by the counterpart of Mersin.

Table 5-4: Outline of the Experiment on Public Education in MGM

Programs in the Community	
1. Implementation period :	During the implementation of the public education
2. Targets :	Building representatives, “kapticis” (doorkeepers) and residents
3. Methods :	Work meetings, workshops, lectures, leaflets, pamphlets, educational books, site visits
4. Sponsor :	MoE, MGM , DM, community organisations

5.2.4.6 Promotion of Public Interest in Future SWM for Mersin

The authorities can encourage public motivation to participate and devise a SWM system, unique to the local culture and common practices.

5.2.4.7 Institutional, Administrative, and Legislative Changes

National and regional laws and legislation in place, that help maintain regional sanitation and mitigate environmental pollution, should be made know to the general public. Also for future reference, the public should be encouraged to contribute any ideas that could be used to enforce and enact new regulations for environmental protection.

5.2.5 Implementation of the Experiment of the Separate Collection in MGM

5.2.5.1 Selection of the Experiment Site

Güven Sitesi Housing Complex (GSHC), located in Güvenevler “mahalle” (ward) at the south-east sector of Yenisehir district was selected as an experimental site for the separate collection by the team and counterpart due to the following reasons:

As an experiment certain scale of population is necessary. The GSHC has 25 buildings of ten stories in an area of approximately 4.6ha. as shown in Figure 5-2. In total 1,000 households and 5,140 residents (about 1% of whole population of Mersin GM) living the complex.

There is enough space for the installation of containers for separately discharged compostable waste without disturbing current refuse collection system.

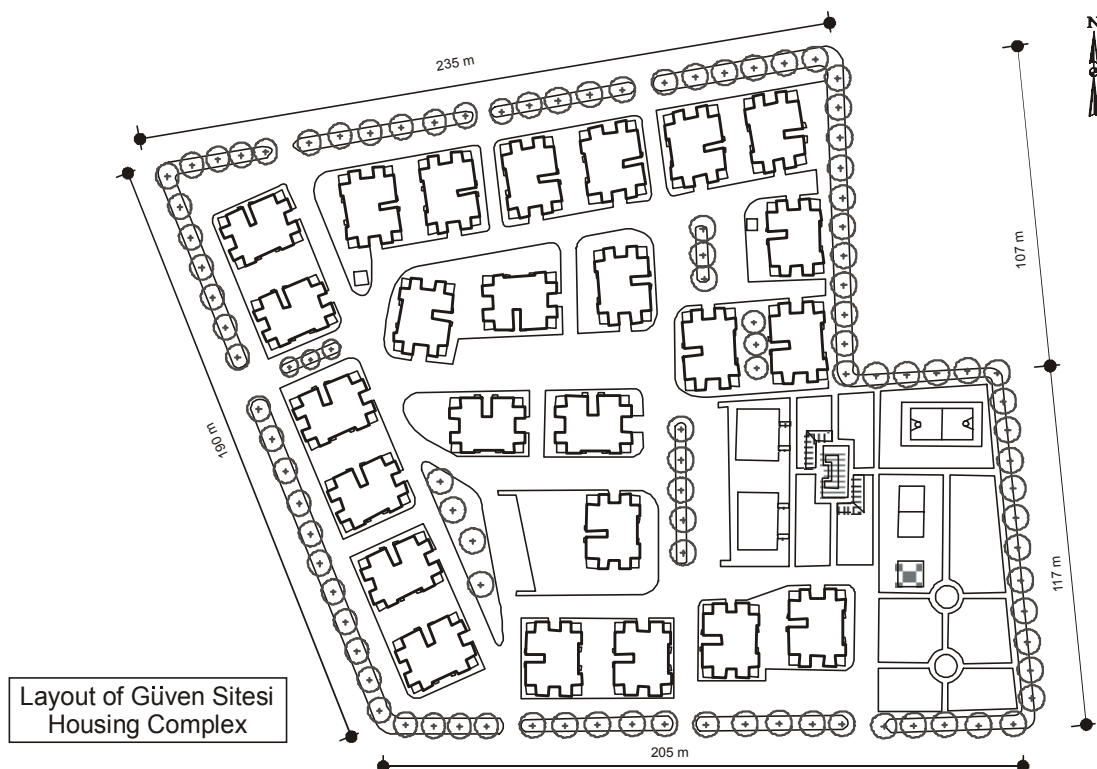


Figure 5-2: Layout of Guven Sitesi Housing Complex in MGM

5.2.5.2 Gain Resident's Co-operation

In order to obtain resident's co-operation for separate discharge of compostable and non-compostable wastes the team and counterpart conducted the following works:

- 1) Installation of a notice board to ask co-operation of the residents of the Guven Sitesi Housing Complex and inform general public in Mersin Greater Municipality about the separate collection experiment.
- 2) Delivery of pamphlets and education books to instruct the residents of the GSHC to conduct a proper separate discharge of their waste.
- 3) Holding assemblies and meetings with the residents and their representatives.

5.2.5.3 Implementation of Separate Collection

The separate collection was implemented for one month (from May 10 to June 9, 1999). Prior to the commencement of the separate collection experiment the team and counterpart conducted the following activities:

- 1) Distribution of green plastic bags which shall be used by households for the separate discharge of compostable waste.
- 2) Distribution of waste bins which shall be used by "kapticis" (doorkeepers: who take care of waste collection from households of each building) for compostable waste collection.

- 3) Installation of new colours green containers for compostable waste for collection service. Current containers are used for the collection of non-compostable waste.

The survey was conducted according the schedule (Table 5-5).

Table 5-5: Implementation Schedule by Activities in MGM

Activity	Schedule	Result (from May 10 th to June 9 th)
Separate waste at source by residents of GSHC	From May 10 to June 9, 1999	Satisfactory
Separate collection by private contractors of YDM	From May 11 to June 10, 1999	Well carried out according the planned schedule

Figure 5-3 shows the outline for the implementation of experiment on separate collection. The experimental project is essentially divided into three stages; namely, (1) preparation and planning stage, (2) implementation and verification stage, and (3) evaluation.

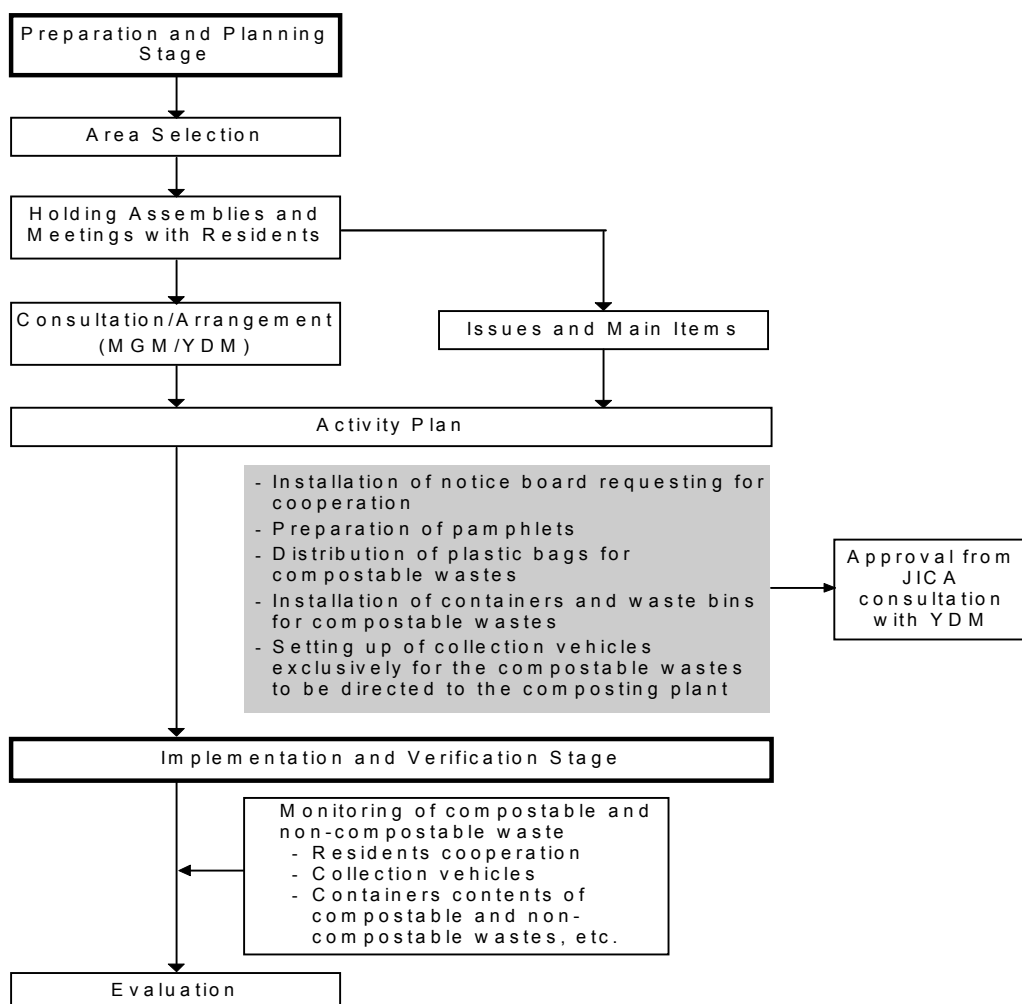


Figure : Implementation Procedure of Separate Collection

Figure 5-3: Implementation Procedure of Separate Collection in MGM

Before and during the implementation of separate collection several meetings with the president, building representatives, doorkeepers and residents of the complex were conducted in order to apply an approach in community base separation experiment.

During the implementation stage, monitoring and verification of the separation collection activities were conducted to make clear problems, issues and main items.

The monitoring for separate collection was conducted daily from May 11, 1999, during the implementation of the pilot project in order to know the followings:

- 1) Waste separate amount
- 2) Separation level of compostable and non-compostable wastes
- 3) Observation of residents participation and co-operation, and level of waste separation

Table 5-4 shows the location of green plastic containers (for compostable wastes) besides the existing metal containers (for non-compostable wastes). Every two buildings (80 householders) as illustrated in the figure use both containers (green plastic and silver metallic). Also, waste bins (for compostable) provided for the experiment are placed at every stair landing area together with the existing ones for non-compostable wastes, which are used by 4 householders. The wastes discharged by the householders into the separated waste bins are collected by the doorkeepers and disposed into the corresponding containers installed outdoor in the complex. Later the compostable wastes and non-compostable wastes are collected separately by the private contractors and bringing them to the existing composting plant and landfill respectively.



Figure 5-4: Location of Containers in GSHC, MGM

5.2.5.4 Monitoring

At the beginning, the implementation of the plans proposed in the M/P was carried out with some difficulties, due to the national and municipal elections and change of the municipal government. However, the performance was satisfactorily achieved after the commencement and during the implementation of the experiment.

A monitoring survey of the separate collection were conducted from May 11th to June 10th (except some weekends) in GSHC to verify the proposed system and identify the issues and main items with following objectives:

- Control of the components of wastes brought by residents and/or doorkeepers,
- Controlling the capacity of containers arranged,
- Controlling the truck drivers and workers who discharge the separated waste components into defined truck, and
- Determining the faults and improving the experiment for sustainable implementation of the pilot project.

The following check sheet was utilised for the verification of the separate collection (Table 5-6).

Table 5-6: Check Sheet for Separate Waste Collection in MGM

Compostable Waste							Non Compostable Waste						
Date							Date						
Truck number							Truck number						
Driver name							Driver name						
Supervisor							Supervisor						
Workers							Workers						
Arrival time (Guven Sitesi)							Arrival time (Guven Sitesi)						
Time for collection GS							Time for collection GS						
Transportation time							Transportation time						
Arrival time (Compost Plant)							Arrival time (Compost Plant)						
Weight							Weight						
Compostable Waste							Non Compostable Waste						
Cont.	No. of bags		Qty.	Separation Grade			Remarks	Cont.	Qty.	Separation Grade			Remarks
Green	Green	Other	(%)	Poor	Aver.	Good		Exist.	(%)	Poor	Aver.	Good	
C1								E1					
C2								E2					
C3								E3					
...								...					
...								...					
...								...					
...								...					

Notes: C: Compostable, GW: garden waste, NC: Non-Compostable, M: mixed waste, N/A: Not available

Using the check sheet above a monitoring survey was carried out by one month. Taking into account the numbers of green plastic bags (compostable) and other bags (non-compostable) in both containers for compostable and non-compostable wastes a survey on the separation level was done categorising as poor, average and good.

The results of the monitoring survey of the container content of both compostable and non-compostable wastes are shown in the following Figure 5-5 and Figure 5-6.

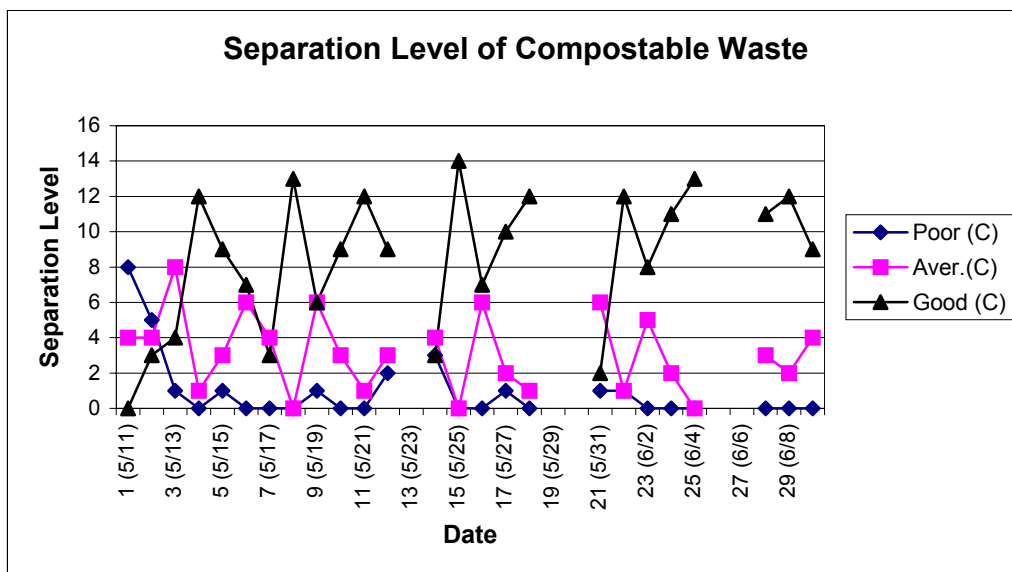


Figure 5-5: Separation Level of Compostable Wastes in MGM

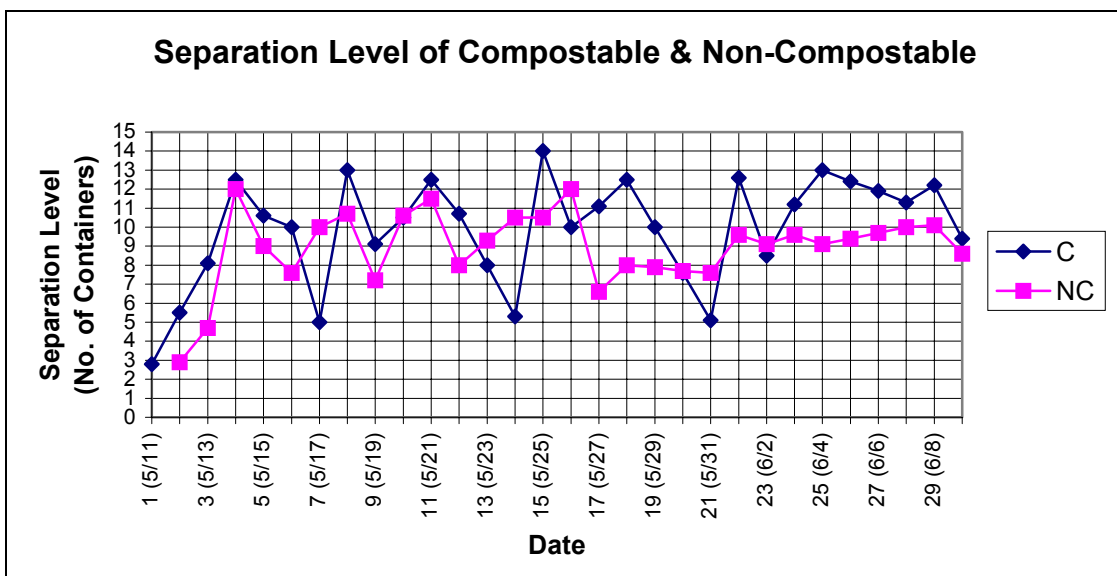


Figure 5-6: Separation Level of Non-Compostable Wastes in MGM

As it is observed in the above figures, generally the waste separation activities are well carried out during the weekdays. However, the performance is declining during the weekends due to the leave of residents at the weekend and the resting date of the doorkeepers. Apparently, the green plastic bag for kitchen waste provided, contains food waste. However, some of them contain many other plastic bags and non-compostable wastes as it were observed during the waste separation activities in the compost plant.

Other issues observed during the implementation of the experiment are as follows:

- The participation of the residents and building administrators of the GSHC and the private collection workers in the collection activity were satisfactory obtained.
- Generally the waste separation of compostable waste from other waste (non-compostable waste) at source were well carried out by the residents using the green plastic bags provided by the team. However, some non-compostable waste has been encountered in the green plastic bags, needing to pay more attention for the separation at source.
- The collection of the collective waste bins (one for compostable waste and other one for non-compostable waste placed at every stair landing area) by the doorkeepers were well carried out.
- Generally there is only one dustbin at the kitchen source to dispose general waste, because most of the residents do not practice a separate collection of household wastes. During the implementation of the separate collection, some of the residents used shopping plastic bags for non-compostable wastes placed into the existing dustbin, and the provided green plastic bags for kitchen waste without receptacle. This situation made the residents to mistakenly throw kitchen wastes into the existing dustbin with non-compostable wastes.
- The collection activity by the private contractor of Yenisehir District Municipality (YDM) was proceeding in smooth way according the planned schedule. The collection workers were highly co-operative and courteous.

Figure 5-7 shows summarised both separation levels (compostable and non-compostable wastes). Monitoring survey on some weekends (May 23, 29, 30 and June 5, 6) were not performed. However, in order to make continuous lines an interpolation between Friday and Monday level values was made as shown in the mentioned figure. The separation levels were improved after the final meeting of June 2nd with the GSHC representatives, obtaining an average level for both compostable and non-compostable wastes, achieving a satisfactory experiment result.

In conclusion, it can be said that the performance of separation grade is risen after meetings and declining on weekends except during June, suggesting that continuous meeting and information releases are necessary to encourage the promotion of sustainable separate collection.

Separation Level of Compostable & Non-Compostable

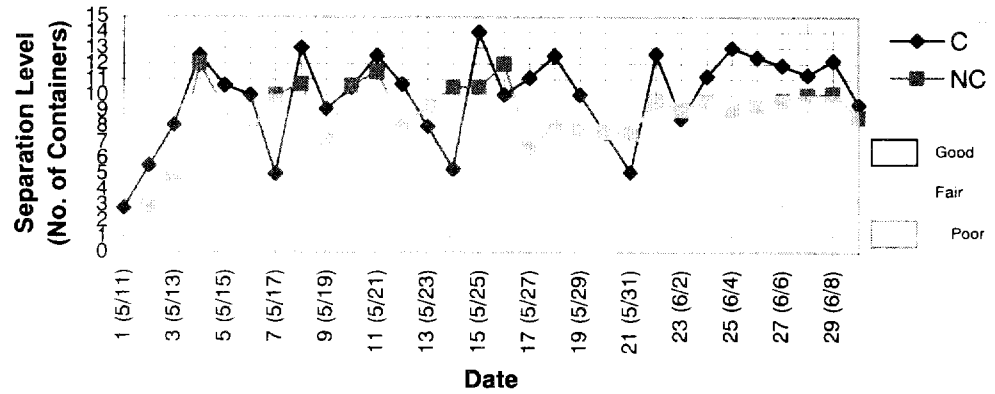


Figure 5-7: Separation Level of Compostable & Non-Compostable Wastes in MGM

Details of the daily monitoring survey performed during May 11 to June 10 are shown later in this chapter.

5.2.5.5 Separated Waste Amount

The average daily amount was about 1,030 Kg (49.3%) and 1,060 Kg (50.7%) for compostable and non-compostable wastes respectively. Figure 5-8 shows the daily separated waste amount from May 11 to June 10, 1999 (except weekends).

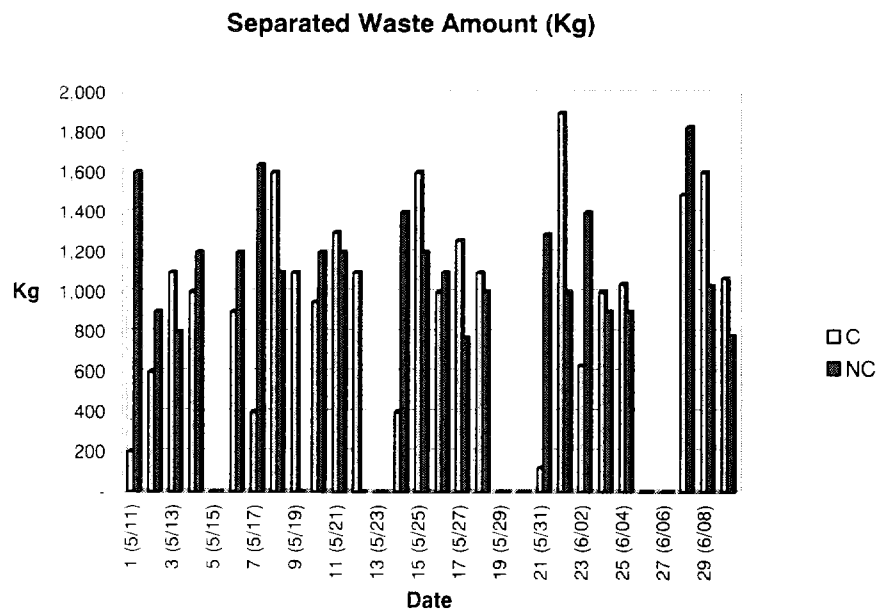


Figure 5-8: Separated Waste Amount in MGM

As it is observed in the figure, non-compostable wastes surpass considerably the compostable wastes, especially on Monday, pointing out that the householder's discharge several non-compostable items during the weekends. Generally, however, during the weekdays the compostable wastes surpass the non-compostable wastes.

5.2.5.6 Findings

The following main findings were obtained by the experiment from May 10th to June 10th:

- 1) According to the visual observation of compostable waste discharged into the green containers (see Figure 5-7), the level of separation, how it includes non-compostable wastes, is coming worse in the weekend.
- 2) The compostable waste brought into the windrow yard still includes some non-compostable, such as plastics, etc. The rate of non-compostables in the compostable wastes collected is 7.1%. According to the results of the measurement of non-compostables eliminated by composting plant workers.
- 3) According to the physical composition analysis of non-compostable waste conducted for 4 days on May 22nd, 23rd, June 9th and 10th, the rate of kitchen waste in the non-compostable waste is **33.43%** in average (Table 5-7).

Table 5-7: Results of Non-compostable Waste Composition Survey (Wet Base) in Mersin (Discharge Source : Household Waste at Guven Sitesi Housing Complex)

Unit : g

Item		Physical Composition										Apparent Specific Gravity	
Date		Kitchen Waste	Paper	Textile	Grass Wood	Plastic	Leather Rubber	Metal	Bottle Glass	Ceramic Stone	Miscellaneous		Total
22 May.	g	3,400.00	3,400.00	1,200.00	200.00	1,800.00	400.00	200.00	1,200.00	1,200.00	1,200.00	14,200.00	0.08
Sat.	%	23.94	23.94	8.45	1.41	12.68	2.82	1.41	8.45	8.45	8.45	100.00	
23 May.	g	4,000.00	1,800.00	600.00	200.00	1,000.00	50.00	100.00	600.00	600.00	200.00	9,150.00	0.08
Sun.	%	43.72	19.67	6.56	2.19	10.93	0.55	1.09	6.56	6.56	2.19	100.00	
9 June.	g	2,950.00	3,000.00	600.00	100.00	1,000.00	100.00	200.00	400.00	-	-	8,350.00	0.09
Wed.	%	35.33	35.93	7.19	1.20	11.98	1.20	2.40	4.79	-	-	100.00	
10 June.	g	4,000.00	2,950.00	1,900.00	230.00	1,000.00	400.00	100.00	50.00	600.00	-	11,230.00	0.09
Thu.	%	35.62	26.27	16.92	2.05	8.90	3.56	0.89	0.45	5.34	-	100.00	
Total	g	14,350.00	11,150.00	4,300.00	730.00	4,800.00	950.00	600.00	2,250.00	2,400.00	1,400.00	42,930.00	0.09
Week	%	33.43	25.97	10.02	1.70	11.18	2.21	1.40	5.24	5.59	3.26	100.00	

5.2.6 Evaluation of the Separate Collection Experiment

5.2.6.1 Waste Collection Shift

At present, both the GSHC and all the district areas in Mersin receive waste collection services for general waste every day. During the pilot project on separate collection, a two shift collection service, one for compostable waste at 7:00 a.m. and the other for non-compostable waste at 9:30 a.m., was carried out. Residents discharged compostable waste into the non-compostable containers after the first shift collection, therefore separate collection, introduced at a city level, should be provided on alternate days, e.g., Monday, Wednesday, Friday, and Sunday for compostable wastes, and Tuesday, Thursday, and Saturday for non-compostable wastes. Waste collection on alternate days would ensure that the waste is clearly separated, and it would reduce both time and transportation costs.

5.2.6.2 Separate Receptacles

Because most kitchens do not have a separate receptacle for different waste types, there is a need to promote the use of separate receptacles, or waste bins, for compostable and non-compostable wastes.

5.2.6.3 Wastewater Strainer

Residents often discharge kitchen waste into double lined plastic bags to avoid wastewater from leaking. This makes the removal of non-compostable materials at the recovery area very hard and unhygienic. Therefore to reduce wastewater and to eliminate the use of double lined bags, the use of a strainer, or water filter, in the kitchen sink is recommended. Residents should be informed on the use of strainers, that must become part of general life, through a public campaign.

5.2.6.4 Continuous Information

Most of the residents are willing to participate in separate collection. However, because residents are not well informed on how to separate waste, there is a need to constantly provide information to the residents through meetings and assemblies; SWM authorities should constantly monitor the waste separation activities, and select a representative to promote public awareness campaigns.

5.2.6.5 Public Education Programs

The AGM and the MGM, together with the district municipalities and with other relevant organisations and with the residents, should actively carry out campaigns on separate collection, and initiate public education programs to promote co-operation with SWM. SWM authorities and educational establishments must encourage waste separation and recycling programs at schools to widen the application of separate collection.

The pilot project on separate collection revealed the importance of such education programs for the master plan to succeed. Work meetings and assemblies, and solid waste education materials, such as pamphlets and education booklets, and other campaign items, such as visual projections and demonstrations, all proved to be successful during the study. In the future, these and other similar materials, should be

used by the waste management authorities to promote separate collection and recycling.

5.2.7 Recommendation to Promote Separate Collection System at a Housing Complex in the Selected Priority Project Area

Most of householders in the housing complex may have interest to participate in the separate waste collection experiment. Some apartment dwellers, however, will not be able to take part in waste separation activities for a variety of reasons. But most of the people understand that objectives of waste separation contribute for the better environment and the future of its city.

The followings are simple issues to be considered to promote the experiment:

- 1) To discuss the idea with the building representatives and doorkeepers. They are familiar with the buildings, its tenants and how waste is collected.
- 2) To find out how garbage is handled now. To verify if each householder required bringing the garbage to a collective waste bin installed on each floor. If there are containers outside the buildings to store the garbage, etc.
- 3) To determine what composting and recycling opportunities are available in the area?
- 4) Design a separate collection and recycling systems that fits into each situation and area. For example, if each tenant places their garbage into a waste bin or container, then set up a separate waste bin and container for organic wastes and recyclable materials, providing instructions on what should and should not go into it.
- 5) To prepare information (e.g., leaflets, pamphlets, etc.) for householders on how the program is to work and why it is important to participate.
- 6) To launch the program using the building representatives, doorkeepers or internal newsletter to broadcast the program.
- 7) Monitor the program to make sure everyone knows how to participate properly and receives information on how well they are doing to encourage their continuous co-operation.

Adjust the program to take any changes into account.

5.3 Education Booklet

As part of the experiment and complementary material to promote separate collection system, a education booklet has been prepared and distributed in GSHC to enlightens the minds of not only residents of the complex but children of both Adana GM and Mersin GM, and gain their co-operation and support.

The education booklet has been published to draw the attention of close linkage between the living environment and the waste. It emphasises the benefits to be obtained if care is devoted to achieve the followings three simple targets:

1. Minimising the waste quantity.

2. Recycling the waste.
3. Safely dispose wastes that cannot be recycled in a environmentally friendly manner.

This booklet outlines many practical steps to achieve those targets and was prepared taking into account the followings aspects:

- Simple and colourful, and made of good quality paper to encourage people's for reading and keeping.
- Format with little text and many illustrations and photographs to attract the attention of the residents, especially children of the complex.
- Text with general vocabulary not limited to defined group: age, gender, social status, etc.

Main messages of the booklet are the followings:

- Separate collection contributes to compost and recycle, reducing the reliance on landfills.
- Waste separation protects the health and environment when harmful substances are removed from the waste stream.
- Waste resource recovery and recycling conserves the natural resources because it reduces the need for raw materials.

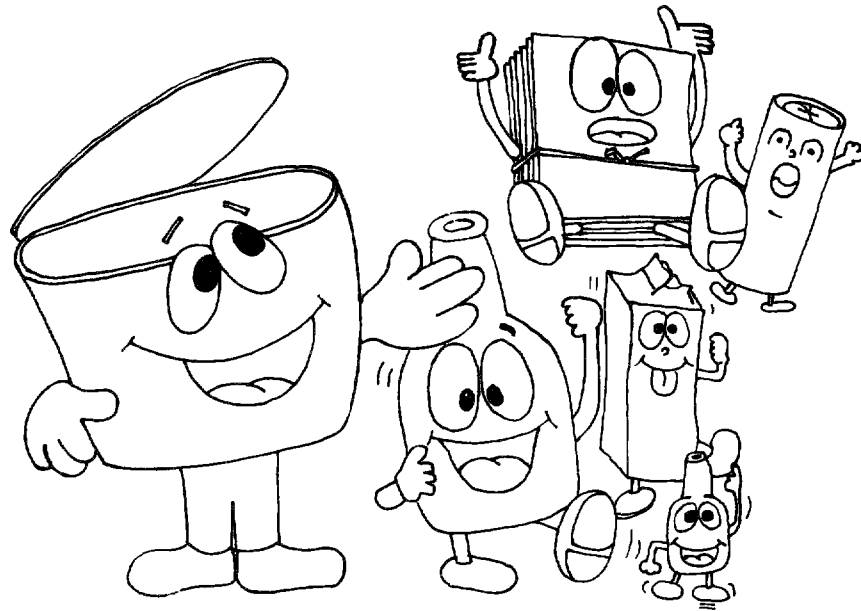
It is expected that the messages described are valuable information and will direct important steps and develops attitudes, and practices for the contribution of an appropriate SWM and better environment in the near future.

A sample of the education book is attached herewith.

English

WASTE AND US

Garbage in Our Daily Life



**"If you separate waste, its recyclable,
if you mix it, its waste"**

*Promoted by Adana Greater Municipality & Mersin Greater Municipality
Supported by Japan International Cooperation Agency (JICA)*

INTRODUCTION

We all wish to be living in clean, appropriate and healthy condition. Besides many state departments, our municipalities too, are working for this purpose.

Whatever the authorities and responsible do, unless the citizens participation is not obtained, the results will be inefficient.

This booklet has been published to draw the attention between the healthy environment and the waste. It emphasises the benefits to be obtained in case of devoting some care to the following three simple proposals:

1. Control waste generation as much as possible (waste minimisation)
2. Recycle generated waste as much as possible (recycling)
3. Safely dispose wastes that cannot be recycled in a environmentally-friendly manner (waste minimisation)

With the common efforts of JICA Study Team and the residents of Guven Sitesi Housing Complex in Mersin, an experimental campaign, covering separate collection has been launched. Within the perspective of the works, supported also by the greater municipalities of Adana and Mersin as well as Yenisehir District Municipality, explanatory messages to the residents and especially to the children of the complex are dealt with as the main objectives of this booklet.

Starting from the direct and indirect benefits of the individuals bay separate collection, we hope that the herewith-submitted message will direct important steps for the near future.

CONTENTS

1. Reutilization of Waste	1-2
2. Garbage from Our Daily Life	3-4
3. Generation of Waste	5-6
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9. Let's give it a try! Ways to Reduce Waste Generation!	17-18
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11. Make Our City a Beautiful City	20

Let's Take Care of Our Resources

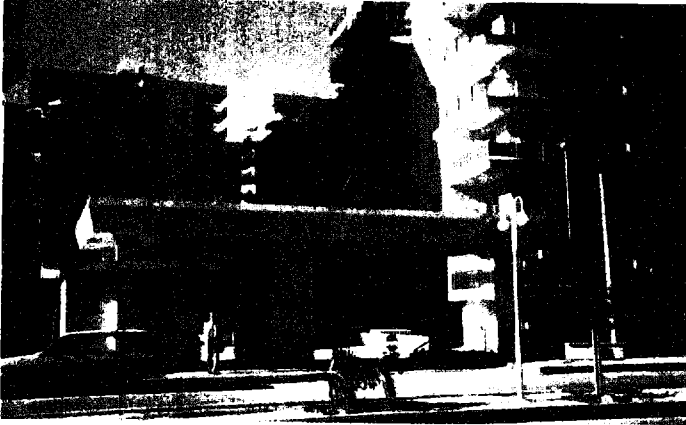
It's the Time of Diversion

Thank You Guven Sitesi



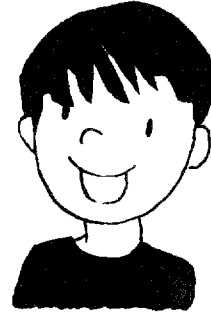
1. Reutilization of Waste

(Reduce, Reuse and Recycle Turns Yesterday's Waste into Today's Resources)

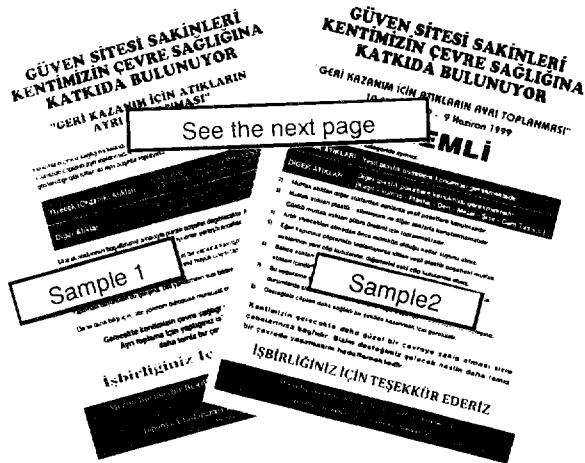


Guven Sitesi Housing Complex

Do you know that the community of Güven Sitesi Housing Complex in Mersin City is contributing with our environment? Waste collected from Güven Sitesi Housing Complex is used to produce compost, which is used for fertilizing.

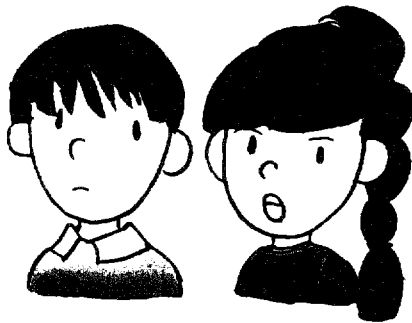


In Güven Sitesi Housing Complex, a pilot project for "Separate Waste Collection for Waste Recovery" is being promoted ("Separate Waste Collection for Waste Recovery" from May 6 to June 5, 1999).



See the next page

I wonder what kind of wastes is separated and how they are recovered?



Let's all find out together!

This experiment involves asking households to segregate food wastes, which are then fermented to produce compost. The compost is then used in the farms.
Improve our cities and contribute with our environment!

Let's see how much you know!

1	Do you know how much waste is generated in a year in your city?	Yes	No
2	Do you know that waste should be discharged separately by type?	Yes	No
3	Do you know where the landfill site is located in your city?	Yes	No
4	Do you know that waste is very useful to agriculture?	Yes	No
5	Do you know how cans and bottles can be recycled?	Yes	No
6	Do you know how household wastes used to be disposed of?	Yes	No
7	Do you know that it can be produced many rolls of toilet papers from milk packages	Yes	No
8	Do you know what kind of environmental problems the world is facing today?	Yes	No



The answers to the above questions are written herein. Read the book and find the answers!

THE COMMUNITY OF GÜVEN SITESİ IS CONTRIBUTING WITH OUR CITY ENVIRONMENT

“Separate Waste Collection for Waste Recovery”

A separate waste collection program is to be conducted in your housing complex for waste recovery and contribution to your city environment. Therefore, you are requested to separate your garbage into two categories at home:

• Kitchen waste	In the green plastic bag promoted by MGM & YDM and provided by JICA
• Other waste:	In a separate bag (paper, textile, plastic, leather & rubber, metal, bottle & glass, ceramic & stone and miscellaneous)

For this purpose plastic bags will be distributed and provided you to dispose your kitchen waste. Also, containers for kitchen waste will be installed in your housing complex to dispose the garbage separately into them.

Your active participation and co-operation in source separation is very important for the welfare and life quality of your community and city environment.

For more information, please ask to your housing complex management office.

The future of our city environment depends on our effort. Our co-operation in waste separation will offer better clean environment to future generation

Thank you very much for your co-operation

Promoted by
Mersin Greater Municipality & Yenisehir District Municipality

Supported by
Japan International Cooperation Agency (JICA)

THE COMMUNITY OF GÜVEN SITESİ
IS CONTRIBUTING WITH OUR CITY ENVIRONMENT
“Separate Waste Collection for Waste Recovery”
From May 10 to June 9, 1999

IMPORTANT

- 1) Please separate your wastes into two categories:

• Kitchen waste	In the green plastic bag promoted by MGM & YDM and provided by JICA
• Other waste:	In a separate bag (paper, textile, plastic, leather & rubber, metal, bottle & glass, ceramic & stone and miscellaneous)

- 2) Kitchen wastes must be disposed in a plastic bag separately from other wastes.
- 3) **Do not mix kitchen wastes with plastic, aluminium sheet or other miscellaneous items** because they are collected as compostable materials.
- 4) Before disposing of leftover food, drain the liquid out of it as much as possible.
- 5) If no doorman (kapici) collect your garbage, please dispose your plastic bag containing kitchen waste into the plastic container “Only for Kitchen Waste”. Other wastes will be disposed in the existing container.
- 6) Garden waste should be disposed in the green colour container “Only for Kitchen Waste and Garden Waste” installed at your housing complex.
- 7) For the safe disposal of wastes that cannot be recycled in an environmentally friendly manner, please consult MGM or your building manager.
- 8) Co-operate for the proper way of garbage disposal.

The future of our city environment depends on our effort. Our co-operation in waste separation will offer better clean environment to future generation

Thank you very much for your cooperation

Promoted by
Mersin Greater Municipality & Yenisehir District Municipality

Supported by
Japan International Cooperation Agency (JICA)

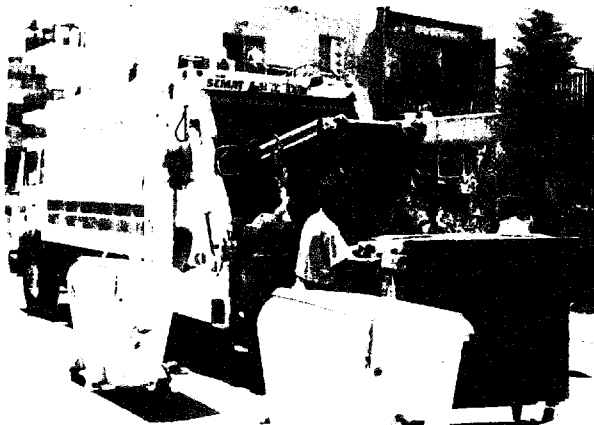
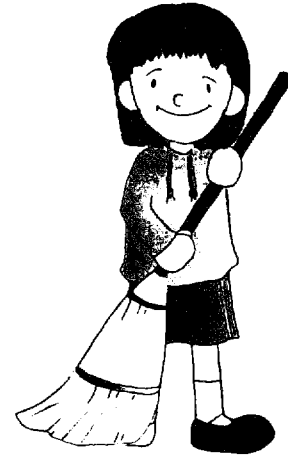


2. Garbage from Our Daily Life

I wonder what kind of wastes is generated everyday?



Separation of waste at home



Waste from residential area



Our neighborhood has become clean. We really should dispose our waste properly.



Clean-up activity at school

I did not know there are different type of wastes in different places.



Waste from commercial

Quiz Corner



What kind of waste can be composted?

.....

What kind of waste can be recycled?

.....

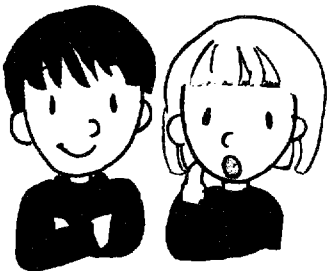




3. Generation of Waste

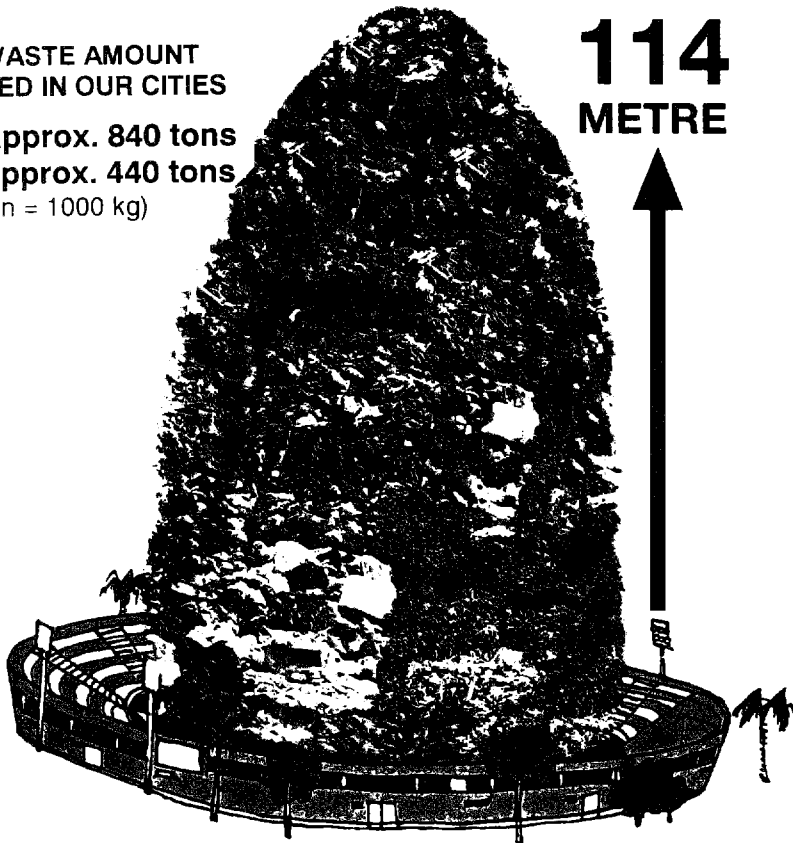
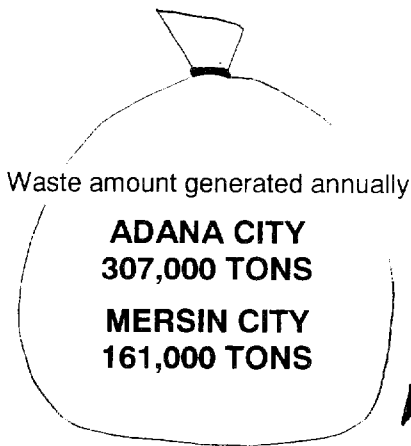
I wonder how much waste is generated in our city?

If we calculate it by the number of collection trucks in Adana, it is approximately **105** collection trucks are necessary a day, **38,300** trucks a year.



DAILY WASTE AMOUNT GENERATED IN OUR CITIES
Adana : approx. 840 tons
Mersin: approx. 440 tons
(1 ton = 1000 kg)

114 METRE



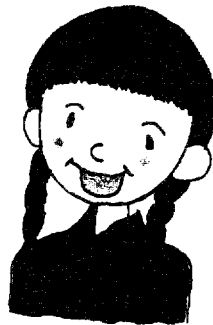
If this waste amount (in Adana) is placed in the soccer ground (90m x 60m) it would create a pile of **114 metres** tall!

If we calculate it by the number of collection trucks in Mersin, it is approximately **55** collection trucks are necessary a day, **20,100** trucks a year.

The amount of household waste generated in **Mersin** is
430 grams/capita/day
157 Kg/capita/year



We should find a way to reduce the amount of waste generated per capita per day.



The amount of household waste generated in **Adana** is

460 grams/capita/day
168 Kg/capita/year



Our city is working towards increasing the amount of waste recycled as much as possible and reduce the amount of waste for landfilling.



Quiz Corner

What is the weight of the waste generated per capita per year in Adana or Mersin (assuming a weight of 30kg/child)

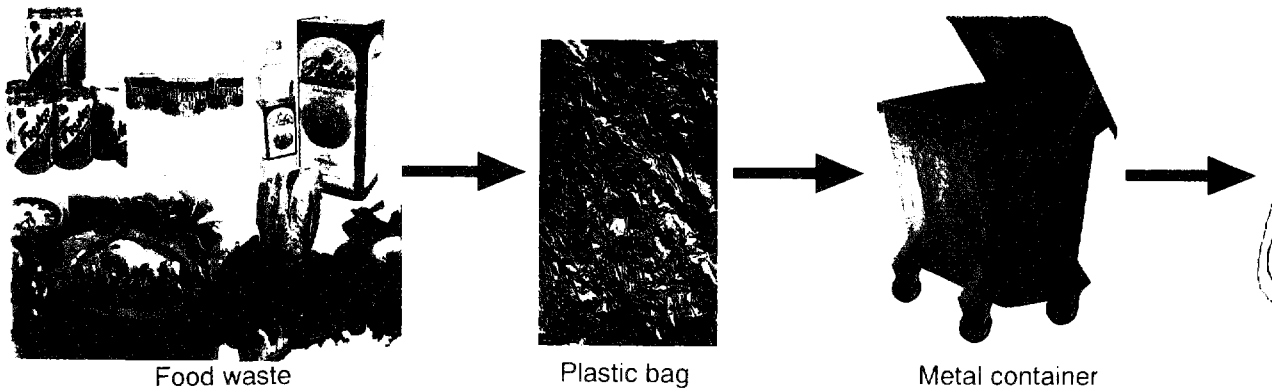
- (1) Equal to the weight generated by 4 kids
- (2) Equal to the weight generated by 6 kids
- (3) Equal to the weight generated by 10 kids

Result:

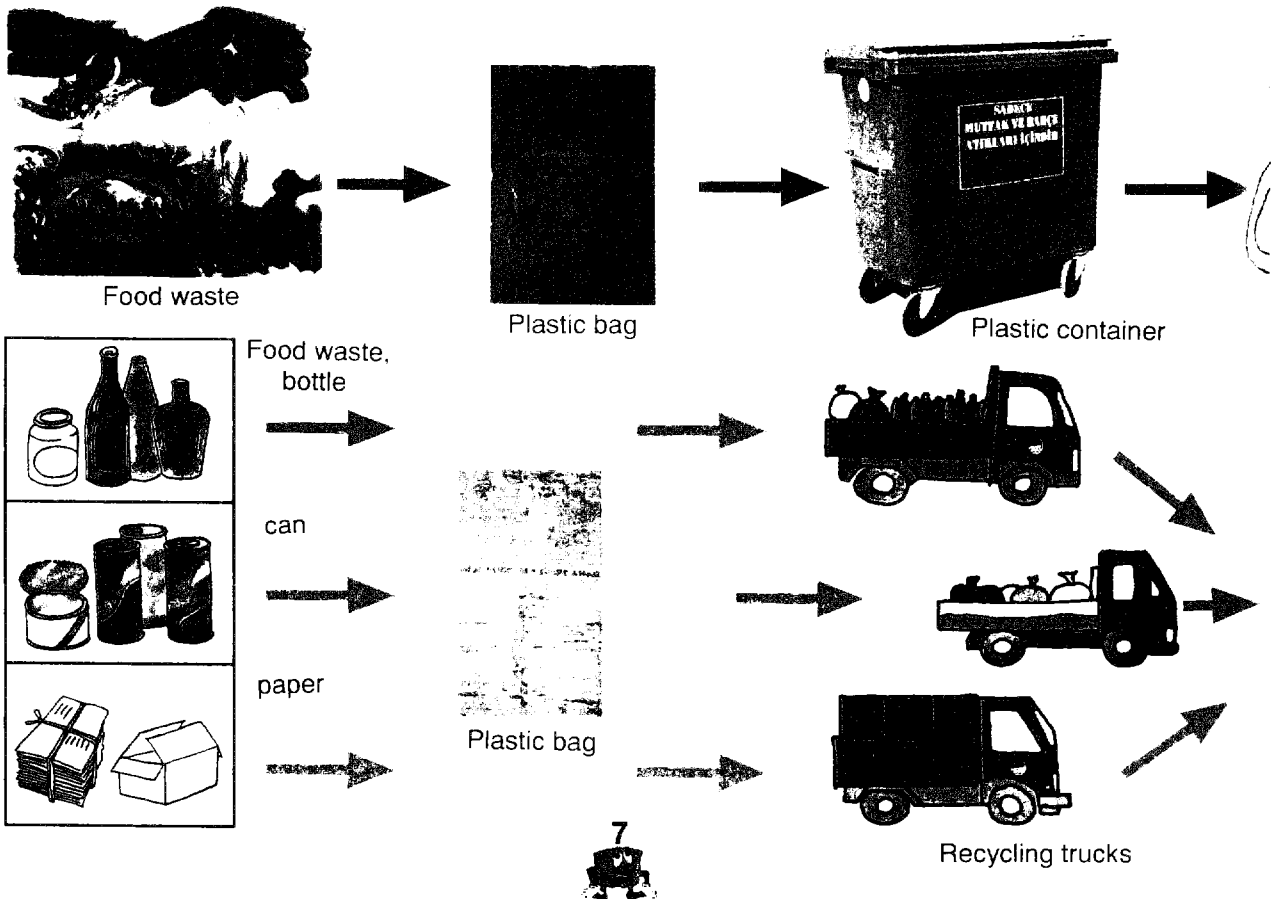


4. Actual Waste Flow and Proposed Separate Waste Collection

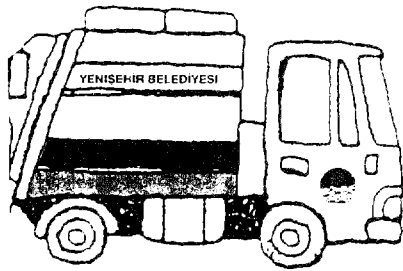
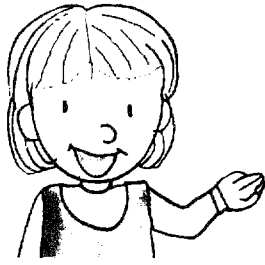
Present Flow



Proposed Separate Waste Collection



Do you know where wastes are taken to?



Compactor truck



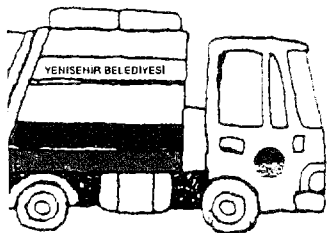
LANDFILL

I did not know that wastes are discharged separately by type.



COMPOST

AGRICULT LAND



Compact. truck



RESIDUAL MATERIAL



RESIDUAL MATERIAL



LANDFILL

RECYCLING CENTER



RECOVERY CONSUMPTION



NOT RECYCLABLE WASTE



LANDFILL

For more details see next pages



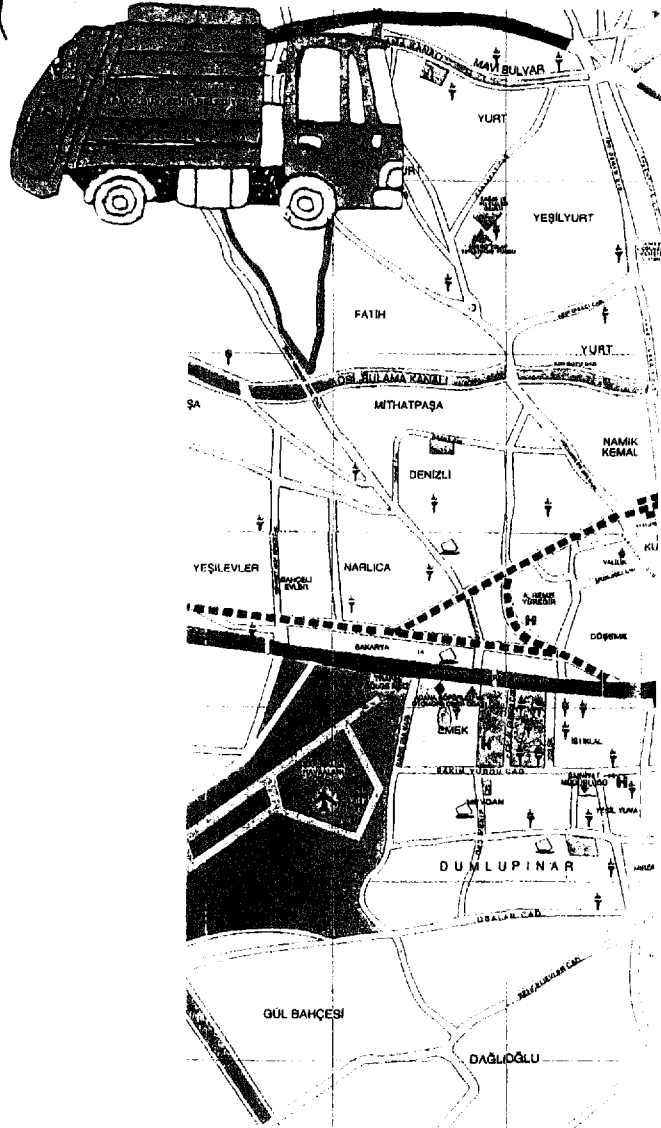
5. A Day of a Waste Collection Vehicle



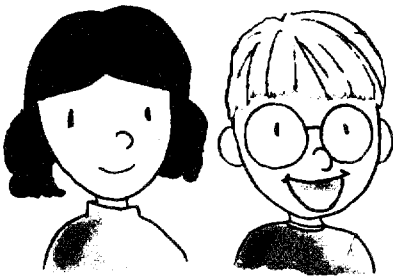
Mersin Landfill Site



AKDENİZ



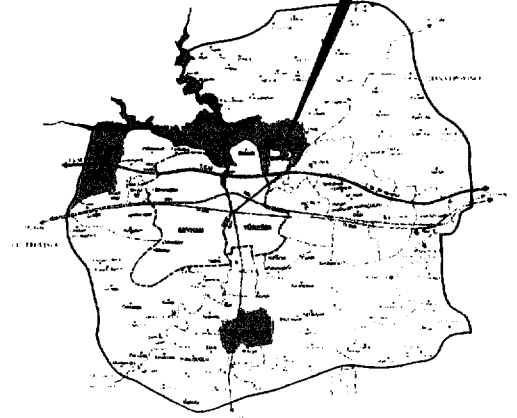
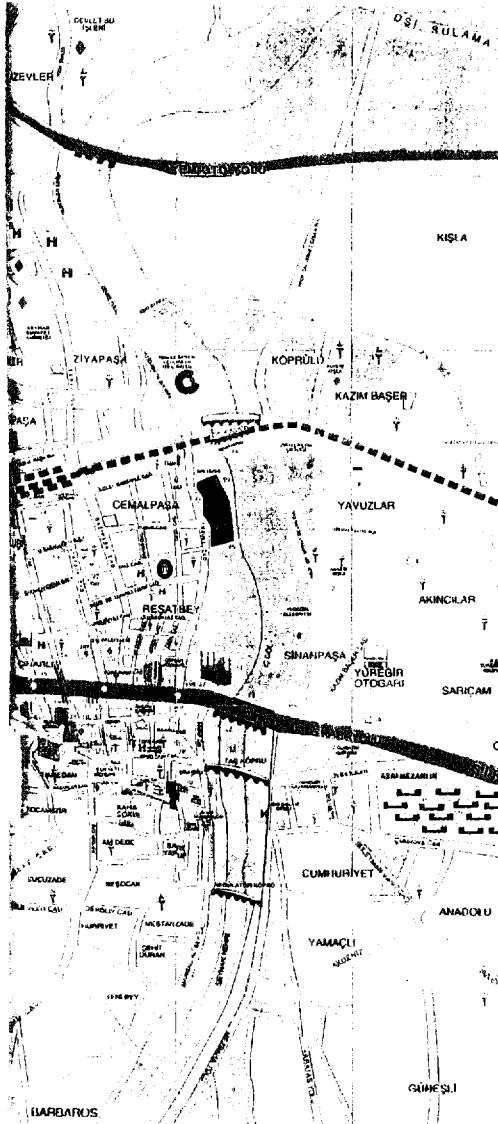
I wonder how the collection vehicle that makes the rounds to collect waste goes about with its work? I would like to find out by riding with the collection vehicle while it is doing its rounds.



First, the vehicle is checked and then the schedule for the day is confirmed. Waste collection starts from 6 o'clock in the morning and covers a designated route. In Adana City, Seyhan and Yuregir (municipalities of the Adana Greater Municipality) and in Mersin City, Yenisehir, Akdeniz and Toroslar (municipalities of the Mersin Greater Municipality) are the district municipalities in charge of the waste collection. The wastes are collected by a total of 60 collection vehicles in Adana and 41 collection vehicles in Mersin. Collection should be carried out according to the designated day and time. Waste collection in rainy days is an extremely difficult job to carry out.



Adana Landfill Site



Quiz Corner

How many waste collection vehicles are there in Adana Greater Municipality?

How many waste collection vehicles are there in Mersin Greater Municipality?