JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NAIROBI CITY COUNCIL
MINISTRY OF LOCAL AUTHORITIES
THE REPUBLIC OF KENYA

THE STUDY ON SOLID WASTE MANAGEMENT IN NAIROBI CITY IN THE REPUBLIC OF KENYA

FINAL REPORT

VOLUME 5

DATA BOOK (1)

AUGUST 1998

CTI ENGINEERING CO., LTD.
ENVIRONMENTAL TECHNOLOGY CONSULTANTS CO., LTD.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NAIROBI CITY COUNCIL
MINISTRY OF LOCAL AUTHORITIES
THE REPUBLIC OF KENYA

THE STUDY ON SOLID WASTE MANAGEMENT IN NAIROBI CITY IN THE REPUBLIC OF KENYA

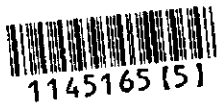
FINAL REPORT

VOLUME 5

DATA BOOK (1)

AUGUST 1998

CTI ENGINEERING CO., LTD.
ENVIRONMENTAL TECHNOLOGY CONSULTANTS CO., LTD.



All the Kenyan shilling amounts including the project costs shown in this report are indicated in 1997 price unless otherwise indicated. Those amount are estimated partly based on the foreign prices by applying mean 1997 currency exchange rates; namely, US$1 = Kshs. 58.8 = 121.76 Japanese Yen.

CONTENTS OF DATA BOOK (1)

* Subsections 5.2.3 and 5.2.4 (pages from 5-89 to 5-1172) are shown in Data Book (2).

DATA BOOK 1

WASTE GENERATION AND COMPOSITION ANALYSIS

1.1
PRESENT WASTE GENERATION AND COMPOSITION

1. WASTE GENERATION AND COMPOSITION ANALYSIS

1.1 Present Waste Generation and Composition

The following tables show the results of Waste Generation and Composition in the field survey.

Table 1.1-1 Information about Road surveyed

name of roads	width (m)	survey length (m)	
		First Survey	Second Survey
Moi Avenue	16	300	330
Loita Street	10.4	300	330
Kenyatta Avenue	16	300	330
Tom Mboya Road	12	300	300
River Road	8	300	260
City Hall Way	12	300	300
Enterprise Road	14	300	320

Table 1.1-2 Number of Members in Household Surveyed in the First Survey

generation source	name of district	numbers	average size
High income	Loresho	7.1	6
	Karen	5.0	
Middle income	Ngara	7.3	6
	Langata	6.1	
	Madaraka	5.1	
	Umoja	5.7	
	South B	5.8	
Low income	Bahati	4.5	5
	Uhuru	5.2	
	Muthurwa	4.4	
	Dandora	4.0	
	Satellite	5.7	
	Kangeme	5.9	
Surrounding area	Kibera	6.7	6
	Mathare	6.2	
	Kariobangi	5.7	

(unit :person)

Table 1.1-3 Number of Members in Household Surveyed in the Second Survey

generation source	name of district	numbers	average size
High income	Riara Villas	6.4	5.7
	Verona Court	5.0	
Middle income (high)	Nyako Estate	5.1	5.1
	Posta Flats	4.7	
	Umoja Inner Core	4.6	
	Santack	4.5	
	Buru Buru	7.7	
	Kimathi	5.3	
Middle income (low)	Harambee Estate	5.7	
	Jamhuri Estate	4.4	
	Satellite	4.9	
	Marringo Posta Flats	5.1	
Low income (high)	Jerusalem	7.4	4.6
	Jericho	7.6	
	MOW Flats	5.1	
	Bahati Estate	5	
	Umoja	4.8	
	Community	2.5	
Low income (low)	Makongeni	4.4	
	Kaloreni	4.7	
	Maringo	4.0	
Surrounding area	Kibera	6.7	5.4
	Dandora	4.6	
	Kariobangi South	5.5	

(unit :person)

Table 1.1-4 Weight of Each Generation Source in the First Survey

Day	unit	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	average
Date		3/5	4/5	5/5	6/5	7/5	8/5	9/5	10/5	
Mixed(restaurant)	shop		11.33	3.00	5.66	5.50	4.25	3.90	3.23	4.90
Mixed (others)	shop		8.01	9.68	9.49	5.96	5.09	5.73	7.52	6.90
High income	household	4.35	4.01	4.61	4.68	4.96	3.79	5.18		4.55
	capita	0.725	0.668	0.768	0.780	0.826	0.632	0.862		0.76
Middle income	household	4.60	4.03	4.18	4.33	4.30	3.67	3.15		4.00
	capita	0.766	0.671	0.696	0.722	0.717	0.611	0.525		0.67
Low income	household	3.05	3.07	3.88	3.20	2.88	3.44	2.25		3.07
	capita	0.610	0.614	0.775	0.640	0.576	0.687	0.451		0.61
Surrounding area	household	2.82	3.13	4.09	4.23	3.33	3.61	2.48		3.39
	capita	0.419	0.522	0.682	0.705	0.555	0.602	0.414		0.57
Markets	shop	1,170	1,660	2,230	2,800	1,740		2,780		2609
Roads	1km				54.48	35.43	33.88	19.80	73.00	43.86

(unit :kg/day)

Table 1.1-5 Weight of Each Generation Source in the Second Survey

Day	unit	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	10/11	
Mixed (restaurant)	shop	7.11	11.10	5.19	10.36	6.17	15.68	7.98	8.68
Mixed (others)	shop	1.49	0.89	3.72	0.85	0.88	1.75	0.90	1.39
High income	household	2.18	3.01	3.44	2.36	2.57	5.13	3.19	3.13
	capita	0.382	0.527	0.603	0.414	0.452	0.900	0.559	0.549
Middle income	household	3.31	2.70	2.27	2.73	2.48	2.29	2.83	2.67
	capita	0.649	0.530	0.444	0.534	0.487	0.449	0.555	0.523
Low income	household	2.30	2.34	2.66	2.45	2.59	2.11	2.14	2.37
	capita	0.501	0.508	0.577	0.532	0.563	0.459	0.466	0.515
Surrounding area	household	3.34	3.03	3.07	2.65	2.44	2.57	2.06	2.75
	capita	0.619	0.560	0.568	0.491	0.452	0.477	0.381	0.509
Markets	market	1.52	2.93	2.55	2.26	1.17	3.23	1.80	2.24
Roads	1km	26.00	37.86	36.22	81.57	110.0	32.31	56.19	52.57

(unit :kg/day)

Table 1.1-6 Apparent Specific Gravity of Each Generation Source in the First Survey

Day	Sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	average
Date	3/5	4/5	5/5	6/5	7/5	8/5	9/5	10/5	
Mixed (restaurant)		0.266	0.178	0.225	0.256	0.197	0.214	0.241	0.235
Mixed (others)		0.372	0.338	0.253	0.196	0.228	0.214	0.270	0.257
High income	0.251	0.281	0.275	0.288	0.357	0.249	0.313		0.291
Middle income	0.264	0.286	0.254	0.288	0.299	0.28	0.302		0.281
Low income	0.249	0.347	0.344	0.298	0.302	0.338	0.336		0.317
Surrounding area	0.255	0.297	0.347	0.331	0.291	0.276	0.328		0.262
Roads				0.261	0.197	0.15	0.154	0.333	0.223
Markets	0.617		0.687	0.357	0.216			0.394	0.419

(unit :kg/day)

Table 1.1-7 Apparent Specific Gravity of Each Generation Sources in the Second Survey

Day	Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date	5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Mixed (restaurant)	0.272	0.301	0.172	0.404	0.301	0.418	0.382	0.317
Mixed (others)	0.248	0.112	0.690	0.128	0.250	0.350	0.218	0.256
High income	0.212	0.293	0.335	0.230	0.250	0.500	0.310	0.305
Middle income	0.305	0.315	0.135	0.164	0.312	0.290	0.326	0.242
Low income	0.220	0.246	0.248	0.256	0.238	0.172	0.276	0.232
Surrounding area	0.828	0.101	0.369	0.374	0.312	0.314	0.267	0.269
Roads	0.260	0.165	0.145	0.364	0.336	0.174	0.262	0.243
Markets	0.383	0.338	0.360	0.205	0.310	0.363	0.423	0.340

(unit :kg/day)

Table 1.1-8 Waste Composition in Mixed Area (Restaurants) in the First Survey

Day		Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		4/5	5/5	6/5	7/5	9/5	10/5	
Food Waste		60.60%	30.25%	40.79%	35.06%	57.43%	44.39%	41.61%
Paper		15.20%	40.88%	30.85%	31.02%	21.40%	27.74%	29.73%
Textile		0.97%	2.92%	1.15%	3.13%	1.03%	2.57%	1.92%
Plastic	Container	0.97%	3.50%	3.40%	6.89%	4.49%	2.05%	3.45%
	Others	10.84%	13.81%	9.72%	8.20%	7.72%	16.09%	11.24%
	sub-total	11.81%	17.31%	13.12%	15.09%	12.21%	18.14%	14.69%
Grass/Wood		0.97%	1.63%	0.78%	1.87%	1.47%	1.53%	2.31%
Leather		7.06%	3.34%	8.06%	2.01%	0.00%	0.00%	3.61%
Rubber		0.00%	0.42%	1.07%	1.00%	0.66%	0.61%	0.64%
Glass	Container	0.00%	0.42%	0.54%	1.53%	0.66%	0.28%	0.59%
	Others	0.97%	1.21%	0.00%	0.29%	0.00%	0.00%	0.32%
	sub-total	0.97%	1.63%	0.54%	1.82%	0.66%	0.28%	0.91%
Metal	Container	1.45%	0.83%	1.61%	3.45%	3.82%	1.10%	1.92%
	Others	0.97%	0.79%	0.53%	1.39%	0.00%	0.76%	0.86%
	sub-total	2.42%	1.62%	2.14%	4.84%	3.82%	1.86%	2.78%
Any other		0.00%	0.00%	1.50%	4.16%	1.32%	2.88%	1.81%

Table1.1-9 Waste Composition in Mixed Area (Others) in the First Survey

Day		Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		4/5	5/5	6/5	7/5	9/5	10/5	
Food Waste		40.95%	32.69%	41.54%	33.76%	33.69%	41.72%	40.41%
Paper		16.40%	17.23%	19.22%	31.13%	18.75%	29.36%	22.17%
Textile		9.08%	1.38%	1.24%	1.79%	0.42%	0.70%	2.36%
Plastic	Container	3.49%	5.61%	3.53%	3.54%	6.46%	2.74%	3.81%
	Others	6.53%	5.44%	14.01%	6.96%	19.19%	13.24%	10.34%
	sub-total	10.02%	11.05%	17.54%	10.50%	25.64%	15.98%	14.15%
Grass/Wood		6.81%	7.20%	0.56%	0.36%	0.00%	0.62%	2.53%
Leather		1.13%	0.31%	0.28%	1.17%	0.00%	0.00%	0.40%
Rubber		1.13%	0.00%	0.28%	0.33%	0.00%	0.85%	0.45%
Glass	Container	5.08%	9.99%	6.32%	12.25%	0.94%	7.00%	7.05%
	Others	0.00%	3.75%	3.69%	1.06%	0.00%	0.00%	1.46%
	sub-total	5.08%	13.74%	10.01%	13.31%	0.94%	7.00%	8.51%
Metal	Container	8.83%	5.37%	3.38%	1.82%	14.04%	1.07%	4.57%
	Others	0.57%	0.66%	1.80%	1.42%	0.94%	0.68%	0.87%
	sub-total	9.40%	6.03%	5.18%	3.24%	14.98%	1.75%	5.44%
Any other		0.00%	10.37%	4.15%	4.41%	5.57%	2.02%	3.42%

Table 1.1-10 Waste Composition in High Income Area in the First Survey

Day		sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		3/5	4/5	5/5	6/5	7/5	9/5	10/5	
Food Waste		45.25%	45.80%	53.13%	48.66%	50.59%	54.47%	41.99%	48.57%
Paper		22.15%	19.97%	19.11%	23.84%	19.29%	16.01%	13.50%	18.57%
Textile		1.99%	1.73%	2.42%	6.29%	1.21%	1.93%	3.31%	2.78%
Plastic	Container	9.09%	7.92%	7.64%	7.40%	4.64%	5.60%	2.81%	5.94%
	Others	17.45%	12.82%	6.95%	3.99%	11.87%	10.73%	11.45%	10.12%
	sub-total	26.54%	20.74%	14.59%	11.39%	16.51%	16.33%	14.26%	16.06%
Grass/Wood		2.09%	2.78%	2.21%	0.82%	7.80%	2.31%	10.39%	4.75%
Leather		0.00%	1.39%	0.36%	2.51%	0.00%	0.00%	1.20%	0.84%
Rubber		0.00%	0.48%	0.00%	0.74%	0.00%	0.90%	0.97%	0.48%
Glass	Container	0.00%	1.78%	0.33%	0.37%	1.11%	3.49%	1.76%	1.32%
	Others	0.00%	3.84%	0.00%	0.00%	0.00%	0.00%	0.00%	0.48%
	sub-total	0.00%	5.62%	0.33%	0.37%	1.11%	3.49%	1.76%	1.80%
Metal	Container	0.94%	0.53%	3.91%	2.71%	0.64%	0.42%	10.04%	3.07%
	Others	0.00%	0.96%	0.65%	0.74%	1.34%	0.00%	1.49%	0.88%
	sub-total	0.94%	1.49%	4.56%	3.45%	1.98%	0.42%	10.04%	3.95%
Any other		1.04%	0.00%	3.29%	1.93%	1.51%	4.14%	2.58%	2.20%

Table 1.1-11 Waste Composition in Middle Income Area in the First Survey

Day		sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		3/5	4/5	5/5	6/5	7/5	9/5	10/5	
Food Waste		51.62%	55.25%	48.29%	54.36%	49.49%	53.21%	50.63%	51.87%
Paper		15.59%	15.77%	18.70%	15.34%	18.00%	14.97%	18.70%	16.70%
Textile		2.93%	2.45%	3.33%	3.06%	3.74%	6.97%	1.72%	3.43%
Plastic	Container	6.80%	6.57%	8.70%	5.44%	6.27%	7.60%	2.55%	6.30%
	Others	10.32%	7.72%	7.94%	7.49%	9.41%	7.59%	12.92%	9.03%
	sub-total	17.12%	14.29%	16.64%	12.93%	15.68%	15.19%	15.47%	15.33%
Grass/Wood		7.36%	3.38%	3.51%	7.12%	4.49%	1.94%	3.83%	4.57%
Leather		0.26%	1.79%	1.09%	0.30%	0.55%	0.26%	0.58%	0.69%
Rubber		0.75%	1.09%	1.35%	1.00%	0.60%	3.69%	0.81%	1.30%
Glass	Container	1.09%	1.27%	2.46%	2.12%	1.71%	0.00%	2.08%	1.54%
	Others	0.25%	0.13%	0.39%	0.26%	0.24%	0.70%	1.27%	0.45%
	sub-total	1.34%	1.40%	2.85%	2.38%	1.95%	0.70%	3.35%	1.99%
Metal	Container	0.65%	4.13%	1.97%	0.59%	0.68%	0.87%	0.87%	1.41%
	Others	1.03%	0.45%	0.94%	0.39%	1.25%	0.75%	0.13%	0.71%
	sub-total	1.68%	4.58%	2.91%	0.98%	1.93%	1.62%	1.00%	2.12%
Any other		1.35%	0.00%	1.33%	2.53%	3.57%	1.45%	3.91%	2.00%

Table 1.1-12 Waste Composition in Low Income Area in the First Survey

Day		sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		3/5	4/5	5/5	6/5	7/5	9/5	10/5	
Food Waste		53.67%	69.53%	57.11%	51.38%	53.39%	44.99%	59.77%	55.75%
Paper		16.12%	13.33%	18.25%	20.92%	25.91%	13.58%	14.47%	17.76%
Textile		1.13%	2.70%	3.95%	3.45%	0.95%	7.52%	1.54%	3.18%
Plastic	Container	6.05%	3.40%	6.95%	5.99%	5.86%	4.99%	3.05%	5.23%
	Others	12.90%	8.32%	7.85%	8.79%	9.04%	4.81%	11.28%	8.71%
	sub-total	18.95%	11.72%	14.80%	14.78%	14.90%	9.80%	14.33%	13.94%
Grass/Wood		1.02%	0.35%	0.56%	2.38%	0.96%	2.95%	0.98%	1.31%
Leather		0.00%	0.07%	1.01%	0.00%	0.00%	0.69%	1.58%	0.50%
Rubber		1.70%	0.00%	1.57%	0.29%	0.00%	12.78%	1.28%	2.50%
Glass	Container	0.68%	0.94%	0.28%	1.56%	0.29%	2.12%	0.75%	0.94%
	Others	0.00%	0.35%	1.12%	0.00%	0.29%	1.45%	1.13%	0.66%
	sub-total	0.68%	1.29%	1.40%	1.56%	0.58%	3.57%	1.88%	1.60%
Metal	Container	0.00%	1.01%	0.81%	2.21%	0.00%	2.39%	2.67%	1.34%
	Others	1.13%	0.00%	0.28%	0.59%	0.00%	0.00%	0.00%	0.24%
	sub-total	1.13%	1.01%	1.09%	2.80%	0.00%	2.39%	2.67%	1.58%
Any other		5.60%	0.00%	0.26%	2.44%	3.31%	1.73%	1.50%	1.88%

Table 1.1-13 Waste Composition in Surrounding Area in the First Survey

Day		sat.	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		3/5	4/5	5/5	6/5	7/5	9/5	10/5	
Food Waste		48.36%	57.02%	41.27%	39.50%	56.88%	53.81%	54.91%	49.45%
Paper		21.45%	23.34%	20.07%	17.56%	17.03%	22.56%	12.60%	19.14%
Textile		3.83%	2.31%	4.59%	3.37%	1.93%	5.25%	1.59%	3.40%
Plastic	Container	2.60%	5.67%	5.88%	6.08%	2.66%	5.96%	2.25%	4.69%
	Others	13.66%	8.09%	8.09%	8.31%	8.62%	5.36%	15.54%	9.20%
	sub-total	16.26%	13.76%	13.97%	14.39%	11.28%	11.32%	17.79%	13.89%
Grass/Wood		0.00%	0.49%	4.16%	10.08%	6.01%	1.78%	0.00%	3.73%
Leather		1.09%	0.50%	0.66%	0.00%	0.39%	0.00%	0.00%	0.33%
Rubber		0.00%	0.49%	6.24%	1.36%	0.86%	1.70%	0.99%	1.98%
Glass	Container	1.23%	0.99%	1.90%	1.15%	0.43%	0.67%	1.40%	1.13%
	Others	0.00%	0.00%	0.00%	0.63%	0.77%	0.74%	0.00%	0.35%
	sub-total	1.23%	0.99%	1.90%	1.78%	1.20%	1.41%	1.40%	1.48%
Metal	Container	0.68%	0.55%	2.91%	1.25%	0.77%	0.64%	1.40%	1.27%
	Others	2.32%	0.55%	0.96%	9.35%	0.00%	0.00%	0.00%	2.08%
	sub-total	3.00%	1.10%	3.87%	10.60%	0.77%	0.64%	1.40%	3.35%
Any other		4.78%	0.00%	3.27%	1.36%	3.65%	1.53%	9.32%	3.25%

Table 1.1-14 Waste Composition in Seven Roads in the First Survey

Day		Mon.	Tues.	Wed.	Thurs.	Fri.	average
Date		5/5	6/5	7/5	8/5	9/5	
Food Waste		42.66%	21.44%	9.70%	20.20%	65.45%	49.22%
Paper		18.79%	22.58%	17.29%	33.67%	19.03%	12.09%
Textile		1.49%	0.00%	17.64%	0.00%	2.66%	4.88%
Plastic	Container	1.88%	5.04%	11.74%	0.00%	4.95%	1.99%
	Others	13.03%	17.88%	4.92%	6.06%	3.80%	10.74%
	sub-total	14.91%	22.92%	16.66%	6.06%	8.75%	12.73%
Grass/Wood		9.44%	2.28%	3.51%	26.94%	0.00%	16.25%
Leather		0.00%	0.94%	0.00%	0.00%	0.84%	1.48%
Rubber		0.39%	0.00%	0.00%	1.51%	1.75%	0.00%
Glass	Container	0.00%	1.61%	0.70%	0.00%	0.00%	0.85%
	Others	0.79%	0.00%	1.40%	0.00%	0.00%	0.85%
	sub-total	0.79%	1.61%	2.10%	0.00%	0.00%	1.70%
Metal	Container	1.31%	2.69%	7.03%	0.00%	1.52%	0.21%
	Others	1.09%	0.00%	2.04%	0.00%	0.00%	0.19%
	sub-total	2.40%	2.69%	9.07%	0.00%	1.52%	0.40%
Any other		9.13%	25.54%	24.03%	11.62%	0.00%	1.27%

Table 1.1-15 Waste Composition in Three Markets in the First Survey

Day		Sat.	Mon.	Tues.	Wed.	Sat.	Mon.	Tues.	average
Date		3/5	5/5	6/5	7/5	10/5	12/5	13/5	
Food Waste		56.76%	49.76%	51.79%	11.99%	56.33%	46.15%	61.72%	49.22%
Paper		10.81%	4.85%	17.86%	24.32%	11.27%	9.62%	10.16%	12.09%
Textile		8.11%	16.75%	5.95%	8.90%	1.41%	0.00%	3.91%	4.88%
Plastic	Container	8.11%	0.00%	2.98%	4.11%	1.41%	0.00%	1.56%	1.99%
	Others	10.81%	9.71%	9.52%	16.44%	7.04%	6.73%	14.06%	10.74%
	sub-total	18.92%	9.71%	12.50%	20.55%	8.45%	6.73%	15.62%	12.73%
Grass/Wood		0.00%	16.75%	11.90%	23.97%	19.72%	32.69%	3.13%	16.25%
Leather		0.00%	0.00%	0.00%	0.00%	0.00%	4.81%	1.56%	1.48%
Rubber		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Glass	Container	2.70%	0.00%	0.00%	0.00%	0.00%	0.00%	2.34%	0.85%
	Others	0.00%	0.00%	0.00%	0.00%	2.82%	0.00%	1.56%	0.85%
	sub-total	2.70%	0.00%	0.00%	0.00%	2.82%	0.00%	3.90%	1.70%
Metal	Container	2.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%
	Others	0.00%	2.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.19%
	sub-total	2.70%	2.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.40%
Any other		0.00%	0.00%	0.00%	10.27%	0.00%	0.00%	0.00%	1.27%

Table 1.1-16 Waste Composition in Mixed area (Restaurants) in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		64.75%	70.07%	84.45%	85.22%	51.82%	67.82%	56.18%	70.50%
Paper	recyclable	8.60%	15.68%	5.26%	5.94%	20.72%	7.02%	11.50%	10.04%
	others	1.50%	10.13%	0.00%	2.83%	1.22%	10.63%	9.16%	5.68%
	sub-total	10.10%	25.81%	5.26%	8.77%	21.94%	17.65%	20.66%	15.72%
Textile		0.58%	0.00%	0.00%	0.00%	0.00%	0.00%	0.89%	0.21%
Plastic	Container	0.34%	0.00%	2.69%	0.98%	0.51%	0.05%	0.34%	0.62%
	Others	3.07%	0.88%	5.50%	1.00%	3.44%	0.40%	1.34%	1.80%
	sub-total	3.41%	0.88%	8.19%	1.98%	3.95%	0.45%	1.68%	2.42%
Grass/Wood		16.24%	2.62%	0.00%	3.06%	21.78%	13.82%	20.16%	9.88%
Leather		0.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%
Rubber		0.00%	0.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.09%
Glass	Container	2.46%	0.09%	1.81%	0.51%	0.00%	0.27%	0.00%	0.64%
	Others	0.00%	0.00%	0.00%	0.11%	0.30%	0.00%	0.00%	0.05%
	sub-total	2.46%	0.09%	1.81%	0.62%	0.30%	0.27%	0.00%	0.69%
Metal	Container	0.26%	0.00%	0.28%	0.19%	0.20%	0.00%	0.43%	0.19%
	Others	0.00%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.04%
	sub-total	0.26%	0.00%	0.28%	0.35%	0.20%	0.00%	0.43%	0.23%
any other		1.89%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%

Table 1.1-17 Waste Composition in Mixed area (Others) in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		14.49%	17.74%	6.20%	2.52%	8.88%	0.00%	16.98%	9.64%
Paper	recyclable	51.21%	50.40%	87.38%	40.44%	69.45%	91.43%	56.13%	68.27%
	others	0.00%	10.08%	0.00%	7.97%	0.00%	0.00%	0.00%	1.87%
	sub-total	51.21%	60.48%	87.38%	48.41%	69.45%	91.43%	56.13%	70.14%
Textile		6.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.85%
Plastic	Container	3.30%	2.02%	0.62%	6.71%	0.00%	5.71%	0.55%	1.72%
	Others	13.81%	13.31%	1.24%	10.49%	6.39%	2.86%	6.93%	6.37%
	sub-total	17.11%	15.33%	1.86%	17.20%	6.39%	8.57%	7.48%	8.09%
Grass/Wood		3.03%	0.00%	2.59%	10.91%	9.24%	0.00%	0.00%	3.65%
Leather		7.41%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%
Rubber		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Glass	Container	0.00%	0.00%	0.41%	3.78%	0.00%	0.00%	19.40%	2.93%
	Others	0.00%	0.00%	0.00%	0.00%	5.33%	0.00%	0.00%	0.64%
	sub-total	0.00%	0.00%	0.41%	3.78%	5.33%	0.00%	19.40%	3.57%
Metal	Container	0.00%	6.45%	1.55%	12.58%	0.00%	0.00%	0.00%	2.59%
	Others	0.00%	0.00%	0.00%	3.78%	0.71%	0.00%	0.00%	0.47%
	sub-total	0.00%	6.45%	1.55%	16.36%	0.71%	0.00%	0.00%	3.06%
any other		0.00%	0.00%	0.00%	0.84%	0.00%	0.00%	0.00%	0.08%

Table 1.1-18 Waste Composition in High Income Area in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		50.73%	49.73%	58.50%	68.09%	53.42%	38.44%	67.88%	53.73%
Paper	recyclable	11.62%	25.24%	21.76%	13.59%	2.45%	10.65%	5.35%	13.57%
	others	0.00%	1.07%	0.00%	0.00%	0.00%	0.67%	0.40%	0.37%
	sub-total	11.62%	25.24%	21.76%	13.59%	2.45%	11.32%	5.75%	13.94%
Textile		0.80%	0.00%	0.00%	4.89%	19.61%	0.00%	4.14%	2.93%
Plastic	Container	3.60%	2.14%	10.75%	2.44%	2.63%	5.06%	1.11%	4.40%
	Others	5.47%	0.11%	1.75%	1.53%	3.85%	4.05%	4.24%	3.00%
	sub-total	9.07%	2.25%	12.50%	3.97%	6.48%	9.11%	5.35%	7.40%
Grass/Wood		16.02%	14.87%	0.00%	4.27%	11.91%	31.83%	14.85%	19.42%
Leather		1.34%	1.71%	1.83%	0.00%	0.00%	0.00%	0.00%	0.72%
Rubber		0.67%	0.00%	0.00%	0.00%	0.00%	4.05%	0.00%	1.00%
Glass	Container	3.20%	2.14%	4.19%	5.19%	1.75%	5.12%	0.81%	3.37%
	Others	0.67%	0.00%	0.87%	0.00%	1.23%	0.00%	0.40%	0.40%
	sub-total	3.87%	2.14%	5.06%	5.19%	2.98%	5.12%	1.21%	3.77%
Metal	Container	5.07%	0.43%	0.35%	0.00%	1.23%	0.00%	0.20%	0.84%
	Others	0.80%	2.57%	0.00%	0.00%	1.93%	0.13%	0.10%	0.67%
	sub-total	5.87%	3.00%	0.35%	0.00%	3.16%	0.13%	0.30%	1.51%
any other		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%	0.08%

Table 1.1-19 Waste Composition in Middle Income Area in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		61.59%	49.22%	55.35%	56.36%	57.69%	51.49%	47.18%	55.90%
Paper	recyclable	15.55%	9.69%	15.15%	12.83%	9.46%	12.67%	7.05%	12.04%
	others	3.76%	6.57%	5.46%	4.00%	7.02%	8.16%	18.26%	6.25%
	sub-total	19.31%	16.26%	20.61%	16.83%	16.48%	20.83%	25.31%	18.29%
Textile		0.50%	1.01%	2.51%	0.75%	2.78%	1.89%	2.87%	1.49%
Plastic	Container	4.04%	5.67%	3.76%	5.43%	3.56%	5.57%	4.59%	4.74%
	Others	6.20%	6.04%	1.71%	3.49%	3.47%	4.26%	5.49%	4.39%
	sub-total	10.24%	11.71%	5.47%	8.92%	7.03%	9.83%	10.08%	9.13%
Grass/Wood		2.12%	8.06%	2.80%	4.66%	6.71%	3.98%	6.97%	4.93%
Leather		0.10%	1.91%	1.36%	0.61%	0.23%	0.48%	1.01%	0.71%
Rubber		0.13%	0.52%	1.58%	0.73%	0.51%	0.33%	0.42%	0.57%
Glass	Container	1.54%	4.94%	0.51%	1.55%	1.33%	1.92%	0.63%	1.83%
	Others	0.27%	0.10%	1.50%	0.30%	0.49%	0.02%	0.21%	0.41%
	sub-total	1.81%	5.04%	2.01%	1.85%	1.82%	1.94%	0.84%	2.24%
Metal	Container	2.15%	4.05%	3.30%	2.80%	3.22%	2.00%	3.84%	2.90%
	Others	0.03%	1.13%	3.16%	1.20%	1.44%	2.74%	1.06%	1.32%
	sub-total	2.18%	5.18%	6.46%	4.00%	4.66%	4.74%	1.90%	4.22%
any other		2.00%	1.09%	1.85%	5.29%	2.09%	4.49%	0.42%	2.52%

Table 1.1-20 Waste Composition in Low Income Area in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		67.86%	72.23%	45.69%	64.84%	47.79%	64.21%	56.48%	59.31%
Paper	recyclable	16.39%	12.35%	19.47%	11.32%	9.69%	8.48%	15.23%	13.41%
	others	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.40%	0.47%
	sub-total	16.39%	12.35%	19.47%	11.32%	9.69%	8.48%	18.63%	13.88%
Textile		0.00%	0.00%	0.05%	0.00%	0.00%	0.06%	0.00%	0.02%
Plastic	Container	4.48%	2.05%	5.19%	3.48%	10.48%	8.65%	4.13%	5.52%
	Others	5.37%	5.12%	8.49%	4.05%	3.08%	3.10%	0.84%	4.37%
	sub-total	9.85%	7.17%	13.68%	7.53%	13.56%	11.75%	4.97%	9.89%
Grass/Wood		0.00%	0.00%	7.97%	5.56%	9.54%	3.22%	1.62%	4.17%
Leather		0.95%	0.11%	0.94%	0.00%	0.50%	3.16%	1.08%	0.93%
Rubber		1.00%	2.39%	0.47%	0.00%	3.18%	0.58%	1.73%	1.19%
Glass	Container	0.79%	1.71%	1.89%	0.26%	1.09%	0.64%	2.81%	1.32%
	Others	0.68%	1.14%	0.00%	3.53%	1.09%	2.11%	0.49%	1.27%
	sub-total	1.47%	2.85%	1.89%	3.79%	2.18%	2.75%	3.30%	2.59%
Metal	Container	0.68%	0.34%	0.99%	0.31%	1.44%	0.58%	1.30%	0.32%
	Others	0.05%	0.28%	0.14%	1.25%	0.70%	1.11%	0.13%	0.52%
	sub-total	0.73%	0.62%	1.13%	1.56%	2.14%	1.69%	1.43%	1.34%
any other		2.74%	2.28%	8.72%	5.71%	11.43%	4.09%	10.77%	6.68%

Table 1.1-21 Waste Composition in Surrounding Area in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		56.13%	63.32%	60.35%	70.32%	69.51%	81.49%	76.53%	67.03%
Paper	recyclable	4.71%	8.95%	15.11%	16.87%	8.97%	11.06%	5.15%	10.17%
	others	0.75%	0.00%	0.09%	0.00%	0.28%	0.27%	0.57%	0.28%
	sub-total	5.46%	8.95%	15.20%	16.87%	9.25%	11.33%	5.72%	10.45%
Textile		0.52%	0.87%	0.00%	2.45%	0.00%	0.27%	0.64%	0.69%
Plastic	Container	4.81%	2.81%	3.41%	0.61%	0.61%	1.07%	0.89%	2.26%
	Others	3.63%	0.29%	0.77%	0.75%	2.42%	1.34%	3.88%	1.82%
	sub-total	8.44%	3.10%	4.18%	1.36%	3.03%	2.41%	4.77%	4.08%
Grass/Wood		12.50%	22.98%	12.89%	0.66%	15.90%	1.82%	6.42%	10.91%
Leather		0.67%	0.48%	0.90%	5.65%	0.00%	0.00%	0.00%	1.16%
Rubber		0.45%	0.00%	0.94%	0.00%	0.00%	1.39%	0.00%	0.41%
Glass	Container	0.30%	0.00%	1.54%	1.47%	0.11%	0.24%	0.00%	0.41%
	Others	5.37%	0.22%	1.32%	0.00%	0.44%	0.21%	0.06%	1.31%
	sub-total	5.37%	0.22%	2.86%	0.47%	0.55%	0.45%	0.06%	1.72%
Metal	Container	1.94%	0.09%	2.09%	2.17%	0.55%	0.43%	1.34%	1.28%
	Others	8.21%	0.00%	0.00%	0.05%	0.00%	0.21%	0.00%	1.53%
	sub-total	10.15%	0.09%	2.09%	2.22%	0.55%	0.64%	1.34%	2.81%
any other		0.00%	0.00%	0.60%	0.00%	1.21%	0.21%	4.52%	0.75%

Table 1.1-22 Waste Composition in Seven Roads in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		16.03%	15.41%	24.71%	12.84%	9.09%	33.53%	5.76%	14.71%
Paper	recyclable	40.71%	9.91%	7.89%	5.55%	12.12%	18.14%	11.44%	11.47%
	others	32.05%	15.47%	23.14%	14.07%	8.08%	30.78%	30.08%	20.05%
	sub-total	72.76%	25.38%	31.03%	19.62%	20.20%	48.92%	41.52%	31.52%
Textile		0.00%	16.51%	1.74%	9.75%	8.08%	0.00%	13.56%	8.27%
Plastic	Container	1.60%	10.35%	0.00%	5.02%	4.04%	1.20%	1.95%	3.47%
	Others	9.62%	2.20%	8.41%	4.96%	4.55%	0.00%	4.92%	4.87%
	sub-total	11.22%	12.55%	8.41%	9.98%	8.59%	1.20%	6.87%	8.34%
Grass/Wood		0.00%	23.11%	31.68%	40.98%	50.00%	8.34%	25.17%	31.52%
Leather		0.00%	0.55%	0.00%	2.74%	1.52%	1.20%	0.00%	1.19%
Rubber		0.00%	0.00%	0.51%	1.87%	0.00%	1.53%	3.39%	1.42%
Glass	Container	0.00%	1.54%	0.46%	0.29%	0.00%	1.31%	2.54%	0.89%
	Others	0.00%	1.10%	0.00%	0.23%	0.51%	0.00%	0.21%	0.28%
	sub-total	0.00%	2.64%	0.46%	0.52%	0.51%	1.31%	2.75%	1.17%
Metal	Container	0.00%	2.20%	0.00%	0.53%	0.51%	0.86%	0.64%	0.61%
	Others	0.00%	0.00%	0.67%	0.00%	1.52%	1.38%	0.34%	0.54%
	sub-total	0.00%	2.20%	0.67%	0.53%	2.03%	2.24%	0.98%	1.15%
any other		0.00%	1.65%	0.79%	1.17%	0.00%	1.72%	0.00%	0.73%

Table 1.1-23 Waste Composition in Three Markets in the Second Survey

Day		Wed.	Thurs.	Fri.	Sat.	Sun.	Mon.	Tues.	average
Date		5/11	6/11	7/11	8/11	9/11	10/11	11/11	
Food Waste		13.61%	4.49%	27.81%	22.40%	5.05%	8.47%	48.15%	21.42%
Paper	recyclable	16.33%	16.47%	3.48%	14.05%	18.68%	11.69%	11.11%	12.29%
	others	0.00%	37.43%	0.00%	0.41%	0.00%	0.00%	0.00%	3.22%
	sub-total	16.33%	53.90%	3.48%	14.45%	18.68%	11.69%	11.11%	15.51%
Textile		8.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.25%
Plastic	Container	0.00%	0.00%	4.63%	10.18%	0.00%	0.00%	1.11%	3.64%
	Others	5.44%	10.78%	3.48%	7.13%	12.97%	12.10%	2.59%	6.76%
	sub-total	5.44%	10.78%	8.11%	17.31%	12.97%	12.10%	3.70%	10.40%
Grass/Wood		37.41%	20.96%	4.63%	8.15%	27.69%	58.87%	5.56%	17.76%
Leather		0.00%	4.79%	4.63%	4.07%	14.95%	5.65%	11.11%	5.94%
Rubber		0.00%	0.00%	34.76%	8.15%	17.58%	0.00%	18.52%	13.97%
Glass	Container	10.20%	0.00%	1.04%	1.02%	0.00%	0.00%	0.00%	1.97%
	Others	0.00%	5.09%	0.46%	1.02%	0.88%	0.00%	0.00%	0.87%
	sub-total	10.20%	5.09%	1.50%	2.04%	0.88%	0.00%	0.00%	2.84%
Metal	Container	0.00%	0.00%	6.95%	4.07%	0.00%	0.00%	0.00%	2.49%
	Others	0.00%	0.00%	1.16%	5.09%	0.00%	0.00%	0.00%	1.50%
	sub-total	0.00%	0.00%	8.11%	9.16%	0.00%	0.00%	0.00%	3.99%
any other		8.50%	0.00%	6.95%	14.26%	2.20%	3.23%	1.85%	6.93%

Table 1.1-24 Three Contents in the Second Survey

generation source	sample	moisture	ash	combustible
Mixed (restaurants)	1	38.10%	7.18%	54.72%
	2	50.80%	4.86%	44.34%
	3	69.90%	6.69%	23.41%
	average	52.93%	6.24%	40.82%
Mixed (others)	1	6.50%	6.64%	86.86%
	2	25.00%	4.82%	70.18%
	3	11.70%	6.78%	81.52%
	average	14.40%	6.08%	79.52%
High income	1	39.25%	6.10%	54.65%
	2	51.61%	13.66%	34.73%
	3	60.37%	3.85%	35.78%
	average	50.41%	7.87%	41.72%
Middle income	1	70.28%	10.99%	18.73%
	2	81.25%	2.64%	16.11%
	3	33.62%	7.82%	58.56%
	average	61.72%	7.15%	31.13%
Low income	1	55.60%	17.20%	27.20%
	2	84.10%	3.32%	12.58%
	3	52.40%	19.79%	27.81%
	average	64.03%	13.44%	22.53%
Surrounding area	1	56.25%	16.62%	27.13%
	2	62.38%	24.69%	12.93%
	3	76.88%	7.06%	16.06%
	average	65.17%	16.12%	18.71%
Market	1	47.36%	5.54%	47.10%
	2	64.68%	9.41%	25.91%
	3	47.82%	9.47%	42.71%
	average	53.29%	8.14%	38.57%
Compost	1	18.34%	55.42%	26.24%
	2	37.93%	41.52%	20.55%
	3	15.00%	68.83%	16.17%
	average	23.76%	55.26%	20.99%

Table 1.1-25 Results of Ultimate Analysis in the Second Survey

		Carbon	Hydrogen	Nitrogen	Sulfur	Chlorine	Oxygen
Mixed (restaurant)	1	54.19%	6.72%	1.31%	0.19%	0.34%	37.25%
	2	64.71%	6.94%	1.15%	0.09%	3.88%	23.22%
	3	67.51%	9.07%	2.20%	0.24%	0.89%	20.11%
	average	61.60%	7.41%	1.49%	0.16%	1.80%	27.54%
Mixed (others)	1	46.99%	6.09%	0.09%	0.22%	0.27%	46.33%
	2	56.02%	6.24%	0.11%	0.16%	0.23%	37.23%
	3	46.79%	6.02%	0.11%	0.21%	0.18%	46.69%
	average	50.03%	6.12%	0.10%	0.20%	0.23%	43.32%
High income	1	46.55%	6.07%	0.68%	0.20%	0.36%	46.13%
	2	55.93%	7.69%	0.51%	0.32%	0.41%	35.13%
	3	47.26%	6.13%	1.41%	0.16%	0.40%	44.63%
	average	49.40%	6.54%	0.89%	0.22%	0.39%	42.56%
Middle income	1	41.48%	5.26%	1.87%	0.25%	0.11%	51.03%
	2	44.68%	5.73%	1.96%	0.19%	0.19%	47.27%
	3	44.87%	5.92%	1.81%	0.25%	0.14%	47.02%
	average	43.69%	5.64%	1.88%	0.23%	0.14%	48.42%
Low income	1	45.50%	5.12%	2.38%	0.22%	0.44%	46.33%
	2	53.98%	6.70%	1.26%	0.19%	0.19%	37.67%
	3	51.96%	6.68%	1.61%	0.18%	0.31%	39.25%
	average	50.61%	6.19%	1.74%	0.20%	0.32%	40.95%
Surrounding area	1	47.46%	7.28%	3.88%	0.11%	0.17%	41.10%
	2	50.57%	7.47%	2.76%	0.08%	0.12%	39.00%
	3	42.01%	7.57%	4.87%	0.13%	0.10%	45.31%
	average	46.87%	7.45%	3.79%	0.11%	0.12%	41.66%
Market	1	46.16%	5.95%	0.63%	0.16%	0.13%	46.98%
	2	54.35%	7.24%	1.34%	0.15%	0.10%	36.83%
	3	64.24%	7.51%	0.96%	0.61%	0.08%	26.59%
	average	54.77%	6.88%	0.97%	0.30%	0.11%	36.97%
Compost	1	38.20%	4.79%	4.51%	0.65%	0.12%	51.71%
	2	40.18%	4.98%	6.04%	0.91%	0.18%	47.70%
	3	32.07%	3.89%	4.26%	0.05%	0.26%	59.46%
	average	37.61%	4.67%	5.06%	0.61%	0.18%	51.89%

Table 1.1-26 Low Calorific Value in the Second Survey

(unit :cal/g)

	1	2	3	average
Mixed (restaurants)	2,941	3,188	1,091	2,344
Mixed (others)	2,824	2,811	2,292	2,681
High income	2,013	988	1,255	1,396
Middle income	633	614	2,344	1,162
Low income	794	511	1,033	803
Surrounding area	889	518	410	614
Market	1,932	1,231	2,122	1,777
Compost	173	136	48	113

1.2
FUTURE WASTE GENERATION AND COMPOSITION

1.2 Future Waste Generation and Composition

The following tables show the basis of forecasting future Waste generation and Composition which are lead through the field survey.

Table 1.2-1 Rate of shops and hawkers of Each Location

Location		shop	hawker of market
Makadara	makadara	1.1%	5.6%
	kalolen/Makongeni	0.5%	2.5%
	Maringo/Mibotela	0.4%	0.0%
	Viwandani	0.2%	0.0%
Kamukuji	Bahati	1.0%	0.0%
	Pumwani	0.6%	1.7%
	Eastleigh	0.1%	2.2%
	kamukunji	7.8%	1.9%
Starehe	Ngara	2.3%	7.9%
	Starehe	61.4%	23.8%
Langata	Kibera/Woodley	1.6%	3.8%
	karen/Langata	0.3%	1.0%
	Kenyatta/Golf Course	0.2%	3.4%
	Mugumoini	0.1%	0.0%
Dagoretti	Waithaka	0.6%	0.0%
	Kangemi	0.8%	8.3%
	Riruta	0.5%	3.3%
	kawangware	1.1%	5.5%
	Mutuini	0.2%	0.0%
Westlands	Parklands*	1.6%	0.5%
	Muthaiga	0.2%	0.0%
	Kilmani	0.5%	0.0%
Mathare	Mathare	1.8%	0.0%
	kariobangi	3.2%	15.7%
	kahara	0.5%	0.0%
	Kasarani(Ruaraka)	0.2%	1.9%
	Raysambu	0.1%	3.3%
Embakasi	Embakasi	0.1%	3.6%
	Njiru	0.4%	1.8%
	Dandora	10.8%	2.1%
Total		100.0%	100.0%

* Parklands except Muthaiga

Table 1.2-2 Future Solid Waste Amount

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
household	generation	1,286	1,362	1,440	1,522	1,615	1,714	1,822	1,943	2,062	2,195	2,337	2,489
	self-disposal	104	110	117	123	131	139	149	159	169	180	192	205
	discharge	1,181	1,251	1,324	1,399	1,484	1,575	1,673	1,784	1,893	2,015	2,145	2,283
commerce		93	98	102	107	112	117	122	129	134	141	148	155
market		82	86	90	94	98	103	108	113	118	124	130	137
road		69	74	79	85	91	98	106	114	123	133	144	155
total		1,426	1,509	1,595	1,684	1,785	1,892	2,009	2,140	2,269	2,413	2,566	2,730

(unit :t/day)

Table 1.2-3 Future Solid Waste Amount (1997-2008)

			unit	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Population		high income	10^3 person	511	532	553	574	604	635	668	703	740	778	819	862
		middle income	10^3 person	585	614	644	674	707	741	778	820	857	899	945	992
		low income	10^3 person	1095	1147	1200	1252	1305	1361	1421	1489	1551	1622	1697	1776
		total	10^3 person	2191	2294	2397	2500	2616	2737	2867	3012	3148	3300	3461	3630
		increasing rate	%		4.70	4.49	4.30	4.63	4.65	4.74	5.07	4.48	4.84	4.87	4.91
GDP/capita		increasing rate	%	2.19	2.34	2.5	2.65	2.74	2.82	2.91	2.99	3.08	3.05	3.02	2.98
Waste Amount/capita/day in household	generaton(1)	high income	kg	0.654	0.662	0.670	0.679	0.688	0.698	0.708	0.719	0.730	0.741	0.752	0.763
		middle income	kg	0.595	0.602	0.609	0.618	0.626	0.635	0.644	0.654	0.664	0.674	0.684	0.694
		low income	kg	0.565	0.572	0.579	0.586	0.594	0.603	0.612	0.621	0.630	0.640	0.650	0.659
		surrounding	kg	0.537	0.543	0.550	0.557	0.565	0.573	0.581	0.590	0.599	0.608	0.617	0.627
	self-disposal(2)	high income	kg	0.122	0.124	0.125	0.127	0.129	0.131	0.133	0.135	0.137	0.139	0.141	0.143
		middle income	kg	0.056	0.057	0.057	0.058	0.059	0.060	0.061	0.062	0.063	0.064	0.064	0.065
		low income	kg	0.006	0.006	0.006	0.006	0.006	0.007	0.007	0.007	0.007	0.007	0.007	0.007
		surrounding	kg	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.012	0.012	0.012	0.012	0.012
	discharge amount (1)-(2)	high income	kg	0.532	0.538	0.545	0.552	0.559	0.567	0.575	0.584	0.593	0.602	0.611	0.620
		middle income	kg	0.539	0.545	0.552	0.559	0.567	0.575	0.583	0.592	0.601	0.610	0.620	0.629
		low income	kg	0.559	0.565	0.572	0.580	0.588	0.596	0.605	0.614	0.623	0.633	0.643	0.652
		surrounding	kg	0.526	0.533	0.539	0.546	0.554	0.562	0.570	0.578	0.587	0.596	0.605	0.614
		average(low+sur	kg	0.543	0.549	0.556	0.563	0.571	0.579	0.587	0.596	0.605	0.615	0.624	0.633
Waste Amount/day	household	high income	t	271.7	286.1	301.1	316.7	337.7	360.2	384.5	410.6	438.6	468.6	500.5	534.6
		middle income	t	315.1	335.0	355.6	376.9	400.6	426.1	453.6	485.8	514.9	548.9	585.2	623.9
		average(low+sur	t	594.3	630.0	666.9	705.2	745.3	788.2	835.0	887.8	939.2	997.0	1058.8	1124.8
		sub-total	t	1181.1	1251.1	1323.7	1398.9	1483.6	1574.5	1673.0	1784.1	1892.8	2014.5	2144.6	2283.3
	commerce	restaurant	t	38.0	39.8	41.6	43.4	45.4	47.5	49.8	52.3	54.6	57.3	60.1	63.0
		others	t	55.5	58.1	60.7	63.3	66.2	69.3	72.6	76.3	79.7	83.5	87.6	91.9
		sub-total	t	93.5	97.9	102.3	106.7	111.6	116.8	122.3	128.5	134.3	140.8	147.7	154.9
	market		t	82.5	86.3	90.2	94.1	98.4	103.0	107.9	113.4	118.4	124.2	130.2	136.6
	road		t	69.0	73.9	79.2	84.8	91.1	98.1	105.7	114.4	123.2	133.1	143.8	155.3
	total		t	1426	1509	1595	1684	1785	1892	2009	2140	2269	2413	2566	2730

Table 1.2-4 Future Solid Waste Amount of Each Location

Location		generation source	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Makadara	Makadara	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	17.2	17.5	17.9	18.3	18.5	18.8	19.0	19.3	19.6	19.9	20.2	20.5
		low	17.3	17.7	18.0	18.4	18.6	18.9	19.2	19.5	19.8	20.1	20.4	20.7
		sub-total	*34.5*	*35.2*	*35.9*	*36.6*	*37.1*	*37.7*	*38.2*	*38.8*	*39.4*	*40.0*	*40.6*	*41.2*
		commerce	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6
		market	4.6	4.8	5.0	5.3	5.5	5.8	6.0	6.3	6.6	6.9	7.3	7.6
		road	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.6	2.7	2.8
		other	*7.6*	*7.9*	*8.3*	*8.6*	*8.9*	*9.3*	*9.7*	*10.2*	*10.6*	*11.1*	*11.5*	*12.1*
		total	***42***	***43***	***44***	***45***	***46***	***47***	***48***	***49***	***50***	***51***	***52***	***53***
	Kaloleni/ Makongeni	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8
		sub-total	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.8*	*0.8*	*0.8*	*0.8*
		commerce	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7
		market	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.1	3.2	3.4
		road	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
		other	*2.5*	*2.6*	*2.8*	*2.9*	*3.0*	*3.1*	*3.3*	*3.5*	*3.6*	*3.8*	*4.0*	*4.2*
		total	***3***	***3***	***3***	***4***	***4***	***4***	***4***	***4***	***4***	***5***	***5***	***5***
	Maringo/ Mbotela	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	14.4	14.7	15.0	15.3	15.5	15.7	16.0	16.2	16.5	16.7	17.0	17.2
		sub-total	*14.4*	*14.7*	*15.0*	*15.3*	*15.5*	*15.7*	*16.0*	*16.2*	*16.5*	*16.7*	*17.0*	*17.2*
		commerce	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.2
		other	*1.2*	*1.2*	*1.3*	*1.3*	*1.4*	*1.4*	*1.5*	*1.5*	*1.6*	*1.6*	*1.7*	*1.7*
		total	***16***	***16***	***16***	***17***	***17***	***17***	***17***	***18***	***18***	***18***	***19***	***19***
	Viwanda	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	7.5	7.7	7.8	8.0	8.1	8.3	8.5	8.6	8.8	9.0	9.2	9.4
		low	7.6	7.7	7.9	8.0	8.2	8.3	8.5	8.7	8.9	9.1	9.3	9.5
		sub-total	*15.1*	*15.4*	*15.7*	*16.0*	*16.3*	*16.6*	*17.0*	*17.4*	*17.7*	*18.1*	*18.5*	*19.0*
		commerce	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.3
		other	*1.1*	*1.1*	*1.2*	*1.2*	*1.3*	*1.3*	*1.4*	*1.4*	*1.5*	*1.5*	*1.6*	*1.7*
		total	***16***	***17***	***17***	***17***	***18***	***18***	***18***	***19***	***19***	***20***	***20***	***21***
Kamukunji	Bahati	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	8.6	8.8	9.0	9.2	9.3	9.4	9.5	9.7	9.8	10.0	10.1	10.3
		low	8.7	8.9	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4
		sub-total	*17.3*	*17.6*	*18.0*	*18.4*	*18.6*	*18.9*	*19.2*	*19.4*	*19.7*	*20.0*	*20.3*	*20.7*
		commerce	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4
		other	*1.9*	*2.0*	*2.1*	*2.1*	*2.2*	*2.3*	*2.4*	*2.5*	*2.6*	*2.7*	*2.8*	*2.9*
		total	***19***	***20***	***20***	***21***	***21***	***21***	***22***	***22***	***22***	***23***	***23***	***24***
	Pumwani	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	5.0	5.1	5.1	5.2	5.6	5.9	6.3	6.7	7.2	7.7	8.2	8.7
		sub-total	*5.0*	*5.1*	*5.1*	*5.2*	*5.6*	*5.9*	*6.3*	*6.7*	*7.2*	*7.7*	*8.2*	*8.7*
		commerce	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0
		market	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
		road	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6
		other	*2.3*	*2.4*	*2.5*	*2.6*	*2.8*	*2.9*	*3.1*	*3.2*	*3.4*	*3.6*	*3.8*	*4.0*
		toal	**7**	**7**	**8**	**8**	**8**	**9**	**9**	**10**	**11**	**11**	**12**	**13**
	Eastleigh	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	66.0	67.2	68.5	69.9	71.4	73.1	74.9	76.7	78.7	80.8	82.9	85.1
		sub-total	*66.0*	*67.2*	*68.5*	*69.9*	*71.4*	*73.1*	*74.9*	*76.7*	*78.7*	*80.8*	*82.9*	*85.1*
		commerce	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		market	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0
		road	3.8	3.9	4.1	4.2	4.4	4.5	4.7	4.9	5.1	5.3	5.5	5.7
		other	*5.7*	*5.9*	*6.2*	*6.4*	*6.6*	*6.9*	*7.2*	*7.5*	*7.8*	*8.2*	*8.5*	*8.9*
		toal	***72***	***73***	***75***	***76***	***78***	***80***	***82***	***84***	***87***	***89***	***91***	***94***
	Kamukunji	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	12.2	12.4	12.7	12.9	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.5
		sub-total	*12.2*	*12.4*	*12.7*	*12.9*	*13.1*	*13.3*	*13.5*	*13.7*	*13.9*	*14.1*	*14.3*	*14.5*
		commerce	7.3	7.7	8.0	8.4	8.8	9.2	9.6	10.1	10.5	11.0	11.6	12.2
		market	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6
		road	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0
		other	*9.6*	*10.1*	*10.5*	*11.0*	*11.5*	*12.0*	*12.5*	*13.1*	*13.7*	*14.4*	*15.1*	*15.8*
		toal	***22***	***22***	***23***	***24***	***25***	***25***	***26***	***27***	***28***	***28***	***29***	***30***

Table 1.2-4 Future Solid Waste Amount of Each Location

Location		generation source	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Starahe	Ngara	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	27.7	28.1	28.6	29.0	30.9	32.9	35.1	37.4	39.8	42.5	45.3	48.2
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*27.7*	*28.1*	*28.6*	*29.0*	*30.9*	*32.9*	*35.1*	*37.4*	*39.8*	*42.5*	*45.3*	*48.2*
		commerce	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5
		market	6.5	6.8	7.1	7.5	7.8	8.2	8.5	9.0	9.4	9.8	10.3	10.8
		road	1.6	1.7	1.7	1.8	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.3
		other	*10.3*	*10.7*	*11.2*	*11.6*	*12.2*	*12.9*	*13.5*	*14.3*	*15.0*	*15.8*	*16.7*	*17.6*
		toal	***38***	***39***	***40***	***41***	***43***	***46***	***49***	***52***	***55***	***58***	***62***	***66***
	Starehe	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	22.5	22.9	23.3	23.7	24.7	25.9	27.1	28.4	29.8	31.2	32.8	34.4
		low	22.7	23.0	23.4	23.8	24.9	26.0	27.3	28.6	30.0	31.4	33.0	34.7
		sub-total	*45.2*	*45.9*	*46.7*	*47.5*	*49.6*	*51.9*	*54.3*	*56.9*	*59.7*	*62.7*	*65.8*	*69.1*
		commerce	57.5	60.2	62.9	65.6	68.6	71.8	75.2	79.0	82.5	86.5	90.8	95.2
		market	19.7	20.6	21.5	22.4	23.5	24.6	25.7	27.0	28.3	29.6	31.1	32.6
		road	2.6	2.7	2.8	2.9	3.0	3.2	3.4	3.6	3.9	4.1	4.4	4.7
		other	*79.8*	*83.5*	*87.2*	*90.9*	*95.1*	*99.6*	*104.3*	*109.7*	*114.7*	*120.3*	*126.2*	*132.5*
		toal	***125***	***129***	***134***	***138***	***145***	***151***	***159***	***167***	***174***	***183***	***192***	***202***
Langata	Kibera/ Woodley	high	12.9	13.2	13.6	14.0	14.9	15.8	16.9	18.0	19.2	20.4	21.8	23.2
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	13.2	13.5	13.9	14.3	15.2	16.2	17.2	18.4	19.6	20.9	22.2	23.7
		sub-total	*26.1*	*26.7*	*27.5*	*28.2*	*30.1*	*32.0*	*34.1*	*36.3*	*38.7*	*41.3*	*44.0*	*46.9*
		commerce	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5
		market	3.1	3.3	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.2
		road	1.5	1.6	1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.7	3.0	3.2
		other	*6.2*	*6.5*	*6.7*	*7.0*	*7.4*	*7.8*	*8.3*	*8.7*	*9.2*	*9.7*	*10.3*	*10.9*
		toal	***32***	***33***	***34***	***35***	***37***	***40***	***42***	***45***	***48***	***51***	***54***	***58***
	Karen/Langata	high	43.7	47.8	51.9	56.3	60.5	65.0	69.9	75.2	80.9	87.1	93.7	100.8
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*43.7*	*47.8*	*51.9*	*56.3*	*60.5*	*65.0*	*69.9*	*75.2*	*80.9*	*87.1*	*93.7*	*100.8*
		commerce	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5
		market	0.9	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4
		road	2.6	2.9	3.2	3.5	3.8	4.1	4.5	4.9	5.3	5.8	6.4	7.0
		other	*3.7*	*4.0*	*4.4*	*4.7*	*5.1*	*5.5*	*5.9*	*6.4*	*7.0*	*7.5*	*8.1*	*8.8*
		total	***47***	***52***	***56***	***61***	***66***	***71***	***76***	***82***	***88***	***95***	***102***	***110***
	Kenyatta/ Golf Course	high	9.0	9.3	9.6	9.9	10.5	11.2	11.9	12.7	13.6	14.5	15.4	16.4
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*9.0*	*9.3*	*9.6*	*9.9*	*10.5*	*11.2*	*11.9*	*12.7*	*13.6*	*14.5*	*15.4*	*16.4*
		commerce	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		market	2.8	2.9	3.0	3.2	3.3	3.5	3.6	3.8	4.0	4.2	4.4	4.6
		road	0.5	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1
		other	*3.4*	*3.6*	*3.8*	*3.9*	*4.1*	*4.3*	*4.6*	*4.8*	*5.1*	*5.3*	*5.6*	*5.9*
		total	***12***	***13***	***13***	***14***	***15***	***16***	***17***	***18***	***19***	***20***	***21***	***22***
	Mugumoini	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	69.4	72.7	76.1	79.7	84.8	90.3	96.2	102.5	109.3	116.5	124.2	132.4
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*69.4*	*72.7*	*76.1*	*79.7*	*84.8*	*90.3*	*96.2*	*102.5*	*109.3*	*116.5*	*124.2*	*132.4*
		commerce	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	4.1	4.3	4.6	4.8	5.2	5.6	6.1	6.6	7.1	7.7	8.3	9.0
		other	*4.2*	*4.4*	*4.7*	*5.0*	*5.3*	*5.8*	*6.2*	*6.7*	*7.3*	*7.9*	*8.5*	*9.2*
		total	***74***	***77***	***81***	***85***	***90***	***96***	***102***	***109***	***117***	***124***	***133***	***142***
Dagoretti	Waithaka	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	24.7	26.6	28.5	30.5	32.8	35.2	37.9	40.8	43.9	47.2	50.8	54.7
		sub-total	*24.7*	*26.6*	*28.5*	*30.5*	*32.8*	*35.2*	*37.9*	*40.8*	*43.9*	*47.2*	*50.8*	*54.7*
		commerce	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	1.4	1.6	1.7	1.8	2.0	2.2	2.4	2.6	2.8	3.1	3.4	3.7
		other	*2.0*	*2.1*	*2.3*	*2.5*	*2.7*	*2.9*	*3.1*	*3.4*	*3.6*	*3.9*	*4.3*	*4.6*
		total	***27***	***29***	***31***	***33***	***35***	***38***	***41***	***44***	***48***	***51***	***55***	***59***
	Kangemi	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	59.7	64.1	68.8	73.6	79.1	84.9	91.4	98.3	105.8	113.9	122.6	131.8
		sub-total	*59.7*	*64.1*	*68.8*	*73.6*	*79.1*	*84.9*	*91.4*	*98.3*	*105.8*	*113.9*	*122.6*	*131.8*
		commerce	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2
		market	6.8	7.1	7.5	7.8	8.1	8.5	8.9	9.4	9.8	10.3	10.8	11.3
		road	3.5	3.8	4.1	4.4	4.8	5.3	5.7	6.3	6.8	7.5	8.2	8.9
		other	*11.0*	*11.6*	*12.3*	*13.0*	*13.8*	*14.7*	*15.6*	*16.6*	*17.7*	*18.8*	*20.1*	*21.4*
		total	***71***	***76***	***81***	***87***	***93***	***100***	***107***	***115***	***123***	***133***	***143***	***153***

Table 1.2-4 Future Solid Waste Amount of Each Location

Location		generation source	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Dagoretti	Rirutа	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	30.4	32.7	35.1	37.5	40.3	43.3	46.6	50.1	53.9	58.1	62.5	67.2
		sub-total	*30.4*	*32.7*	*35.1*	*37.5*	*40.3*	*43.3*	*46.6*	*50.1*	*53.9*	*58.1*	*62.5*	*67.2*
		commerce	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7
		market	2.7	2.9	3.0	3.1	3.3	3.4	3.6	3.8	3.9	4.1	4.3	4.5
		road	1.8	1.9	2.1	2.3	2.5	2.7	2.9	3.2	3.5	3.8	4.2	4.5
		other	*4.9*	*5.2*	*5.5*	*5.9*	*6.2*	*6.6*	*7.1*	*7.5*	*8.0*	*8.6*	*9.2*	*9.8*
		total	***35***	***38***	***41***	***43***	***47***	***50***	***54***	***58***	***62***	***67***	***72***	***77***
	Kawangware	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	19.1	20.5	22.0	23.5	25.3	27.1	29.2	31.4	33.8	36.4	39.2	42.1
		sub-total	*19.1*	*20.5*	*22.0*	*23.5*	*25.3*	*27.1*	*29.2*	*31.4*	*33.8*	*36.4*	*39.2*	*42.1*
		commerce	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.7
		market	4.5	4.8	5.0	5.2	5.4	5.7	6.0	6.3	6.5	6.9	7.2	7.5
		road	1.1	1.2	1.3	1.4	1.5	1.7	1.8	2.0	2.2	2.4	2.6	2.8
		other	*6.7*	*7.0*	*7.4*	*7.8*	*8.2*	*8.6*	*9.1*	*9.7*	*10.2*	*10.8*	*11.4*	*12.1*
		total	***26***	***28***	***29***	***31***	***33***	***36***	***38***	***41***	***44***	***47***	***51***	***54***
	Mutuini	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	22.3	24.0	25.7	27.5	29.5	31.7	34.2	36.7	39.5	42.6	45.8	49.3
		sub-total	*22.3*	*24.0*	*25.7*	*27.5*	*29.5*	*31.7*	*34.2*	*36.7*	*39.5*	*42.6*	*45.8*	*49.3*
		commerce	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	1.3	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.6	2.8	3.0	3.3
		other	*1.4*	*1.6*	*1.7*	*1.8*	*2.0*	*2.1*	*2.3*	*2.5*	*2.8*	*3.0*	*3.3*	*3.6*
		total	***24***	***26***	***27***	***29***	***32***	***34***	***36***	***39***	***42***	***46***	***49***	***53***
Westlands	Parklands[1]	high	111.6	117.2	123.0	129.0	137.3	146.2	155.9	166.3	177.4	189.3	202.0	215.5
		middle	0	0	0	0	0	0	0	0	0	0	0	0
		low	0	0	0	0	0	0	0	0	0	0	0	0
		sub-total	*111.6*	*117.2*	*123.0*	*129.0*	*137.3*	*146.2*	*155.9*	*166.3*	*177.4*	*189.3*	*202.0*	*215.5*
		commerce	1.5	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.3	2.4
		market	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7
		road	6.6	7.0	7.5	7.9	8.6	9.2	10.0	10.8	11.7	12.7	13.7	14.9
		other	*8.5*	*9.0*	*9.5*	*10.1*	*10.8*	*11.6*	*12.4*	*13.4*	*14.4*	*15.5*	*16.7*	*18.0*
		total	***120***	***126***	***132***	***139***	***148***	***158***	***168***	***180***	***192***	***205***	***219***	***233***
	Muthaiga	high	13.4	14.7	16.1	17.5	18.6	19.8	21.1	22.5	24.0	25.6	27.3	29.1
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*13.4*	*14.7*	*16.1*	*17.5*	*18.6*	*19.8*	*21.1*	*22.5*	*24.0*	*25.6*	*27.3*	*29.1*
		commerce	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
		market	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		road	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.0
		other	*1.0*	*1.1*	*1.2*	*1.3*	*1.4*	*1.5*	*1.6*	*1.8*	*1.9*	*2.0*	*2.2*	*2.4*
		total	***14***	***16***	***17***	***19***	***20***	***21***	***23***	***24***	***26***	***28***	***29***	***31***
	Kilimani	high	31.6	32.2	32.9	33.6	35.8	38.1	40.6	43.3	46.1	49.2	52.4	55.9
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*31.6*	*32.2*	*32.9*	*33.6*	*35.8*	*38.1*	*40.6*	*43.3*	*46.1*	*49.2*	*52.4*	*55.9*
		commerce	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	1.9	1.9	2.0	2.1	2.2	2.4	2.6	2.8	3.0	3.3	3.6	3.9
		other	*2.4*	*2.5*	*2.5*	*2.6*	*2.8*	*3.0*	*3.3*	*3.5*	*3.8*	*4.1*	*4.1*	*4.7*
		total	***34***	***35***	***35***	***36***	***39***	***41***	***44***	***47***	***50***	***53***	***57***	***61***
Mathare	Mathare	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	29.4	29.9	30.5	31.1	31.6	32.0	32.5	33.0	33.5	34.0	34.5	35.0
		sub-total	*29.4*	*29.9*	*30.5*	*31.1*	*31.6*	*32.0*	*32.5*	*33.0*	*33.5*	*34.0*	*34.5*	*35.0*
		commerce	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.4
		other	*3.4*	*3.5*	*3.6*	*3.8*	*3.9*	*4.0*	*4.2*	*4.4*	*4.5*	*4.7*	*4.9*	*5.1*
		total	***33***	***33***	***34***	***35***	***35***	***36***	***37***	***37***	***38***	***39***	***39***	***40***
	Kariobangi	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	5.2	5.6	6.0	6.5	7.0	7.5	8.1	8.7	9.3	10.1	10.8	11.6
		sub-total	*5.2*	*5.6*	*6.0*	*6.5*	*7.0*	*7.5*	*8.1*	*8.7*	*9.3*	*10.1*	*10.8*	*11.6*
		commerce	3.0	3.1	3.3	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.7	5.0
		market	13.0	13.6	14.2	14.8	15.5	16.2	17.0	17.8	18.6	19.5	20.5	21.5
		road	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8
		other	*16.3*	*17.0*	*17.8*	*18.6*	*19.5*	*20.4*	*21.4*	*22.5*	*23.5*	*24.7*	*25.9*	*27.2*
		total	***21***	***23***	***24***	***25***	***26***	***28***	***29***	***31***	***33***	***35***	***37***	***39***

Table 1.2-4 Future Solid Waste Amount of Each Location

Location		generation source	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mathare	Kahara	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	26.4	28.7	31.1	33.6	35.7	38.0	40.5	43.2	46.0	49.1	52.3	55.7
		low	26.5	28.9	31.3	33.8	36.0	38.3	40.8	43.5	46.4	49.4	52.7	56.1
		sub-total	*52.9*	*57.6*	*62.4*	*67.4*	*71.7*	*76.3*	*81.3*	*86.7*	*92.4*	*98.5*	*105.0*	*111.9*
		commerce	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8
		market	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		road	3.1	3.4	3.7	4.1	4.4	4.7	5.1	5.5	6.0	6.5	7.0	7.6
		other	*3.6*	*3.9*	*4.2*	*4.6*	*5.0*	*5.3*	*5.7*	*6.2*	*6.7*	*7.2*	*7.8*	*8.4*
		total	***56***	***61***	***67***	***72***	***77***	***82***	***87***	***93***	***99***	***106***	***113***	***120***
	Kasarani (Ruaraka)	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	59.6	63.1	66.6	70.3	73.9	77.7	81.8	86.3	91.1	96.2	101.6	107.5
		sub-total	*59.6*	*63.1*	*66.6*	*70.3*	*73.9*	*77.7*	*81.8*	*86.3*	*91.1*	*96.2*	*101.6*	*107.5*
		commerce	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
		market	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6
		road	3.5	3.7	4.0	4.2	4.5	4.8	5.1	5.5	5.9	6.3	6.8	7.3
		other	*5.2*	*5.5*	*5.9*	*6.2*	*6.6*	*7.0*	*7.4*	*7.9*	*8.4*	*8.9*	*9.5*	*10.1*
		total	***65***	***69***	***72***	***77***	***80***	***85***	***89***	***94***	***99***	***105***	***111***	***118***
	Roysambu	high	49.7	51.9	54.2	56.5	60.2	64.1	68.3	72.7	77.6	82.7	88.1	93.9
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		sub-total	*49.7*	*51.9*	*54.2*	*56.5*	*60.2*	*64.1*	*68.3*	*72.7*	*77.6*	*82.7*	*88.1*	*93.9*
		commerce	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
		market	2.7	2.9	3.0	3.1	3.3	3.4	3.6	3.8	3.9	4.1	4.3	4.5
		road	2.9	3.1	3.3	3.5	3.7	4.0	4.4	4.7	5.1	5.5	6.0	6.5
		other	*5.8*	*6.1*	*6.4*	*6.7*	*7.1*	*7.6*	*8.1*	*8.6*	*9.2*	*9.8*	*10.5*	*11.2*
		total	***55***	***58***	***61***	***63***	***67***	***72***	***76***	***81***	***87***	***93***	***99***	***105***
Embakasi	Embakasi	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	41.7	44.8	48.0	51.2	54.9	58.9	63.2	67.8	72.8	78.1	83.9	90.0
		low	42.0	45.1	48.3	51.6	55.3	59.3	63.6	68.2	73.3	78.7	84.4	90.6
		sub-total	*83.8*	*89.9*	*96.2*	*102.8*	*110.2*	*118.1*	*126.7*	*136.0*	*146.0*	*156.8*	*168.3*	*180.6*
		commerce	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		market	2.9	3.1	3.2	3.4	3.5	3.7	3.9	4.0	4.2	4.4	4.6	4.9
		road	4.9	5.3	5.7	6.2	6.7	7.3	8.0	8.7	9.5	10.3	11.2	12.2
		other	*7.9*	*8.5*	*9.1*	*9.7*	*10.4*	*11.1*	*11.9*	*12.9*	*13.8*	*14.9*	*16.0*	*17.3*
		total	***92***	***98***	***105***	***112***	***121***	***129***	***139***	***149***	***160***	***172***	***184***	***198***
	Njiru	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	94.0	103.8	113.9	124.4	133.7	143.7	154.5	168.9	178.9	192.5	207.2	222.9
		low	94.7	104.6	114.7	125.3	134.6	144.7	155.6	170.1	180.2	193.9	208.6	224.4
		sub-total	*188.7*	*208.4*	*228.7*	*249.6*	*268.2*	*288.3*	*310.1*	*339.0*	*359.1*	*386.4*	*415.8*	*447.3*
		commerce	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6
		market	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5
		road	11.0	12.3	13.6	15.1	16.4	17.9	19.5	21.7	23.3	25.4	27.8	30.3
		other	*12.9*	*14.2*	*15.7*	*17.2*	*18.7*	*20.2*	*22.0*	*24.2*	*26.0*	*28.3*	*30.7*	*33.4*
		total	***202***	***223***	***244***	***267***	***287***	***309***	***332***	***363***	***385***	***415***	***447***	***481***
	Dandora	high	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		middle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		low	13.0	14.1	15.2	16.3	17.5	18.8	20.2	21.8	23.4	25.2	27.1	29.2
		sub-total	*13.0*	*14.1*	*15.2*	*16.3*	*17.5*	*18.8*	*20.2*	*21.8*	*23.4*	*25.2*	*27.1*	*29.2*
		commerce	10.1	10.6	11.1	11.6	12.1	12.7	13.3	13.9	14.6	15.3	16.0	16.8
		market	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9
		road	0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.7	1.8	2.0
		other	*12.6*	*13.3*	*13.9*	*14.5*	*15.3*	*16.0*	*16.8*	*17.7*	*18.6*	*19.6*	*20.6*	*21.7*
		total	***26***	***27***	***29***	***31***	***33***	***35***	***37***	***39***	***42***	***45***	***48***	***51***
Nairobi total		high	272	286	301	317	338	360	384	411	439	469	501	535
		middle	315	335	356	377	401	426	454	486	515	549	585	624
		low	594	630	667	705	745	788	835	888	939	997	1059	1125
		sub-toal	*1181*	*1351*	*1324*	*1399*	*1484*	*1575*	*1673*	*1784*	*1893*	*2015*	*2145*	*2283*
		commerce	94	98	102	107	112	117	122	129	134	141	148	155
		market	83	86	90	94	98	103	108	113	119	124	130	137
		road	69	74	79	85	91	98	106	114	123	133	144	155
		other	*245*	*258*	*272*	*286*	*301*	*318*	*336*	*356*	*376*	*398*	*422*	*447*
		total	***1426***	***1509***	***1595***	***1684***	***1785***	***1893***	***2009***	***2141***	***2269***	***2413***	***2566***	***2730***

unit t/day

DATA BOOK 2

INSTITUTIONAL AND ORGANISATIONAL STUDY

2.1

ORGANISATION AND MANAGEMENT WORKSHOP FOR THE DEPARTMENT OF THE ENVIRONMENT, NCC

"Organisation and Management" Workshop for the Department of the Environment, NCC

Facilitator
Andrew Homewood

The Holiday Inn, Nairobi Mayfair Court
16 & 17 December 1997

JICA SWM Study

"Organisation and Management" Workshop for the Department of the Environment, NCC

Facilitator
Andrew Homewood

The Holiday Inn, Nairobi Mayfair Court
16 & 17 December 1997

JICA SWM Study

Workshop Structure

DAY 1

1. Opening Session by The Town Clerk, NCC

2. Introduction to the Workshop

   Workshop Objectives
   Workshop Methodology

3. What is Good Organisation and Management?

4. Formulate Actions for Strengthening the Department of Environment's Solid Waste Management Functions

DAY 2

5. Formulate and Agree a Strategy for the Future Role and Status of the Department of Environment

6. Finalise and Agree Actions for Strengthening the Department of Environment's Solid Waste Management Functions

7. Closing Session:

   - Present Workshop's Key Dccisions and Recommendations to the Permanent Secretary, MOLG
   - Closing speech by the Permanent Secretary, MOLG

Introduction

Workshop Objectives
Workshop Methodology

JICA SWM Study

Introduction

Workshop Objectives
Workshop Methodology

Workshop Objectives

The Primary Objective is for the Workshop participants to jointly agree and formulate a number of actions required to strengthen the Department of Environment's Solid Waste Management functions which are currently provided by the Department's Cleansing Section.

The Secondary Objective is to formulate a strategy for the future role, status and organisational structure for the Department of Environment.

Workshop Methodology

1 Background to the Workshop

1.1 "The Study on Solid Waste Management in Nairobi City, for the Republic of Kenya"

The "Organisation and Management" Workshop is a joint and cooperative effort amongst the Ministry of Local Government (MOLG), Nairobi City Council (NCC) and the JICA Study Team to formulate and agree actions to strengthen the Department of Environment.

The initiative for the Workshop arises from the "The Study on Solid Waste Management in Nairobi City, for the Republic of Kenya" (the Study) which is being carried out by the JICA Study Team.

Under the Study, an Institutional Restructuring Plan (IRP) has been prepared in draft which contains a number of recommendations concerning the organisation and management of the Department of Environment (DoE).

These draft recommendations have been discussed and agreed in principle amongst MOLG, NCC and the JICA Study Team.

The primary focus of these draft recommendations is on strengthening the DoE's Solid Waste Management (SWM) functions which are currently provided by the Department's Cleansing Section.

The secondary focus of these draft recommendations addresses the future role and status of the DoE; these are separately dealt with below.

1.2 Strategy for Strengthening the DoE's SWM Functions

Recommendations for strengthening the DoE's SWM functions cover three key areas:

- restructuring the existing organisational structure;
- establishing a number of new functions; and
- development of key management capabilities.

Some of these recommendations can be implemented fully or partially by NCC itself, but most of them require assisted implementation provided by international consultants under a separate Capacity Building Assistance Program (CBAP) which it is proposed will begin in 1999. The CBAP will critically support the implementation of the IRP.

Preparatory Actions

The recommendations which NCC can implement fully or partially by itself are essentially Preparatory Actions for the CBAP, ie they must be substantively completed to enable the CBAP to begin. Altogether there are seven Preparatory Actions and they

need to be substantively implemented during 1998. They cover:

1. restructuring the existing organisational structure of the DoE's SWM functions; and
2. initial set up of a number of new functions, including the appointment new managers and staff to them.

Four of these Preparatroy Actions are key Actions which are detailed in the Section "The Role of the Workshop" below.

Strengthening under the CBAP

The actions to be implemented under the Capacity Building Assistance Program cover:

1. full development and implementation of the new functions which are set up by NCC in 1998; and
2. development of key management capabilities.

Figure 2.1-1 below summarises how the recommendations for strengthening the DoE's SWM functions are scheduled between 1) Preparatory Actions and 2) Actions implemented under the CBAP.

Strategy for Strengthening the DoE's SWM Functions

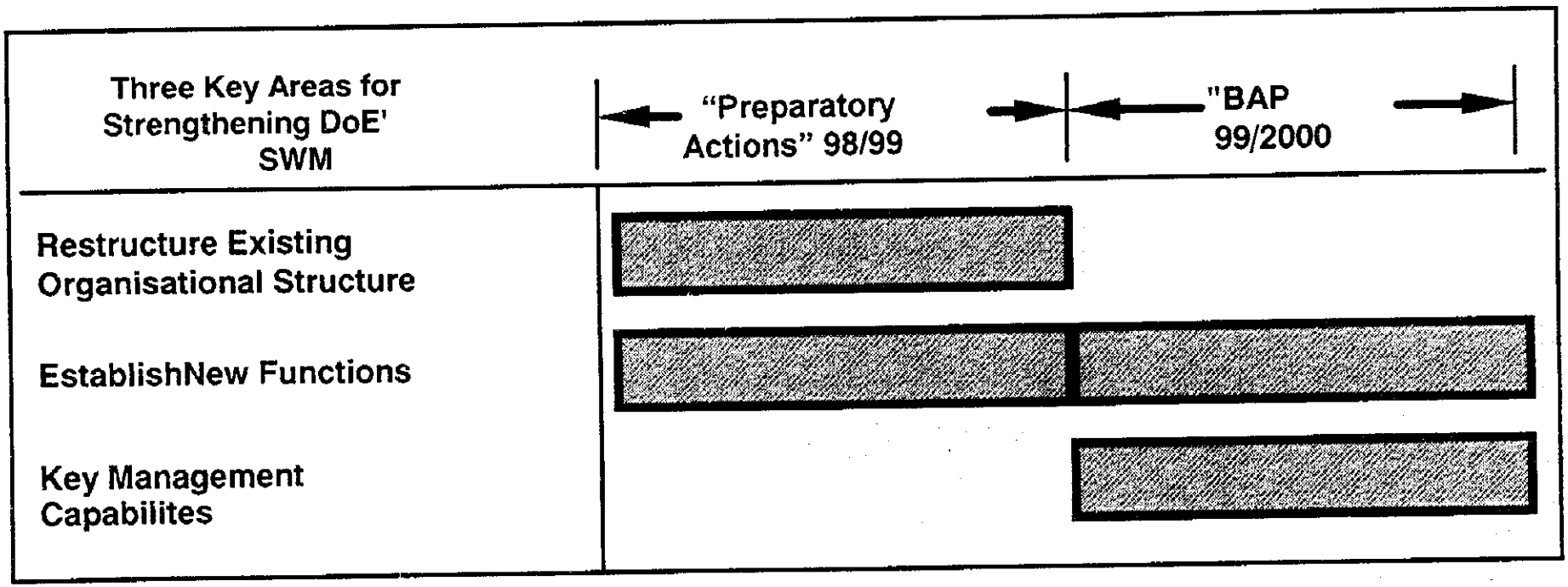


Figure 2.1-1 Strategy for Strengthening the DoE's SWM Functions

2 The Role of the Workshop

The Workshop's key role is to agree and decide on the implementation of four of the Preparatory Actions for strengthening the DoE's SWM functions. These are the key Preparatory Actions.

The Workshop's secondary purpose is to jointly formulate a strategy for the future role and status of the DoE.

Figure 2.1-2 below summarises the role of the Workshop within the Study.

Before considering both of these areas there will be a short session in the morning of Day 1 on what good organisation and management is. The purpose of this session is to inform participants of fundamental management concepts and practices. This will help to give a more consistent conceptual framework to the Workshop.

2.1 Formulate Key Preparatory Actions for Strengthening the DOE's SWM Functions

The four key Preparatory Actions to be formulated are:

1. **Restructuring the Existing Organisational Structure of the DoE's SWM Functions**
2. **Establishing a new Community Development Unit**
3. **Establishing a new Contract Management Unit**
4. **Establishing a new Environmental Regulation Unit for Solid Wastes.**

The key elements of the first Action - restructuring the existing organisational structure are:

- transforming the existing Cleansing Section into a SWM Division by reducing the number of vertical levels in senior and middle management and creating new positions for a SWM Deputy Director, a SWM Operations Manager and two deputy SWM Operations Managers;
- separating disposal from collection and street cleansing services and establishing a Disposal Unit; and
- separating the management of collection services from street cleansing.

Methodology

The Workshop's participants will formulate each Preparatory Action. To do this the they will split into 3 groups. Each group will be allocated 1 or 2 Preparatory Actions and will prepare the following outputs for each Action:]

1. define the objectives and goals of the Preparatory Action;
2. define what is to be implemented;

3. how to implement it;
4. identify who within or outside the DoE is responsible for implementation;
5. prepare an outline implementation timetable; and
6. identify who is responsible for monitoring implementation of the Preparatory Actions.

Each group will then present their Preparatory Action(s) to the whole Workshop which will then discuss and agree them.

On Day 2 a number of Senior officers from MOLG, NCC and other Ministries will join the Workshop. Day 1 participants will present the key issues and recommendations for each of the four Preparatory Actions to them.

After this all participants will jointly agree on the implementation of each Preparatory Action.

Scheduling

On Day 1 - the key Preparatory Actions will be formulated in detail in the afternoon of Day 1.

On Day 2 - Day 1 participants will present the Preparatory Actions to the Senior officers from MOLG, NCC and other Ministries in the afternoon of Day 2.

2.2 Formulate a Strategy for the Future Role and Status of the DoE

The role and status of the DoE covers not only the DoE's SWM functions but also its role as an environmental regulator and a manager of Parks services which are currently provided through its Parks Section.

The Workshop participants will be split into 3 groups. Each group will formulate a strategy for the future role, status and organisational structure. One group will present their strategy to the whole Workshop which will then discuss, add and adjust it and finally agree a strategy.

Outputs

Outputs will be:

1. a Mission Statement;
2. Strategic Objectives and Goals;
3. an outline Strategic Plan;
4. organisational functions. This will cover not only the operational functions but also administration, MIS and other key management capabilities as appropriate. and
5. organisational structure.

Scheduling

The strategy will be formulated on the morning of Day 2. A presentation of the proposed strategy will be made to the Permanent Secretary during the Closing Session at the end of Day 2.

The Role of the Workshop

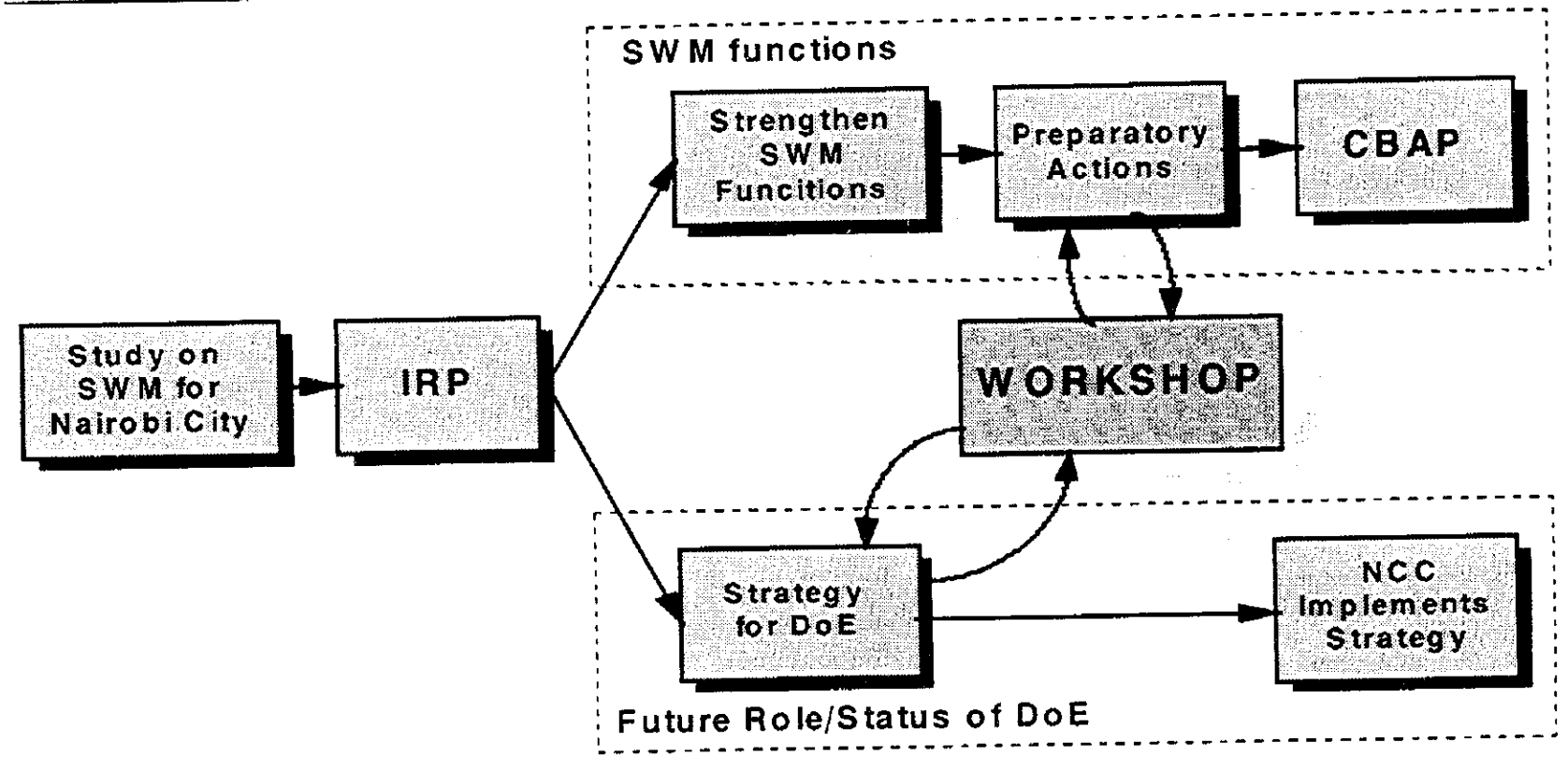


Figure 2.1-2 The Role of the Workshop within the Study

What is Good Oganisation and Management?

What is Good Oganisation and Management?

JICA SWM Study

What is Good Organisation and Management?

1 Introduction

What is good organisation and management? What are key management capabilities?

This brief session is intended to inform and refresh participants on fundamental management concepts and principles. This will help to give a more consistent conceptual framework to the Workshop.

2 Session Structure

What is Management?

The Workshop will define what is meant by "Management", the "Role of Managers" and the "Management Cycle".

What is Planning?

The Workshop will define what is meant by the "Planning Process", ie setting a mission statement, strategic objectives, goals and policies, and preparing strategic and operational plans.

Identifying Key Organisation and Management Principles

After considering these fundamentals the Workshop participants will jointly discuss and agree the key principles of organisation and management and discuss their relevance to the DoE.

Management and the Role of Managers

What is Management?

"Management is the process of obtaining, deploying & utilizing a variety of resources to achieve and fulfill an Organisation's Mission and goals".

"Managers are the "Practitioners of Management": they plan, direct and control the work of their human resources. They do not perform the actual work themselves but they are responsible for the work of others".

Managers Perform Five Unique Functions for an Organisation

Planning

A manager is responsible for setting overall objectives and goals to unify employees' efforts. After setting goals, managers design and prepare the plans and schedules that will help to move and guide everyone towards fulfilling the organisation's goals.

Senior Managers set broad strategic objectives and goals and prepare strategic plans. Middle-level managers generally prepare goals and plans for the next month or year. Supervisors generally establish short-term goals and plans for the next week or day.

Organising

Managers define the organisation's functions and create departments, sections and positions for individual members of staff. Managers then define and assign the responsibilities and tasks to these departments, sections and their staff.

Staffing

Positions in an organisation chart have little consequence until they have been filled with individuals who are qualified to perform the duties associated with those positions. When managers fill these positions they are performing the staffing function.

Directing

Once the plans are prepared, the organisation created and positions filled, the organisation is ready to be set in motion. It is the manager's responsibility to direct the organisation's activities and to direct, ie command or instruct, employees to go carry out their duties.

Controlling

Once an organisation's wheels are in motion, managers must regularly check to see whether outturn results are going according to plan. If plans are faltering and results are off-target manager must take corrective action to put plans back on track. That is the manager's controlling responsibility.

The "Management Process"

Managers routinely perform the five unique functions just described. In theory, they perform these functions in the sequence discussed above. Conceptually, these five steps, taken in order, have been described as the "management process".

In actual practice any of the functions may be taken independently and in any sequence that circumstances dictate. Because the management process can be, and is, repeated over and over again it is sometimes called the "Management Cycle". This is illustrated in the **Figure 2.1-3**

Managerial Skills

Managers must also acquire, develop and apply three basic kinds of expertise:

Conceptual skills: the ability to analyse, interpret and solve problems.

Human relations skills: these are important at all levels of management, although they differ in nature and intensity at different levels.

Technical skills: these tend to be more important at lower levels of management than at upper levels, as they usually relate to specific operating activities.

The Effectiveness of Managers

The effectiveness of managers is judged by the results that they obtain for the organisation by using the resources available to them. A very common way to assess managers' performance is by Management by Objectives (MBO).

Annex 2 gives a more comprehensive description of the management process.

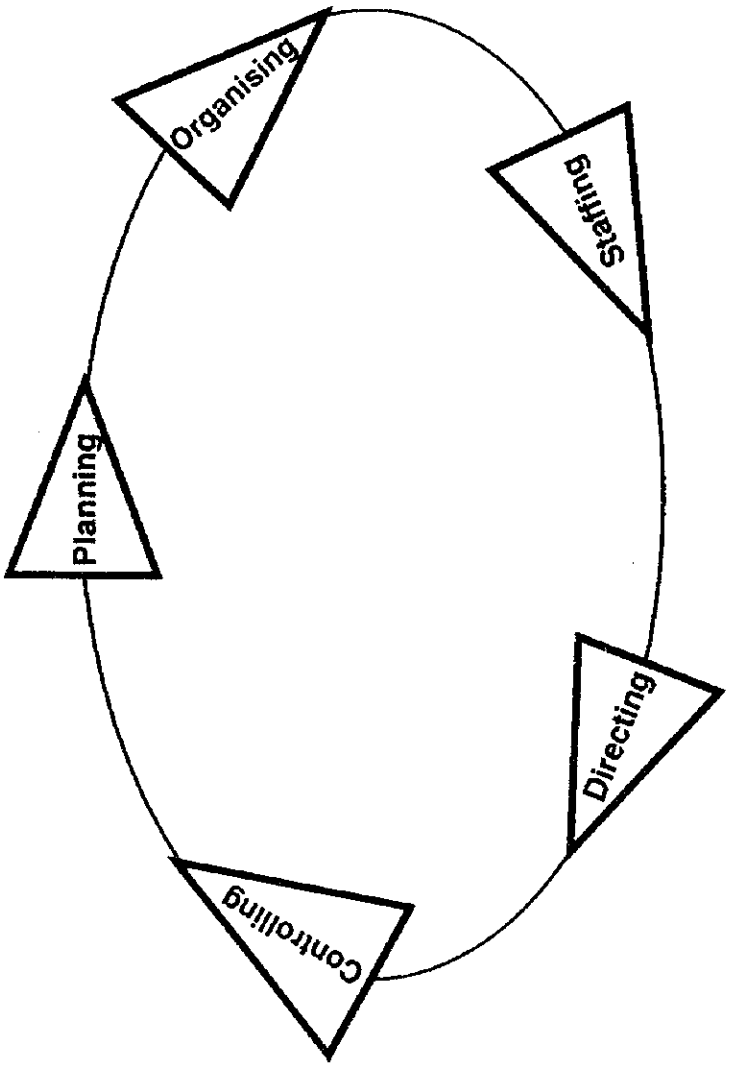


Figure 2.1-3 "The ManagementCycle"

The Planning Process

Planning is a comprehensive process in which managers formulate the specific objectives or goals of an organisation and then develop and prepare plans for attaining them.

Objectives and goals specify an organisation's purposes and targets which (a) support that organisation's survival and (b) provide focus for management's actions and employees' efforts.

Plans delineate the paths to be followed to fulfill an organisation's mission and goals.

Effective Planning follows a Systematic Process

An organisation should:

Firstly set its mission statement, its strategic objectives and strategic goals;

Secondly prepare a strategic plan which delineates the paths (strategies) to be followed to achieve and fulfill its strategic objectives and goals;

Thirdly express its strategies in policies and procedures; and

Fourthly prepare short term operational plans. Operational plans are the cutting edge of the organisation's strategic plans. They are concerned with how an organisation's resources are utilised under specific short term plans and schedules to achieve its strategic objectives and goals.

Figure 2.1-4 summarises the main elements of the planning process showing how missions, goals and plans interlock.

Planning Definitions

A Mission Statement states the organisation's fundamental purpose & objectives. A complete mission statement includes (1) a description of the organisation's basic products or services, (2) the functions that it will perform, and (3) the markets or clients it will serve. For example:

Strategic Objectives are the broad purposes of an organisation and serve as a navigational azimuth, or direction, toward which organisation is steered.

Goals describe the specific, concrete targets, or standards, that an organisation or department is expected to reach in a given period of time.

Plans delineate the paths to be followed to fulfill an organisation's mission, objectives and goals. Plans are the road maps of an organisation.

The Planning Process

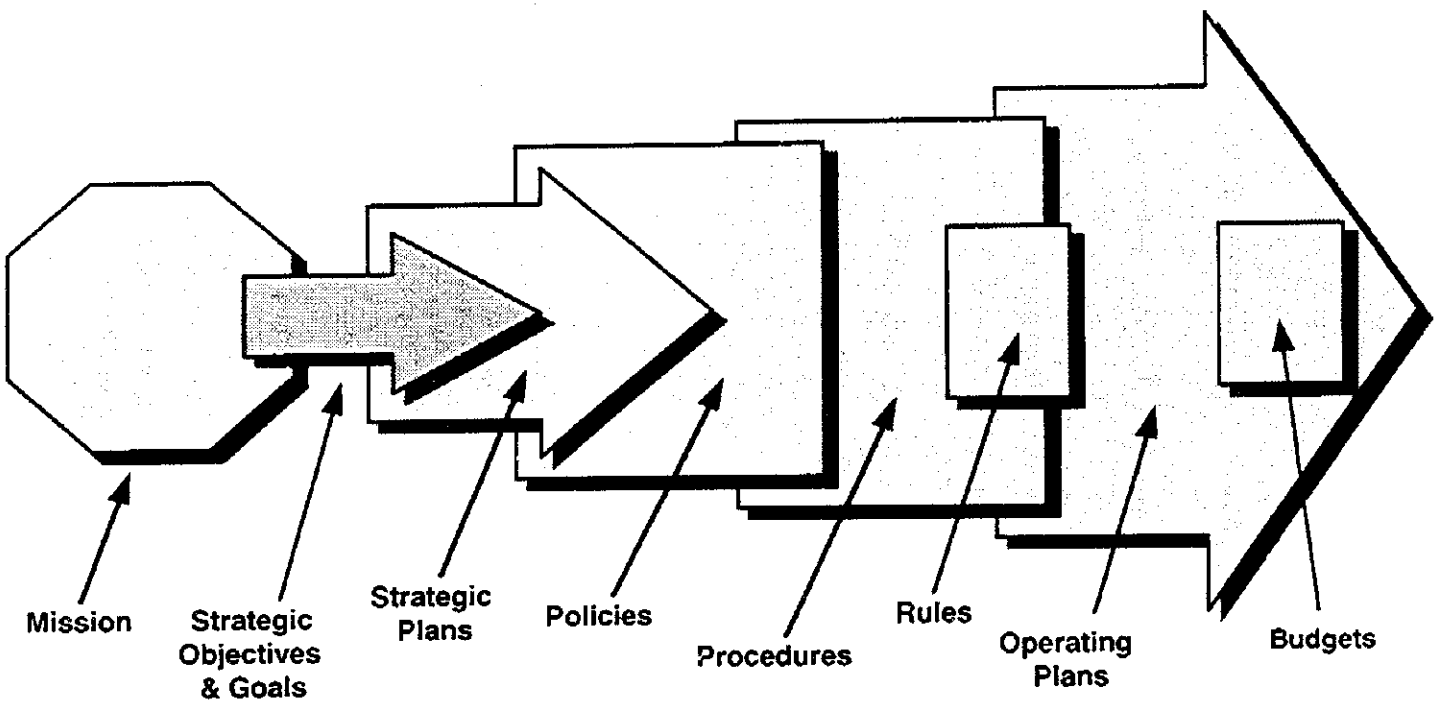


Figure 2.1-4 The Planning Process

Strategic Plans frame the big picture and are long term, ie 3-5 years more. They are conceptual in nature and lay out general guidelines rather than detailed schedules. They delineates the broad paths (strategies) to be followed to achieve and fulfill strategic objectives and goals.

Policies flow from and are an expression of an organisation's strategies. Policies provide managers with general guidelines for making decisions. They also assure consistency among an organisation's managers and help them to avoid making the same decision over and over again.

A Procedure is a more concrete and detailed a policy. It specifies how a recurring task is to be done, enumerating the steps involved and the sequence to be followed

A Rule or Regulation is a further extension of a policy and a procedure. A rule prescribes a detailed course of action that must be followed. It therefore differs from a policy, which is a general guideline, or a procedure.

Operational planning provides the cutting edge for strategic plans. It deals with how an organisation's resources are utilised under specific plans and schedules to achieve strategic objectives and goals.

Annex 1 gives a comprehensive description of the Planning Process.

Key Organisation and Management Principles

Key Management Words and Terms

- Organisational structure
- Functions and Departmentation
- Responsibilities and accountability
- Planning
- Policies
- Procedures and Rules
- Objective setting and performance measurement
- Financial management
- Systems and Management Information Systems
- Decision making
- Human resource management

Key Organisation and Management Principles

1. Effective planning and policy formulation. This includes establishing mission statements, strategic objectives, strategic goals, policies, and preparing strategic and operational plans.
2. An efficient organizational structure with clear reporting lines, rational departmentation, reasonable spans of control and numbers of levels of managersa and supervisors, and an appropriate senior management structure.
3. A clear assignment and delegation of responsibilities and adequate authority to managers and supervisors with accountability for individual performance.
4. Procedures to clearly set and monitor objectives from the strategic level down to middle management and supervisors. Managers must have a clear understanding of their objectives and managers performance should be periodically assessed against agreed performance targets and criteria.
5. Effective financial management. This should include integration of financial planning into the Planning Cycle, and implementing budgetary planning and control and appropriate accounting systems.
6. Effective decision making by managers.
7. Effective and appropriate systems. These will essentially include management information systems. Managers will need appropriate and regular information to enable them to make effective decisions and to efficiently carry out their responsibilities.
8. Good human resource management.
9. Well trained and committed managers who have good conceptual, interpersonal and technical skills.

Formulate Key Preparatory Actions for Strengthening the DoE's SWM Functions

Formulate Key Preparatory Actions for Strengthening the DoE's SWM Functions

JICA SWM Study

Formulate Key Preparatory Actions for Strengthening the DoE's SWM Functions

This Session's Task is to formulate four key Preparatory Actions for strengthening the DoE's SWM functions. The four Actions to be formulated are:

1. Restructuring the Existing Organisational Structure of the DoE's SWM Functions;
2. Establishing a new Community Development Unit;
3. Establishing a new Contract Management Unit; and
4. Establishing a new Environmental Regulation Unit for Solid Wastes.

Methodology for Formulating each Action

The Workshop's participants will split into 3 groups and each group will formulate one or two of the Actions.

Group 1 will formulate "Restructuring the Existing Organisational Structure of the DoE's SWM Functions".

Group 2 will formulate two of the Actions - "Establishing a new Community Development Unit" and "Establishing a new Contract Management Unit".

Group 3 will formulate "Establishing a new Regulation Unit".

It is recommended that each group carries out the formulation and prepares outputs for presentation on the following basis:

1. Define the Objectives and Goals of the Preparatory Action: eg improve organisational efficiency, state mission of new units, strategic goals, etc .

2. Define what is to be implemented: eg what functions, responsibilities and tasks to be implemented and performed, structure of new units, staffing positions and numbers of staff etc . Simple definitions and descriptions should be made.

3. How and when to implement the Action: eg approvals needed to create new units and staff positions, and to recruit staff. Prepare outline implementation timetable.

4. Identify who within and/or outside the DoE will be responsible for implementation.

At this stage new functions are established more in skeletal form, ie units and positions would be created, new managers and senior staff appointed and objectives and simple tasks defined. Full implementation of these functions will require assistance (including training) under the Capacity Building Assistance Program.

The formulation of the "Restructuring of the Existing Organisational Structure" should only consider the top and mid manager level positions, functions and tasks.

Participants should wherever possible identify any urgent actions.

Each group will then present their Preparatory Action(s) to the whole Workshop which will discuss them, adjust them as appropriate and reach agreement on them. The Workshop will also identify who within or outside the DoE is responsible for monitoring the implementation of the Preparatory Actions.

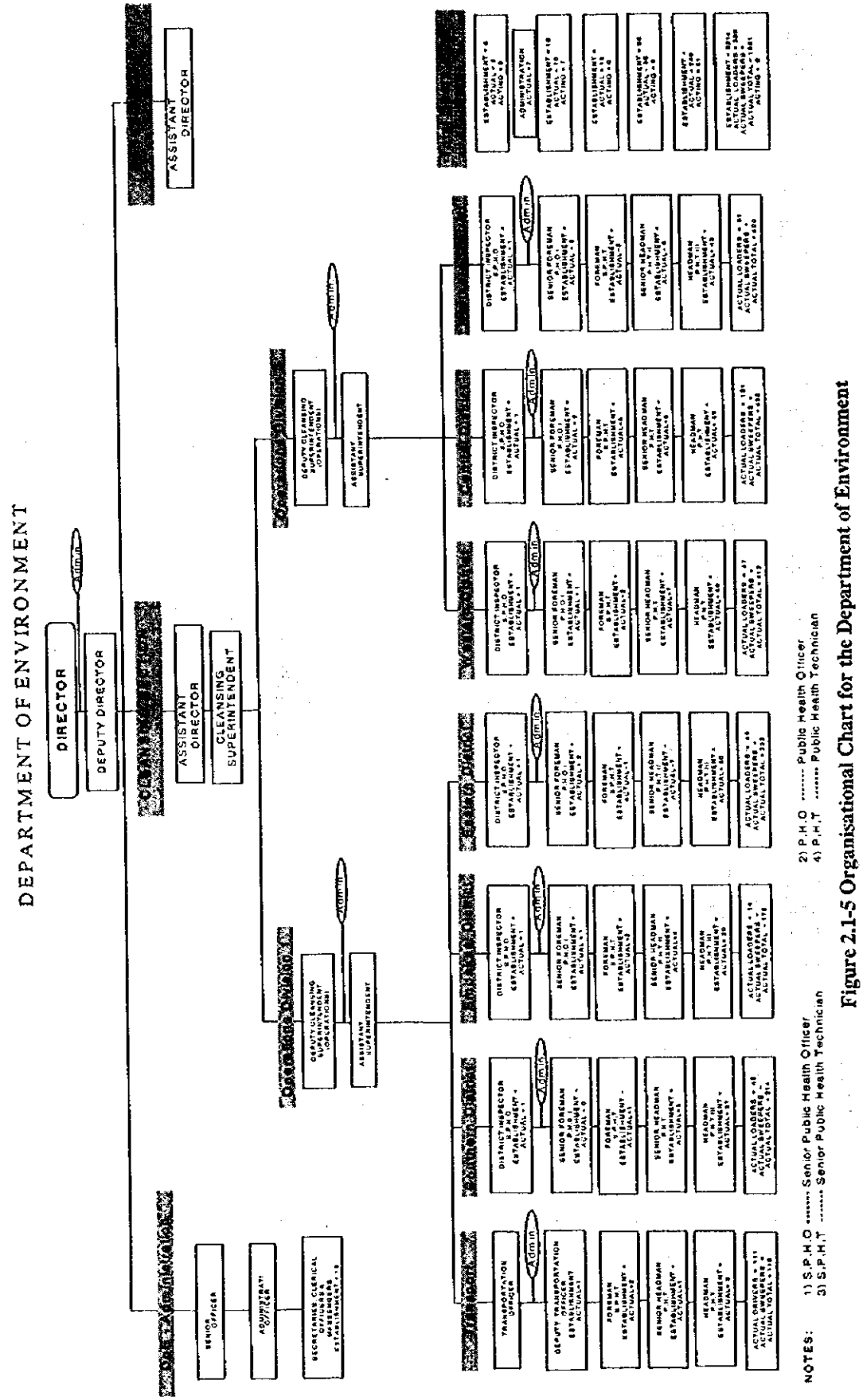
Finalise Agreement on the Preparatory Actions

The Preparatory Actions will be finalised in the afternoon of Day 2 when Day 1 participants will present the key recommendations of each Preparatory Action to a senior audience of policy makers from MOLG, NCC and other Ministries who will join the Workshop in Day 2.

After their presentation, all participants will jointly agree on the implementation of each Preparatory Action.

The Organisation charts of the existing DoE is shown in the **Figure 2.1-5** below.

Background Notes on each Preparatory Action are given below.



NOTES: 1) S.P.H.O ------ Senior Public Health Officer
3) S.P.H.T ------ Senior Public Health Technician
2) P.H.O ------ Public Health Officer
4) P.H.T ------ Public Health Technician

Figure 2.1-5 Organisational Chart for the Department of Environment

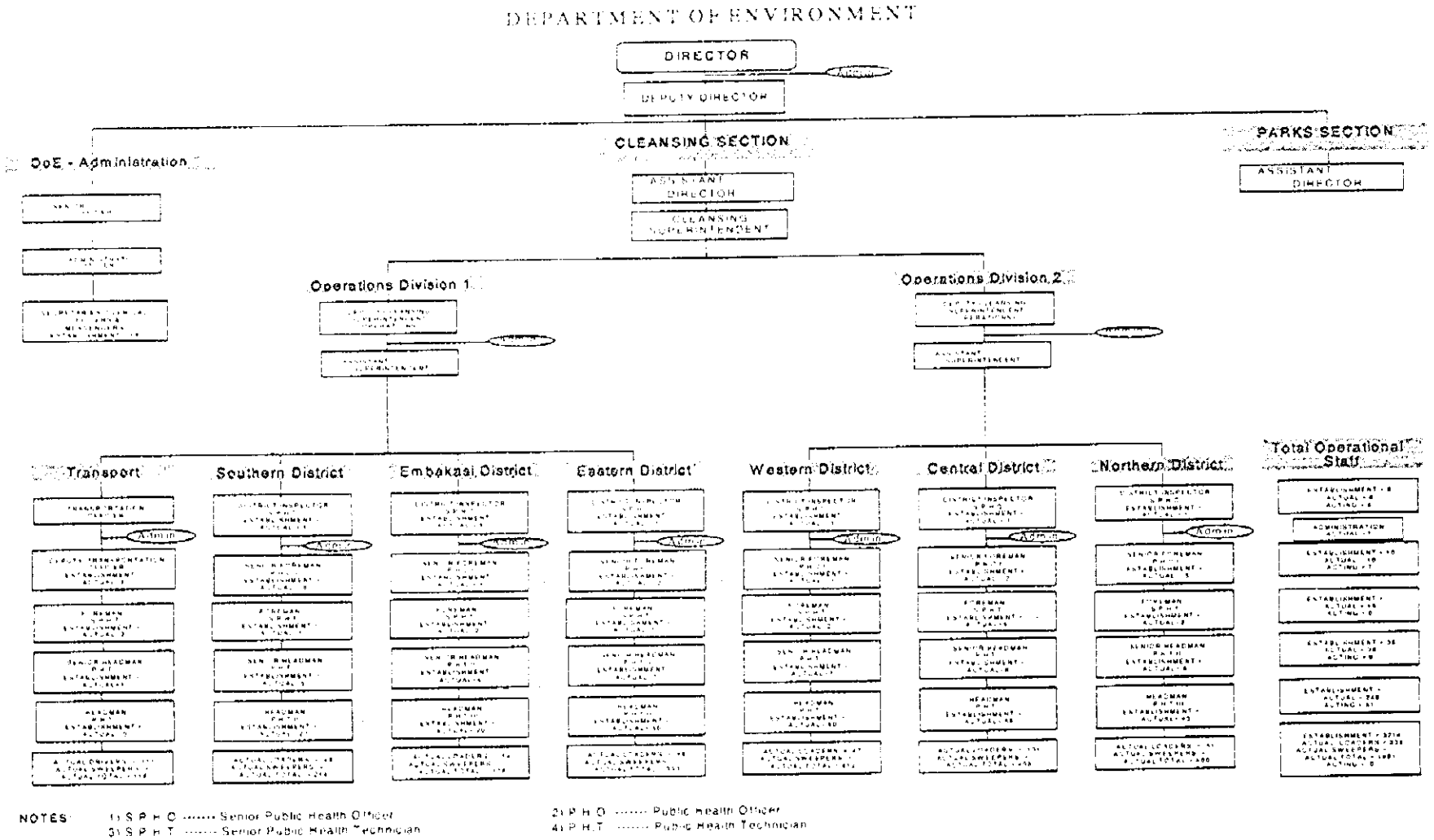


Figure 2.1-5 Organisational Chart for the Department of Environment

1. Restructuring the Existing Organisational Structure of the DoE's SWM Functions

The DoE needs substantial restructuring of its existing organisation of its Cleansing Section. The key elements of the restructuring are:

1. transforming the existing Cleansing Section into a SWM Division and reducing the number of vertical levels in senior and middle management and creating new positions for a SWM Deputy Director, a SWM Operations Manager and two deputy SWM Operations Managers;
2. separating disposal from collection and street cleansing services and establishing a Disposal Unit. A new Disposal Manager will be appointed; and
3. separating the management of collection services from street cleansing.

(1) Reducing the Number of Vertical Levels in the Organisational Structure

Evaluation of the Vertical Structure

The vertical structure is shaped by the scaling of staff rather than by functional needs. As a result Districts have very similar vertical structures and staff have very similar responsibilities in each district. This typically creates too many levels and duplication or overlap of responsibilities.

Figure 2.1-6 below gives the main vertical groupings of staff in the Cleansing Section from management, supervisors down to manual labourers. It is clear from the Figure that there are too many levels. There are 13 levels from the director to manual labourers.

Too many levels contributes to ineffective management and slow decision making as information and requests take too long to travel up and decisions and directions from senior officers take too long to travel down. Information and decisions also get distorted in this process.

In particular there are too many levels of senior managers. Between the Director and the District Heads who are the key middle managers in the Cleansing Section, there are five staffed levels including himself (this excludes the position of Assistant Director Cleansing which is currently vacant).

Overview of management, supervisors and manual labourers

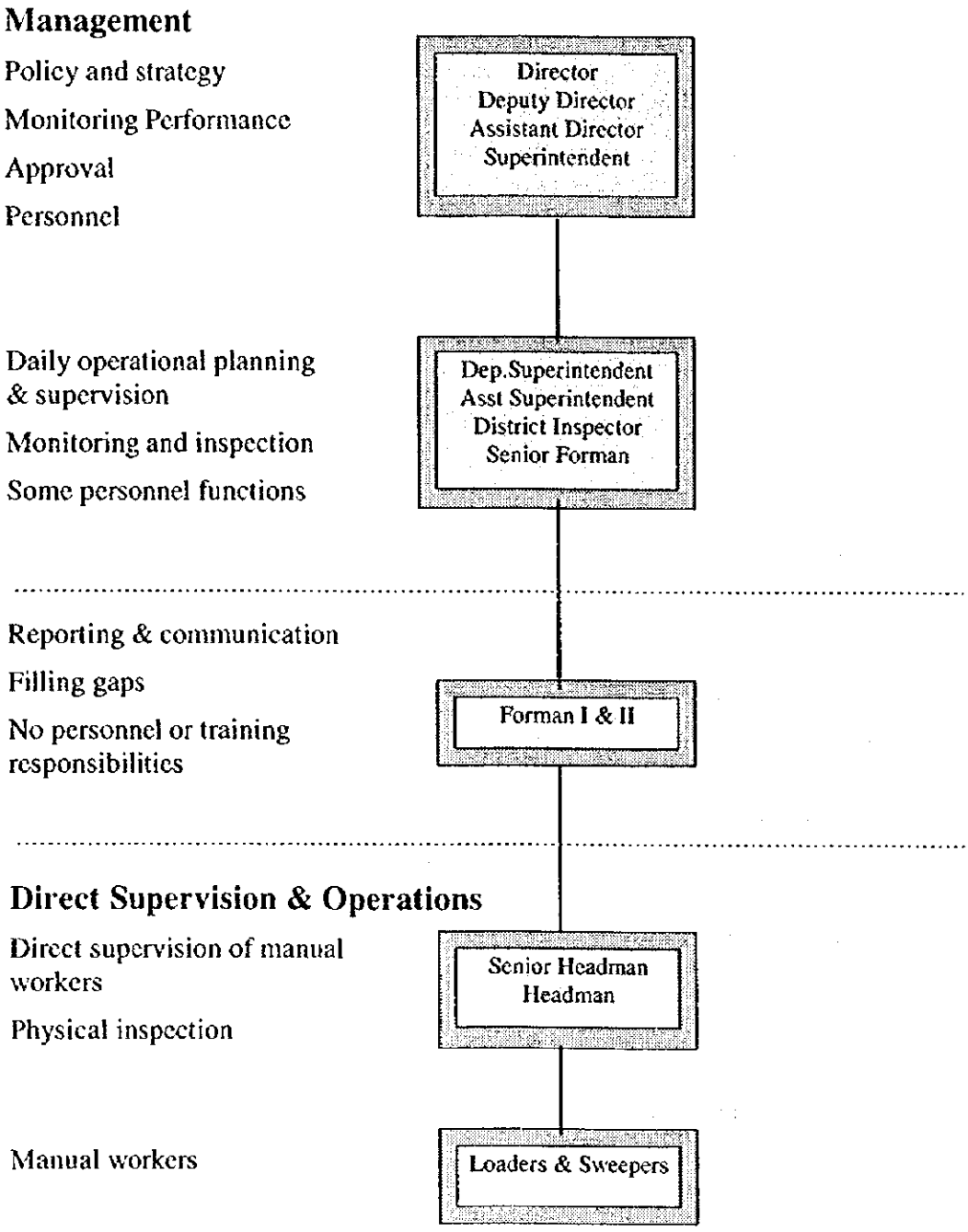


Figure 2.1-6 Overview of Management, Supervisors and Manual Labourers

Amongst these officers there is a considerable overlap in making daily decisions about operations and monitoring the performance of those operations. In fact in some cases there appear to be few real differences in their responsibilities and functions.

This is characteristic of the "chain of approvals" syndrome where people review, report, and make approvals in a long chain but little value is added.

There is similar overlap of supervisory responsibilities between the positions of Senior Forman and Forman I/II and between Forman I/II and the Senior Headman.

At the level of manual workers the DoE is bottom heavy and overstaffed. These positions are filled with scales 16, 17 and 18. Overstafifng is dealt in the Section 2.5, Human Resource Management and Development.

Draft Recommendations for Removing Vertical Levels

Several vertical levels in the organisational structure should be removed to improve organisational efficiency. It is recommend that on balance 4 levels are removed reducing the number from 13 to 9.

Firstly, the position of Assistant Deputy Director of Cleansing which has not yet been filled should be removed. Instead we recommend that the Director is supported by one Deputy Director heading a new SWM Division. Other Deputy Directors would be appointed to other Divisions in the DoE.

Secondly, the position of Cleansing Superintendent should be removed and replaced with four Managers each reporting to the new Deputy Director of SWM.

We recommend that one Manager heads one heads the existing Collection and Street Cleansing Function, one heads a new Community Development Unit, one heads the new Disposal Unit, and one heads a new Contract Management Unit.

Thirdly, within the Collection and Street Cleansing Unit the positions of the two Deputy Superintendents and the two Assistant Deputy Superintendents should be removed and instead replaced by two Deputy Operations Managers. This would remove one level.

Each Deputy Manager would manage one Operating Division comprising 3 Districts similar to the existing arrangements.

In addition the Transportation Unit would cease to be managed under Operating Division 1. Instead we recommend that the Transportation Function is elevated and the Transportation Manager report directly to the new Manager of the Collection and Street Cleansing Unit.

Lastly, the positions of Forman I and II should be removed in each District. There is no need to replace them. Instead the Senior Headman should report directly to Senior Forman. This would remove two levels.

It is recommended that the DoE implement all these structural changes and new appointments in 1998.

(2) Disposal is Separately Managed from Collection and Street Cleansing

Currently the Dandora dumpsite is managed under Embakasi District by one Forman who reports to a Senior Forman. Disposal is a key responsibility of the DoE and should be managed at a much higher level than the District level, given the environmental and social responsibilities involved.

It is recommended that disposal is separately managed from collection and street cleansing in a new Disposal Unit. The Unit would be managed by a Disposal Manager reporting directly to the head of the Cleansing Section. It is thought that the DoE can implement this in 1998. It will need to recruit or internally promote the new manager.

(3) Separate the Management of Collection from Street Cleansing

The daily management of collection and transportation should be separated from the daily management of street cleansing within each of the Cleansing Section's Districts.

We recommend that in each District each of these activities is separately managed by one Senior Forman instead of Senior Forman managing both collection and street cleansing.

This would reduce wide spans of control, eg in Western District, rationalise the organisational structure and strengthen daily management.

It is recommended that the DoE implement this in 1998. It will need to appoint 4 more Senior Forman.

2. Draft Recommendations for Establishing a new Community Development Unit

It is recommended that a new Community Development Unit (CDU) is established in the Cleansing Section. The DoE will need to appoint a Community Development Manager to head the Unit who will report to the new Deputy Director of Cleansing Section. The Manager will need several assistants.

Creation of the CDU and the seniority of its manager gives recognition to the fact that some 50% of Nairobi citizens live in informal settlements which are largely beyond the reach of conventional centralised SWM services, and that a key role of the NCC is to facilitate the development of demand-based self-help community services in these areas.

Three distinct areas of work are identified which will form the core activities of the Unit during its initial years. These are to:

- establish links with NGOs and CBOs to facilitate the extension of self-help community schemes throughout the informal areas to improve sanitary conditions;
- facilitate the formation of local residents' associations through which to establish community-based primary collection schemes to complement minimum level secondary collection services provided by the NCC;
- work with NGOs and CBOs to help facilitate the improvement of the conditions of scavengers, especially those operating at the landfill site.

The DoE should appoint the Community Development Manager and staff in 1998.

3. Draft Recommendations for Establishing a new Contract Management Unit

The system of contract management should be established before the DoE contracts out further collection or street cleansing services.

The principle role of the Contract Management Unit is to manage contracts with the private sector. It would be headed by a Contract Manager who will report directly to the Regulation Manager. The appointee will need contracting expertise.

By contract management is meant the system of controlling and managing contracts from their inception, i.e. preparation of the contract specification, to the completion of the contract. This includes include the procedures and systems to monitor the delivery of the contractor's services.

Pre contract arrangements should typically should include specification preparation, contract planning, setting tender evaluation criteria, prequalification, documentation, the tendering process itself, post tender negotiation and award of the contract. An important feature of the CBA will be to advise on the most appropriate contract pricing structures.

In NCC they appear to be largely the responsibility of the Town Clerk's Department.

The Unit would play an important role in the pre-contract process, ie in formulating contract strategy, preparation of the contract specification, prequalification, contract design and contract negotiation.

Post contract arrangements: the Unit needs to set up a strong system of contract control and monitoring of services to ensure that after the contract is awarded, it is executed and carried out according to the performance standards specified in the contract, and to the contract's terms and conditions. These arrangements should include as a minimum:

Monitoring the service delivery: A performance measurement system should be established to enable the DoE to monitor and to report on the performance of the contractor.

The contractor should be made responsible to report performance data to NCC on a regular basis. In this way the contractor can be made responsible for early identification of problems and make proposals on how to resolve them. This should be supported by regular meetings between the DoE and the contractor to discuss progress on the contract and to anticipate and resolve problems that may arise.

Monitoring is also essential to enable the DoE to assess whether the contract is giving Value for Money (VFM). The VFM assessment considers the balance between risk, cost, service delivery and quality.

The contract should be managed to ensure that all costs are recorded, services are delivered on a timely basis, there is no change to the balance of risk and that quality is assured.

Monitoring for compliance with contract terms and conditions: contract terms and conditions set out the framework of the respective parties' obligations. Monitoring them is essential to ensure that these obligations are complied with by both parties.

Terms and conditions normally cover the payment conditions, responsibilities for contract monitoring and measurement, and procedures for resolving problems concerning failure to perform, default and termination.

It is essential that proper documentary evidence is maintained where the contractor fails to perform or there is default. Maintaining good documentary evidence facilitates the correction of failures to perform and enables default procedures to be effectively implemented.

A workable structure to resolve legal and commercial issues should also be implemented.

Procedures to manage change to contract provisions and terms and conditions: Procedures should be implemented to enable the contracting parties to manage any changes to the contract provisions or terms and conditions.

From time to time such needs arise and it is necessary that they are smoothly and properly handled.

Meeting contracting goals and objectives: As discussed above, part of contract management is to ensure that optimal VFM is assured for NCC and that contracting goals and objectives are met. Senior management should be kept appropriately informed.

The DoE should appoint the Contract Manager and his staff in 1998.

4. Draft Recommendations for Establishing a new Environmental Regulation Unit of Solid Wastes

The role of the Unit would not only cover monitoring and enforcement of solid wastes but also some technical responsibilities.

The principle role of the Unit is to monitor the SWM activities of 1) generators of waste, 2) private collection companies licensing them, as well as, 3) the DoE's own activities, and to enforce SWM legislation. These activities are cover the storage, transportation and disposal of wastes.

The Unit will also take responsibility with the Town Clerks Department for formulating the new SWM By-Law proposed under the Institutional Restructuring Plan.

The Unit will regulate private collection companies by issuing licenses to them and monitoring the licences for compliance.

The focus of monitoring the DoE's activities would be on the handling of industrial, hazardous and clinical wastes. Currently the DoE is having to accept at its Dandora dumpsite site and sometimes collect these wastes. The Regulation Unit will need to formulate basic procedures for the safe handling of these wastes and to develop its staff's technical knowledge.

The Unit will also monitor the activities of generators of industrial, hazardous or clinical wastes in Nairobi. When the new Environmental Bill and NCC's SWM By-Law are enacted and generators have to comply with the new legislation, the DoE can cease monitoring their activities. It is assumed that MENR will then have these responsibilities.

The Unit's role will then be to enforce the new SWM By-Law as well as any provisions of the new Environmental Act. It should also review the working of the By-Law and recommend amending it as appropriate.

The DoE should appoint the Unit's Manager and his supervisory staff in 1998.

Formulate a Strategy for the Future Role and Status of the DoE

Formulate a Strategy for the Future Role and Status of the DoE

This Session's Task is to formulate a strategy for the future role, status and organisational structure for the Department of Environment. Outputs will be:

1. a Mission Statement;
2. Strategic Objectives and Goals;
3. an outline Strategic Plan;
4. organisational functions. This should cover not only operational functions but should also consider arrangements for a senior management team, finance, human resources management, MIS and other key management capabilities as appropriate; and
5. an organisational chart.

Methodology for Formulating the Strategy

The Workshop participants will be split into 3 groups. Each group will formulate a strategy and prepare outputs. One of the Groups will present its strategy to the whole Workshop which will discuss it, add and adjust it as appropriate and reach agreement on it.

The Workshop will also identify who within and/or outside the DoE will be responsible for implementation of the strategy.

Scheduling

The strategy will be formulated on the morning of Day 2. A presentation of the proposed strategy will be made to the Permanent Secretary during the Closing Session at the end of Day 2.

The Current Role of the DoE

Although the DoE was set up as an environmental department it does not carry out any environmental regulation. Currently it provides SWM and Parks management services (provided through its Parks Section) which are very different types of services.

SWM is an environmental and public health service. Parks management provides a recreational and also an aesthetic service to Nairobi's citizens. Parks management therefore fulfills more of a social role. Currently the DoE is therefore carrying out two dissimilar services.

The DoE's future mission remains unclear. Will the DoE develop an environmental regulatory role? If it does what will the scope of DoE's environmental responsibilites be? Currently they remain unclear.

And if it does what will the DoE's basic mission be? Is it to be an environmental regulator or a provider of services or both?

Options for the Future Role and Status of the DoE

There are three basic options for the DoE's future role: Either the DoE becomes an:

1. environmental regulator only;
2. environmental regulator and a provider of SWM services; or
3. environmental regulator, and a provider of SWM and Parks services.

Two of several criteria to evalute the options are:

1. environmental regulation and environmental services should be separated;
2. DoE's environmental regulatory responsibilties should not overlap with national environmental responsibilties.

Non Operational Functions

Non operational functions should also be considered in the strategy and in formulating the organisational struture. In the Institutional Restructuring Plan it is recommended that the DoE establish:

- a New Administration Division to manage the DoE's Human Resources, Finance and general administration;
- a Management Team amongst its existing senior officers; and
- an MIS capability.

It is recommended that these proposals are considered by the groups.

Finalise and Agree Preparatory Actions for Strengthening the DoE's SWM Functions

JICA SWM Study

Finalise and Agree Preparatory Actions for Strengthening the DoE's SWM Functions

The Preparatory Actions will be finalised in the afternoon of Day 2 when Day 1 participants will present the key recommendations of each Preparatory Action to a senior audience of policy makers from MOLG, NCC and other Ministries who will join the Workshop in Day 2.

After their presentation, all participants will jointly agree on the implementation of each Preparatory Action.

Closing Session

JICA SWM Study

Presentation of the Workshop's Key Decisions and Recommendations to thePermanent Secretary, MOLG

The Workshop groups will present to the Permanent Secretary and the Town Clerk the key decisions and recommendations from the Workshop covering the:

1. implementation of the four key Preparatory Actions for strengthening the DoE's SWM functions; and
2. the strategy for the future role and status of the DoE.

The Closing Speech will be given by the Permanent Secretary, the Ministry of Local Government.

Annexes
to the Workshop Pack

JICA SWM Study

Annex 1 of Workshop Pack
The Management Process

The practice of management is difficult, demanding, and unique. Managers - the practitioners of management - exert tremendous leverage in helping groups of people - organisations - to become effective and productive.

What is Management?

Management is the process of obtaining, deploying, and utilising a variety of resources in support of an organisation's objectives. These resources are people, financial, raw materials, equipment, infrastructure, etc...

One of the most essential resources of an organisation is its employees.

Managers, as the practitioners of management, devote a large portion of their efforts to planning, directing, and controlling the work of these human resources.

One clear distinction between managers and other employees, however, is that managers direct the work of others rather than performing the actual work themselves. And managers not only direct the work of others, they are also responsible for the work of others.

Managers Perform Five Unique Functions for an Organisation

Managers perform Five Unique Functions. These are:

Planning

A manager is responsible for setting overall objectives and goals to unify employees' efforts. As an extension of such goal setting, managers also design and prepare the plans and schedules that will help to move and guide everyone towards the organisation's goals.

Senior Managers set broad strategic objectives and strategic goals and prepare strategic plans for the entire organisation. Typically they look ahead for 1 to 5 years.

Middle-level managers are more likely to think in terms of goals and plans for the next month or year.

Supervisors establish short-term goals and plans, such as how many widgets the group must make today.

Organising

In any organisation, there is always the question of who should do what. When managers carry out the organising function, they make that decision.

It is a managers' responsibility to define the organisation's functions and to create departments and sections and positions for individual members of staff. Managers then define and assign the responsibilities and tasks that these departments, sections and staff will carry out.

Managers organise these responsibilities and tasks so that the organisation can meet its objectives.

Organising also requires that the manager establish the relationships between departments or positions. These relationships determine which functions in the organisation will have priority over others and which will be dependent upon others.

For example: the various claims sections of an insurance company may all be on the same level of an organisation chart, but the claims department itself may be placed at a lower level than the underwriting or sales departments.

Staffing

Positions in an organisation chart have little consequence until they have been filled with individuals who are qualified to perform the duties associated with those positions. When managers fill these positions they are performing the **staffing function.**

Directing

Once the plans have been prepared, the organisation created and the positions filled, the organisation is ready to be set in motion. In effect, the organisation is waiting for someone to ring the starting bell and to guide the organisation's activities. That is the manager's responsibility, and it is carried out by the **directing function.**

Managers direct, ie command or instruct, employees to go about their assignments. Directing, of course, requires much more of managers. They must not only be expert communicators; they must also provide the motivation and leadership that give purpose and spirit to the employees who report to them.

Controlling

Once an organisation's wheels are in motion, the hope is that staff will do their job well, that plans will run smoothly, and that goals will be met. This is not often the case.

Someone must keep an eye on things, regularly checking to see whether or not outturn results are going according to plan. That is the manager's **controlling responsibility.**

Managers must know when plans are faltering and results are off-target. When these things do go awry, it is the manager's control responsibility to take the necessary corrective action to put the plan back on track.

The "Management Process"

Managers routinely perform the five unique functions just described. In theory, they perform these functions in the sequence in which they are discussed above and shown in the **Figure 2.1-7**

That is, it is rational for managers first to develop plans, then to create and staff an organisation, next to direct it into action, and finally to exercise controls as the organisation proceeds toward its goals. Conceptually, these five steps, taken in order, have been described as the "management process".

In actual practice, however, any of the functions may be taken independently and in any sequence that circumstances dictate. A manager may go through all five functions in a day and repeat all five the next day. Or a manager may spend months in planning before an organisation is developed and staffed. The plan may then remain in place for months while it is being activated and its progress monitored and controlled.

Because the management process can be - and - is - repeated over and over again the process is sometimes called the **"Management Cycle"**.

Managerial Skills

To effectively carry out their key functions managers must be able to make effective decisions. In the decisional role managers often act as a crisis handler, eg when a competitor cuts its prices, or they act as a negotiator between the organisation and a third party. But the most common decisional role and sometimes the most difficult, is when managers have to make decisions about allocating resources.

Managers must also acquire, develop and apply three basic kinds of expertise. These have been identified as (1) conceptual skills, (2) human relations, or interpersonal skills and (3) technical skills.

Conceptual skills: the ability to analyse, interpret and solve problems becomes increasingly important as you move up the managerial ladder.

Human relations skills: these are important at all levels of management, although they differ in nature and intensity at different levels.

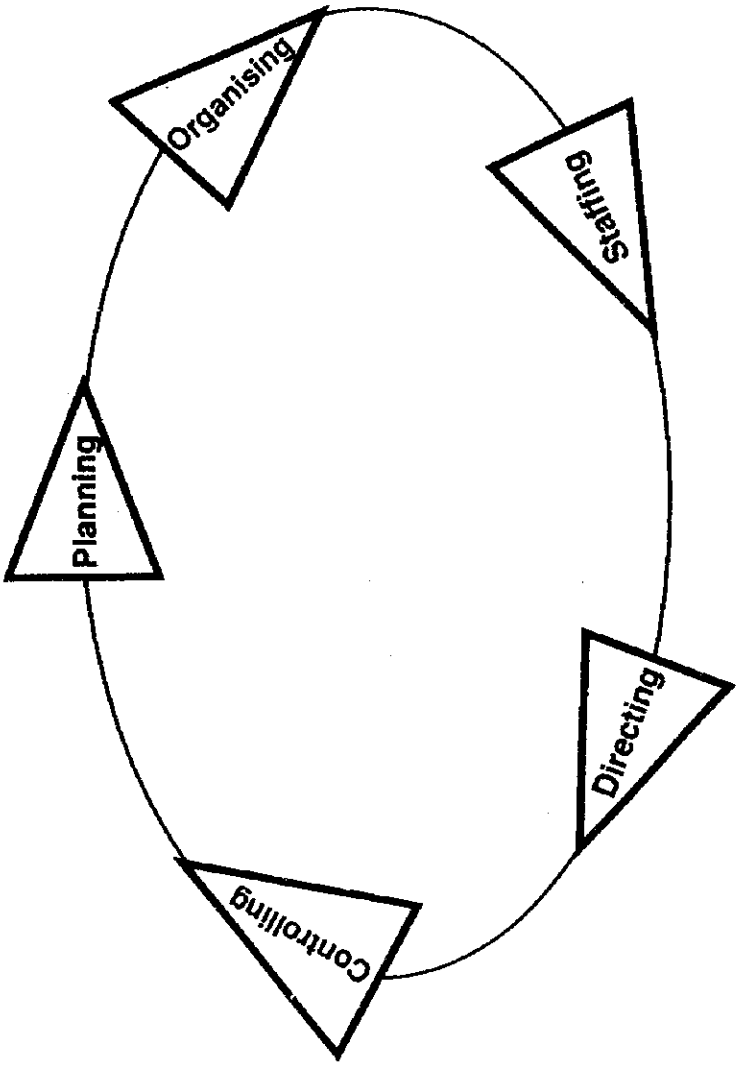


Figure 2.1-7 "The Management Cycle"

Technical skills: technical skills tend to be more important at lower levels of management than at upper levels as they are usually related to the specific operating requirements of a particular organisation.

The Effectiveness of Managers

The effectiveness of managers is judged by the results that they obtain for the organisation by using the resources available to them.

"Management by Objectives"

Many organisations use a technique called "management by objectives" (MBO) as an incentive, a control, or both, to bring the plans and actions of its managers closer to the organisation's objectives.

Management by objectives provides a mechanism for encouraging managers to coordinate personal and departmental plans with organisational goals.

The underlying principle of MBO is that when people are involved in setting their own goals they are likely to be committed to attaining them. This concept has been shown to be most effective when managers assign goals to other managers.

Under an MBO system, the higher-level executive does not impose the goals of the organisation on the subordinate. Instead the two work together to examine the organisations goals, and then in the light of those goals arrive at a set of goals for the subordinate manager to attain. This set usually includes self development goals as well as organisational goals.

MBO therefore provides a mechanism to assess managers' performance as well as to bring the actions of managers closer to the organisation's objectives.

Annex 2 of Workshop Pack
Planning

1. The Planning Process

Planning is a comprehensive process in which managers formulate the specific objectives or goals of an organisation and then develop and prepare the plans for attaining them. Effective planning is future-oriented and follows a systematic process:

Firstly an organisation should set its mission statement, its strategic objectives and strategic goals.

Secondly an organisation should prepare a strategic plan enunciating its long range plans and strategies and express these strategies in policies and procedures.

Lastly an organisation should prepare its short term operational or tactical plans which provide the cutting edge for achieve the organisation's strategic plans and objectives.

The planning process is critical, since the objectives or goals established thereby limit the scope of an organisation's activities as well as its plans. In developing their strategies, managers must recognise the limitations placed upon an organisation by its environment.

The key concepts which underlie the planning process are:

1. Effective planning follows a systematic process.
2. Objectives and goals specify an organisation's purposes and targets that (a) support that organisation's survival and (b) provide focus for management's actions and employees' efforts.
3. Strategic and operating plans delineate the paths to be followed in seeking to fulfil an organisation's mission and goals.
4. Operational planning converts strategies into specific timetables by using a variety of forecasting and scheduling techniques.
5. Management by objectives provides a mechanism for encouraging managers to coordinate personal and departmental plans with organisational goals, thus ensuring that organisational objectives and goals are achieved.

2. Mission and Strategic Objectives

The strategic objectives or the broad purposes of an organisation serve as a navigational azimuth, or direction, toward which organisation is steered.

These are encapsulated in the organisation's Mission Statement which defines and states the organisation's fundamental purpose and objectives. A complete mission statement includes (1) a description of the organisation's basic products or services, (2) the functions that it will perform, and (3) the markets or clients it will serve. For example:

A food company - "we will prepare and distribute fine-quality pack-aged foods to national retailers".

An insurance company - "we will provide a wide variety of financial services to consumer and commercial customers in Kenya".

A hospital - "we will provide primary and secondary health care to all residents of our local community"

Manufacturing company - "we will design and manufacture metal and plastic valves and fittings, and will market them to home builders through a national network of industrial distributors in Kenya".

3. Goals

An organisation needs to state its goals. Goals describe the specific, concrete targets, or standards, that an organisation or department is expected to reach **in a given period of time.**

Goals range, from strategic and broad goals at the top of the organisation to highly specific goals at the lower levels.

At either extreme, goal descriptions are far more specific than the Mission Statement or other strategic objectives. The time period should be clearly stated and the goals quantified when at all possible. Use of numbers makes it relatively simple to determine whether or not a goal has been reached. Examples of goals statements are:

A strategic goal for a commercial airline - "Our goal is to capture 30% of the domestic market within three years".

A corporate goal for a manufacturing company - "Our goal for next year will be to:

- generate sales revenues of $50 million; and
- make a profit of $5 million, or 10 percent of sales".

4. Plans

Strategic and operating plans delineate the paths to be followed in seeking to fulfil an organisation's mission and goals. Plans are therefore the road maps that an organisation follows to reach its goals.

If plans are well-conceived, they will lead managers and employees to the desired destinations. Well-conceived plans specify at least 10 factors:

1. resources to be used, such a facilities, equipment, materials, finances, information and employee staffs;
2. methods, processes, and procedures to be employed
3. tasks to be performed, often each with its own standard or goal to be attained.
4. sequence, or steps, to be followed
5. individuals who are to perform the tasks, as well as those who will be held responsible for implementing the plan and accomplishing the goals.

6. a reiteration of the related goal, or an extraction or projection of that goal as it applies to the particular plan.
7. the location where the plan's activities are to take place
8. associated deadlines, timetables, and schedules
9. points along the way at which progress is to be checked
10. designation of measurements to be used in gauging progress and verifying goal attainment.

Plans can be classified according to their relationships to an organisation's mission and goals.

Strategic Plans

The plans that frame the big picture painted by the "Mission Statement" are called strategic plans. Typically, their planning horizon is 5 years more. They are conceptual in nature in that they lay out general guidelines rather than detailed schedules.

For example, a manufacturing company may say that its strategy is "to limit investment by purchasing, rather than by fabricating parts, and to assemble them for sale."

A fast-food chain's avowed strategy may be "to maintain our number 1 position by out advertising all competitors."

Strategic plans are often called "long-range plans," and many companies do not differentiate between their strategies, missions, and long-range plans.

Policies

Policies flow from strategies. Almost all mature organisations and companies develop a series of guidelines, called "policies," as an expression of their strategic plans.

A policy is a form of plan in that it provides managers with general guidelines for making decisions. Its main purpose is to assure consistency among an organisation's managers and to avoid having to make the same decision over and over again. A policy may be developed for almost any decision area. For example:

For personnel administration - "Our policy is to promote from within"

For purchasingdepartment - "Our policy is to have at least three suppliers for each commodity that we buy"

For marketing - "Our policy is to distribute only through wholesalers"

For finance - "Our policy is never to allow our borrowing to exceed 20 percent of our capital financing".

Procedures

A procedure is another form of plan. It is far more concrete and detailed than a policy. Typically, a procedure specifies how a recurring task is to be done, enumerating the steps involved and the sequence to be followed. Many organisations establish and

maintain a standard operating procedures manual. The procedures in the manual usually describe how a policy is to be carried out.

Rules or Regulations

A rule or regulation is a further extension of a policy and a procedure. A rule differs from a policy, which is a general guideline, or a procedure, which often allows for some leeway, in that it prescribes a course of action that must be followed.

As an extension of the purchasing policy illustrated above, an associated rule could be, "No vendor may supply more than 60 percent of the company's purchases of a particular commodity over a year's period."

Operating Plans

Operational planning provides the cutting edge for a company's strategic plans in that it deals with how an organisation's resources are utilised under specific plans and schedules to achieve the organisation's overall strategic plans and objectives.

Operating plans focus on short-term objectives and are sometimes called "tactical plans". Their horizon is almost always 1 year or less. Some organisations differentiate between "operating plans" and "operating programs" using the latter term to indicate a plan of broader scope and perhaps longer duration.

A company will usually prepare an annual operating plan which details how the organisation's resources financial or otherwise are to be utilised. It will set specific targets, state how objectives are to be met, present financial forecasts and budgets and a financing plan.

Operating plans are also "single-use" plans. That is, a plan is prepared for a specific operational activity eg this week's production, or next month's advertising campaign, or this year's recruitment. Any of these single-use plans may be repeated with slight variations, but when this occurs, the specific features of dates and people are likely to change.

A project is also a single-use plan, usually of a fixed duration, designed to accomplish a single and often narrowly focused task.

Probably the most common single-use operating plan is a budget. A budget specifies the measurable amount of resources financial or otherwise which will be assigned to a particular plan. While budgets are, more often than not, expressed in money terms, they typically encompass equipment, materials, and labour as well.

5. Summary

Goals and plans are essentially inseparable. All plans should cover the five points of "what," "where," "when", "how" and "who". Goals designate the "what," "where," and "when"; and Plans add to these the "how" and the "who".

The **Figure 2.1-8** below summarises the main elements of the planning process showing how plans interlock from missions to budgets.

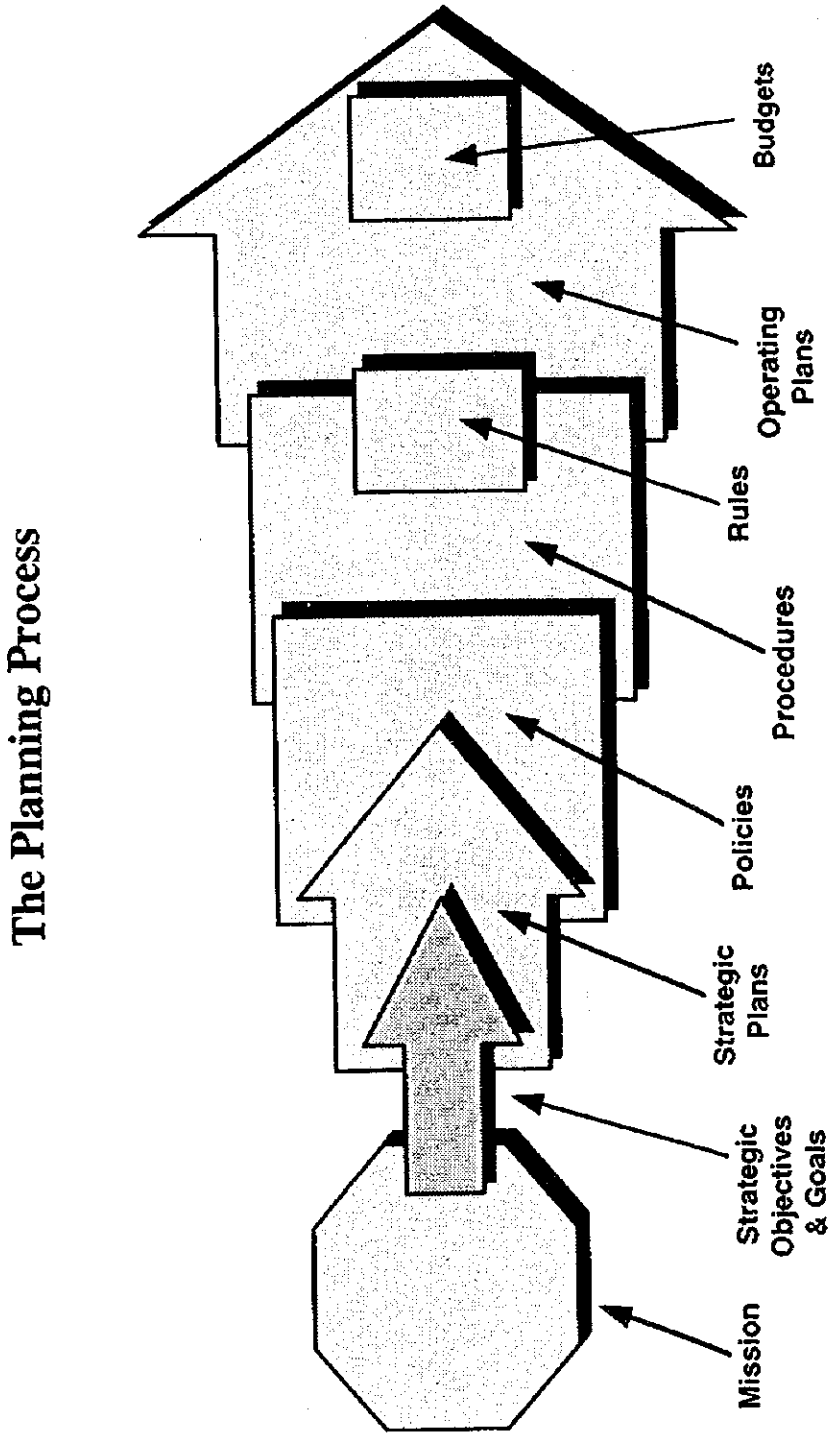


Figure 2.1-8 The Planning Process