

MANAGEMENT OF WORLD HERITAGE SITES IN EGYPT

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A-Artist's View built on
the urban public
compost of Cairo

Preliminary study of the waste disposal management in Historic cairo Final Report

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This report was produced in the framework of Urban Regeneration project for Historic Cairo – UNESCO, World Heritage Centre

The report is a preliminary study on the solid waste management in Historic Cairo. It collects and organizes the existing available information. It provides an initial description of the current different types and modalities of public services and community practices for the waste disposal; and it outlines the critical issues. It finally sketches out a program for a comprehensive study on Historic Cairo to design a waste disposal system in the framework of the Historic Cairo WH site management.

هذا التقرير هو دراسة أولية عن إدارة المخلفات الصلبة في القاهرة التاريخية. وهو يجمع وينظم المعلومات المتاحة حالياً. ويقدم توصيفاً أولياً لأنواع وأشكال الخدمات العامة والممارسات المجتمعية المختلفة الحالية فيما يتعلق بالتخلص من المخلفات؛ ويحدد أيضاً القضايا الحرجة المتعلقة بإدارة المخلفات الصلبة. وأخيراً يرسم برنامجاً لدراسة شاملة عن القاهرة التاريخية لوضع نظام للتخلص من المخلفات الصلبة في إطار خطة إدارة موقع التراث العالمي "القاهرة التاريخية".



Cairo has been a dominant political, cultural, commercial and religious capital throughout history playing a prominent role during Fatimids, reaching its golden age during Mamluks, and sustaining its cosmopolitan significance during Ottoman times. Due to its unique peculiar skyline, it has been known to scholars and historians as “City of the thousand minarets”.

Historic Cairo was inscribed on the World Heritage List in 1979 recognizing its “absolutely unquestionable historical, archaeological and urbanistic importance.” Upon ICOMOS recommendation, the inscription was based on the following criteria:

1. Several of the great monuments of Cairo are incontestable masterpieces;
2. The historic centre of Cairo groups numerous streets and old dwellings and thus maintains, in the heart of the traditional urban fabric, forms of human settlement, which go back to the middle Ages;
3. The historic centre of Cairo constitutes an impressive material witness to the international importance on the political, strategic, intellectual and commercial level of the City during the medieval period.

URHC Goals and Objectives In July 2010, UNESCO-WHC launched the Urban Regeneration Project for Historic Cairo (URHC) in the framework of a larger program of technical assistance to the Egyptian Government concerning the management of the World Heritage Site, focusing on the following objectives:

1. The preparation of a Conservation Plan for Historic Cairo’s “Core and Buffer Zones”, which would include the Management Plan required by the WH Operational Guidelines;
 2. The establishment of an institutional framework to undertake and develop a sustainable urban conservation policy, promoting coordination and collaboration amongst different institutions, administrations and agencies concerned with the management of the World Heritage Site;
 3. The creation of an appropriate and shared information platform for urban conservation.
- To achieve these goals, an interdisciplinary team of local and international consultants are collaborating with the concerned bodies to develop a set of protection measures in order to uphold the site’s Outstanding Universal Value, to prevent further decay of the historic urban fabric and to enhance the socio-economic conditions of Historic Cairo.

Table of Contents

Part One: solid waste management general presentation

5

| | |
|--|-------|
| <u>1. Waste production data</u> | 5 |
| Table 1. National Waste origins from 2000 to 2005 | 5 |
| Figure 1. Household Waste Generation Rates for Years 2000 through 2008. | 6 |
| Figure 2. Household Waste Generation Rates per-capita for Years 2000 through 2008. | 6 |
| <u>2. Waste management</u> | 7 a) |
| Institutional aspects | 7 |
| National Level | 7 |
| Local level | 7 b) |
| Waste management legal framework | 8 |
| Waste management financing legal framework | 9 |
| Regulatory Framework | 9 c) |
| Informal activities | 10 |
| Zabbaleen community: | 10 |
| Table 2 : Waste collected by the Zabbaleen at the national level | 11 d) |
| Integrated waste management policies | 11 |
| National Strategy for Integrated Solid Waste Management | 12 |

Part two: solid waste management in historic cairo

14

| | |
|---|-------|
| <u>1. Waste management in Cairo: statistics and management</u> | 14 a) |
| Waste arising | 14 |
| Table 3. Generated quantities of municipal solid waste divided by service | 14 b) |
| Waste management and institutional aspects | 15 |
| Creation of CCBA or the “formalization path”: integration of informal workers and local private companies | 15 |
| The national strategy and privatization of services: unify the system | 16 |
| Current Situation: | 17 |
| 2010: Policy Vision, a new plan for Cairo | 18 |
| <u>2. Waste management in Historic cairo: statistics and management</u> | 19 a) |
| Management | 19 |
| Map 1. Four zones of Solid Waste Management in Cairo (Boundaries 2008) | 20 |
| Table 4. Historic Cairo’ hay and respective waste collection zones | 20 |
| Table 5. Solid waste management and public cleansing in the Historic Cairo Zone | 21 |
| Consequences of the ongoing New Solid Waste Management Plan for Cairo on the WH property | 22 b) |
| Statistics | 22 |
| Waste generation and Service provision information | 23 |
| Table 6. Waste generation and service provision informations in Historic Cairo | 23 |
| Map 2. Locating Historic Cairo on the daily waste generation per capita map | 24 |
| Service costs recovery | 24 |

| | |
|---|--------------|
| Table 7. Fees paid by household in Historic Cairo | 25 |
| Vehicles | 25 |
| Table 8. Inhabitants per vehicle | 25 |
| Transfer stations | 25 |
| Table 9. Transfer stations deserving the Historic Cairo | 26 c) |
| Informal activities in solid waste management in Historic Cairo | 26 |
| Materials: | 26 |
| Actors | 28 |
| <u>3) Principal difficulties in service provision</u> | <u>28 a)</u> |
| Urban shape and people habits | 29 |
| Conversation Zones specific problems: | 29 |
| The problems of sub-contraction: | 31 |
| People habits: | 31 b) |
| Operators shortages | 31 |
| Household collection: | 31 |
| Cleansing and street collection: | 32 |

Part three: methodology for a comprehensive study of solid waste management in historic Cairo

33

| | |
|--|-----------|
| <u>1. Data and informations collection and production (quantitative)</u> | <u>33</u> |
| Table 10. List of data and informations to be collected | 34 |
| <u>2. Observation (qualitative)</u> | <u>35</u> |
| - Objectives | 35 |
| - Method | 35 |
| Table 11. Time-slot organization for each area: | 37 |
| <u>3. Community Survey (qualitative and quantitative)</u> | <u>38</u> |
| <u>4. Interviews and meeting (qualitative)</u> | <u>38</u> |
| Interviews | 38 |
| Information and communication meetings | 39 |
| <u>5. Research planning and study outputs</u> | <u>39</u> |
| Research planning | 39 |
| Research schedule | 40 |
| Staff | 40 |
| Research outputs | 40 |
| Recommendation for a Solid Waste Management Plan for Historic Cairo | 41 |
| Bibliography: | 42 |

Context of the study:

The study takes place in the framework of the program Safeguarding of Cultural Heritage in Egypt, in close cooperation with the UNESCO World Heritage Centre, responsible national authorities and project team of “Urban Regeneration Project for Historic Cairo” (URHC project). This study is a preliminary study which aims to :

1. Collect and organize the existing available information and documentation on this issue from different sources (recent publications, field research reports, studies, etc.).
2. Provide an initial characterization of the current different types and modalities of public services and community practices for the waste disposal in Historic Cairo
3. Outline the critical issues and a program for a comprehensive study on the whole Historic Cairo, including the field surveys and technical studies necessary to design a waste disposal system in the framework of the Historic Cairo WH site management (including reference to international best practices).

Method:

As the study doesn't plan field research, the information provided below come from the consultant previous field work. The data presented have been previously collected close to the local or national authorities regarding waste management and come from expert reports regarding information concerning the *zabballeen* community.

To tackle the SWM (solid waste management) problems in Cairo involve method problems. The solid waste management study reveals different elements: data shortage, lack of readability and multi-actors involvement. Thus the method proposed here for its better comprehension in Historic Cairo will stress the need of ground observation and investment on the field approach (actors, observation, etc.).

PART ONE: SOLID WASTE MANAGEMENT GENERAL PRESENTATION

Information reported here come from DEBOUT L. and R. EL-SHERBINY, (2010, unpublished). National Study and Case Study of Urban Waste Management in Egypt, Blue Plan Waste Management and Material Flows Work Program, 61p.

1. Waste production data

Available data on waste generation rates indicate data production gaps. Data were compiled from different sources for years 2000 through 2005 as presented in Table 1.

Table 1. National Waste origins from 2000 to 2005

| Waste source | 2000 | 2004 | 2005 |
|-------------------------|--------------------------|---|-------------------------|
| Households | 14-15 million ton | 14,9 million tons | 15-16 million ton |
| Industrial | 4-5 million tons | 6.2 (of which hazardous 0.3) million tons | 4.5-5 million tons |
| Agricultural | 23 million tons | 16,5 million tons | 25-30 million tons |
| Cleaning of waterways | Around 20 million tons | 29,4 million tons | Around 20 million tons |
| Sludges and waste water | 1.5 - 2 million tons | 2 million tons | 1.5 - 2 million tons |
| Medical waste | 100 000-120 000 tons | 130 000 tons | 100 000-120 000 tons |
| Demolition waste | 3-4 million tons | 4 million tons | 3-4 million tons |
| Total | 63.6 - 69.1 million tons | 73.1 million tons | 66.1- 77.1 million tons |

Sources : Ministry of Local development (for years 2000 and 2005) ; GTZ-ERM-GKW (2004). Mediterranean Environmental Technical Assistance Program, Country Report-Egypt (final). METAP, World Bank: 33p. (for year 2004).

Household waste generation has continued to grow over the past decade with the growth in population. The estimated household waste generated for years 2000 through 2008 are presented in Figure 1. The estimated household waste generated per-capita is presented in Figure 2. The per capita waste generation rates have evidently increased from approximately 0.55 kg/capita/day in 2000 to approximately 0.75 kg/capita/day in 2008. Compared to Eurostat data on waste generation rates in European countries, Egyptians produce less waste than most of the European countries (i.e. France: 1.5 kg/day/capita; Germany: 1.5 kg/day/capita; Greece 1.58 kg/day/capita; Italy: 1.5kg/day/capita).

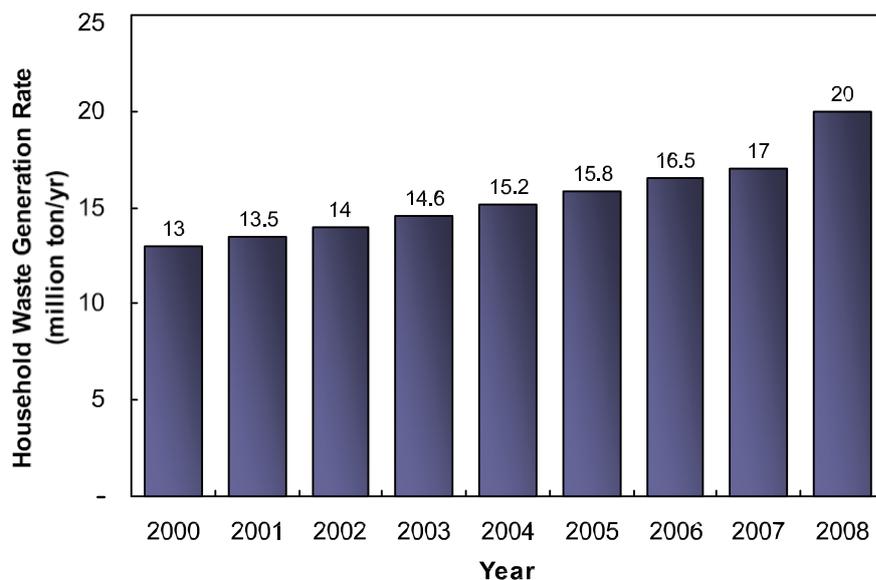


Figure 1. Household Waste Generation Rates for Years 2000 through 2008.

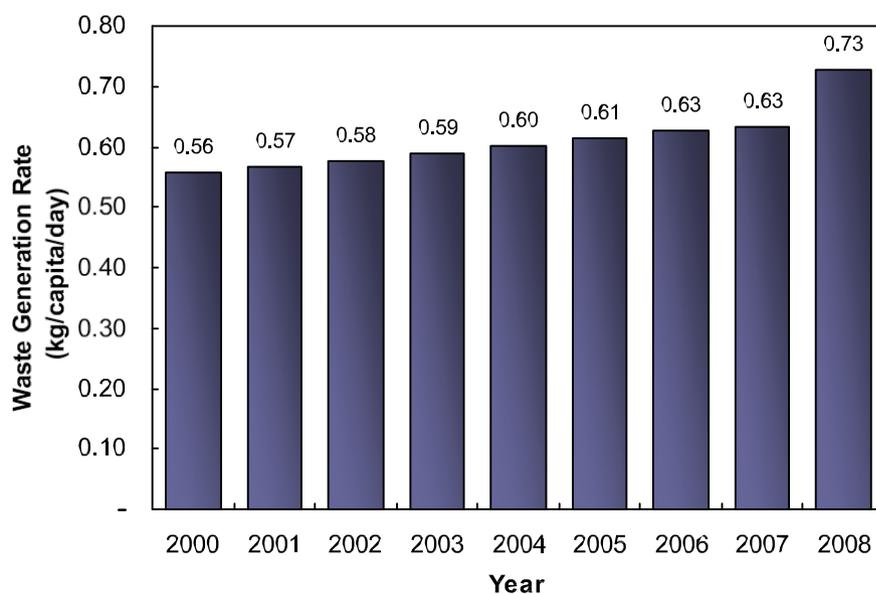


Figure 2. Household Waste Generation Rates per-capita for Years 2000 through 2008.

2. Waste management

a) Institutional aspects

National Level

There is no single authority tasked with solid waste management in Egypt. The responsibility of solid waste management on the national level is shared among several Government entities. In case of municipal solid waste, the responsibility is shared among the Ministry of State for Environmental Affairs, Environmental Affairs Agency, the Ministry of Local Development, Ministry of Housing, utilities, and urban development.

The Ministry of State for Environmental Affairs is responsible for conception and implementation of national policies and strategies. It also plays a regulatory role through The Egyptian Environmental Affairs Agency (EEAA). The responsibility of EEAA, under the umbrella of The Ministry of State for Environmental Affairs, is to ensure the implementation of the environmental laws and regulations. By virtue of its establishment, EEAA is a coordinating agency with limited regulatory power. EEAA has district offices to cover operations across Egypt, but do not have offices in each governorate. According to law n°4 of 1994, the agency benefits from an independent budget.

According to the decree n°134 of 1968, services in new urban developments are fully coordinated through the Ministry of Housing, Utilities, and Urban Development, thus playing the role of local government. This applies to solid waste management services. According to the same decree, the Ministry for Housing, Utilities, and Urban development is also responsible for siting landfills. However, other authorities frequently play a role in such decisions. For example, the GOPP (General Organization for Physical Planning) take part in decisions to ensure land is not reserved for other urban development projects. The Ministry of Local Development oversees the governorates and their local authorities.

For hazardous and special wastes, each ministry concerned by the polluting activity is responsible for their impacts and emissions (ex. Ministry of Health, Ministry of Trade and Industry, Ministry of Agriculture, Ministry of Irrigation, etc...). Other ministries are also indirectly involved in the sector where the Ministry of Social Solidarity licenses and monitors NGOs working in the sector; the Ministry of Finance provides supplemental budget allocations to local authorities for solid waste management; and the ministry of investment regulates the private sector investments in the sector.

Local level



By virtue of Law 38/1967, local authorities (governorates) are responsible for managing solid waste, contracting services, and oversight of contractor performance to ensure service delivery. Prior to privatization of solid waste management, the national government provided the local government and its councils with equipment for waste collection and street sweeping. The governorates and local councils were responsible for planning, management, revenue collection, and operation of the system. With increasing population and burden on local councils, an initiative of privatization of services to local companies was undertaken starting in cities outside Cairo and Giza. Especially in the early days, local private companies lacked the experience and were geared towards waste hauling operations. Thus, local authorities still needed to operate in areas not served by private companies and to monitor and complement the work of private companies.

In 1983, a presidential decree n°284 created the Cairo and Giza Beautification Agencies (CCBA and GCBA). The agencies were tasked with the responsibility of cleansing and solid waste management in Cairo and Giza governorates and were provided an independent budget for that purpose. The CBAs are responsible for planning, licensing of waste operators, budgeting, contracting, and contract monitoring. The CBAs also ended up performing some operations to complement contracted parties.

With the establishment of the Ministry of state for Environmental Affairs and The Egyptian Environmental Affairs Agency in the nineties, Environmental Monitoring Units (EMUs) were established in governorates. In the governorates having no CBA, EMUs have similar responsibilities to CBAs when it come to solid waste management, with additional environmental related duties. Yet EMUs do not benefit from an independent budget to operate with.

b) Waste management legal framework

Solid waste does not have its own legislative framework in Egypt. Laws governing solid waste management originate from different ministries as the responsibility is shared. The most recent law is the law n°4 of 1994 on environment prepared by the EEAA which concerns collection, waste treatment, and disposal. It focuses primarily on hazardous waste. It indicates the ministry of State of Environment as main responsible for solid waste management and its impacts on the environment and the ministry of Housing, Utilities and Urban planning as the responsible for disposal sites selection. The law was recently amended to increase fines mishandling of solid waste.

Law n°48 of 1982 is dedicated to Nile Waters protection and identify the ministry of Irrigation and Waters resources and the ministry of Health and Population as responsible for the disposal of relevant waste.

Waste management financing legal framework

The two main laws relative to the solid waste management service financing are the laws on local authorities. The first law related to solid waste is the n°38 of 1967 law on the public cleansing and its amendment by law n°31 of 1976. It imposes a tax on households about 2% of their residence rental value. The second law is the law n°43 of 1979 on municipalities. It attributes the solid waste management responsibility to the municipalities.

After privatization of waste management services to multinationals in 2003, law n°38 of 1967 was amended by the law n°10 of 2005 which creates the taxes on electricity bill for the cleanliness service. The law states that the amount of those taxes should be fixed according to the social level of the areas. It ranges from 1 to 10 EGP per month in urban governorates, and from 1 to 4 in rural governorates. Shops are taxed from 10 to 30 EGP per month according to their activities (service, liberal professions, shops, industries...).

The collected taxes under the laws n°38 of 1967 and n°10 of 2005 go to the cleanliness fund (Sundoq El-Nazâfa). This fund may also receive funds directly from private donors. The fund is out of national control and does not have to factor in the budgets.

Regulatory Framework

The regulatory framework under which waste management is regulated stems from Law n°4 of 1994. The Executive regulations of law n°4 place restrictions on garbage bins and vehicles in terms of cleanliness and operation. It also requires approval of EEAA for site allocation of solid waste related sites. EEAA relies on Environmental Impact Assessments (EIA) to judge and approve proposed waste related activities. The elements and principles of the EIA are set by EEAA for waste treatment and disposal facilities and provided in guidelines for preparing an EIA. Thus the executive regulations of law n°4 do not include explicit provisions for specifying roles of different authorities nor minimum specifications or performance/emission provisions for solid waste facilities and services. However, more emphasis is put on hazardous waste in the executive regulation.

c) Informal activities

There are different waste-recycling activities in urban areas where there is significant interest in collecting recyclables. Informal parties roam streets looking for plastic, cardboard, metal, aluminum, glass, old bread, old textiles, and used recyclables to collect or buy. They perform door-to-door collection and street collection. These activities are difficult to quantify but they are numerous and take place in privileged and non-privileged areas.

Some of the waste recycling activities are focused around certain products. For example, old-bread collectors pass through streets with carts to collect or buy old-bread for use as animal feed or for use in producing penicillin. Robabikia peddlers collect used items by passing through the streets calling «Roba Vecchia» (they use the Italian words literally «Old things»). Any household hardware as well as regular recyclables are of interest to Robabikia peddlers. The collected items are sold to traders for refurbishing and resale on curb-sides in the suburbs of Cairo. Non-repairable items are broken down and sold as recyclable materials. Similar activities take place for used textiles.

The informal sector also includes roamers and scavengers. Roamers roam the streets trading in recyclables especially plastics and metal. Scavengers pick through dumpsters and dump sites for recyclable materials. In recent years, with the increase in use of containers deployed by multinational waste management companies and waste pooling sites, scavengers have been increasingly collecting recyclables from waste containers and curb sides. However, these activities have caused discomfort to residence due to the litter caused in the streets during the process.

A large portion of the recycling activities is performed by the Zabbaleen who collect waste door-to-door and take it back to their areas for sorting and recycling. The informal recycling activities are served by a number of middlemen that facilitate selling the recyclables. The middlemen collect materials from waste collectors and sell them to wholesalers.

Zabbaleen community:

Early Zabbaleen were migrants from Oases, referred to as “Waahis”¹, who first moved to Cairo in the 1950s. Zabbaleen provided door-to door garbage collection from households for sale as fuel. They formed settlements and used organic waste for breeding pigs. During the urban development in the 1970s, more migrants came from Upper Egypt to work in waste recycling. However, Waahis were the ones that controlled the market and the “right” of collection. The rest of the Zabbaleen had to negotiate agreements with Waahis for access to zones of waste collection. The Zabbaleen operations were organized by the Waahis until

¹ CID consulting (2008), “The informal sector in waste recycling in Egypt”, prepared for GTZ, May, pp.53.

CCBA and GCBA were formed in the 1980s. CCBA and GCBA were formed to organize the sector and license traditional waste collectors and private companies working in the sector. However, the licensing and management systems for the private companies and the traditional collectors was different.

The population of the Zabbaleen community in Greater Cairo is estimated at 96,000 people. Zabbaleen collect waste door-to-door from residential, commercial, and industrial areas on a daily basis. The men often collect waste with their children and bring back the waste to their districts where wives and daughters sort the waste. Some Zabbaleen districts have their own recycling workshops. Those without equipment sell their material either to recycling factories, or Zabbaleen workshops. One thousand small enterprises owned by Zabbaleen were registered in the Mokattam settlements, the largest settlement, in 2006. Part of their economy was based on pig breeding. Thus, after slaughtering of the pigs in 2009, they were highly impacted. In addition, waste collection levels in Cairo decrease as they were no longer interested in collecting organic materials.

The percentage of waste collected by Zabbaleen according to official accounts is presented in Table 2. A noticeable decrease in collection by Zabbaleen in 2009 may have been due the forced pig slaughtering ordered in May 2009. This account does not include waste routed to the Zabbaleen sub-contractors through the formal private sector. Zabbaleen recycle almost 80 - 85% of what they collect.

Table 2 : Waste collected by the Zabbaleen at the national level

| Year | Percent Collected by Zabbalin in Cairo | Percent Collected by Zabbalin Nation wide |
|------|--|---|
| 2004 | 10% | 7.8% |
| 2005 | 14 | 2.08% |
| 2006 | 21% | 5.4% |
| 2007 | 19% | 4.32% |
| 2008 | 34% | 11.97% |
| 2009 | 25% | 10.30% |

Source: Authors calculations from CAPMAS, Annual books

d) Integrated waste management policies

The first actual step towards integrated waste management was taken in 1999 with the publication of the National Strategy for Solid Waste Management. The government of Egypt signed a memorandum of understanding in 1999 with USAID, aimed at 'improving efficiency

and performance of the solid waste management systems through a combination of strategic planning, improved administration, greater public awareness, and more active participation in the private sector². The USAID provided technical and financial support for developing and implementing the National Strategy for Integrated Solid Waste Management in 2000³.

National Strategy for Integrated Solid Waste Management

With the launch of this strategy, solid waste management was thought from collection to final disposal for the first time. The strategy aimed at strengthening the supportive capacity of central government; privatization of the solid waste management services; application of the fee for service and polluter pay principles for sustainable financing; and enhancing public awareness and community participation in waste management systems. The main goals of the strategy were:

- Establishing of an integrated and sustainable MSWM system nationwide in which total service coverage is attained.
- Conservation and protection of the environment and improving its quality
- Effective contribution of natural resources and their recovery
- Effective use of financial and human resources.

The performance measures for the strategy were formulated as follows:

- Collection coverage must exceed 60% for towns by 2005 and 70% by 2010.
- Collection coverage must exceed 80% for capitals of governorates by 2005 and 90% by 2010
- 50% of organic waste generated to be composted by 2005
- 20% of solid waste generated to be recycled by 2005
- 40% of municipal solid waste by 2005 to be source segregated into wet and dry by 2005
- 5% source reduction to be achieved by 2005
- 100% cost recovery of waste management services to be reached by 2005
- The level of funding for waste management services to reach 0.35% of GDP by 2005.

² EPIQ, IRD-Group, et al. (2002) "Task Order n°852, Final Report under EPIQ 1."

³ IRG-Group (2000). The National Strategy for Integrated Municipal Solid Waste Management- A Framework for Action. EPIQ-USAID: 28p. .

Over the 10 years age of the strategy, the government of Egypt's efforts to implement the strategy has resulted in mixed results. Although the objectives of the strategy have not been fully fulfilled yet, these acquired experiences are worthy of review and evaluation for a modification of course if needed. To date, this strategy is still the major document relative to integrated waste management in Egypt.

With recent decline in solid waste management service levels in some areas, there has been growing political and public interest in the sector. This interest has translated into strong urge from high government officials for implementing an integrated sustainable solution to the problems as there is understanding that short term vision shall not suffice. Thus, with the political will and the basis available in the current strategy, there is high potential for improvement and development of sustainable sector in the years to come.

PART TWO: SOLID WASTE MANAGEMENT IN HISTORIC CAIRO

Because most of the statistics are produced at the governorate level and because, as a part of Cairo Governorate, the solid waste management in Historic Cairo falls under responsibility of the Cairo Cleansing and Beautification Agency (CCBA), a general overview of Cairo management and statistics is needed to situate the Historic Cairo case.

1. Waste management in Cairo: statistics and management

a) Waste arising

The total generated waste in Cairo is estimated at about 11,000 tons/day (4Mt annually). The household contribution to waste generation is estimated 60% while commercial waste accounts for 40%. It is estimated that only 70% to 80% of the generated waste is collected while the rest accumulates in streets and open areas. These values do not include medical waste, hazardous waste, and construction and demolition waste. A breakdown of the generated waste by category and service zone is provided in Table 3. By far the highest contribution to generated waste comes from the east zone which contributes 38% of generated waste but has a collection efficiency of approximately 60%. The remaining zones are approximately of equal weight. The average per capita total waste generation ranges from 1.4 to 2.8 kg/capita and averages 1.6 kg/capita.

Table 3. Generated quantities of municipal solid waste divided by service

| Company | Population | Waste generation | | | | | | Waste collected per capita (kg/capita) |
|----------------|------------------|------------------|------------|-------------|------------|--------------|-------------|--|
| | | Household | | Commercial | | Total | | |
| | | (ton/day) | % | (ton/day) | % | (ton/day) | % | |
| EES (East) | 3,094,328 | 3100 | 27% | 1170 | 10% | 4270 | 38% | 1.38 |
| AAEC (North) | 813,004 | 1584 | 14% | 722 | 6% | 2306 | 20% | 2.84 |
| AAEC (West) | 1,601,615 | 716 | 6% | 1727 | 15% | 2443 | 22% | 1.53 |
| Fostat (South) | 1,411,701 | 1345 | 12% | 926 | 8% | 2271 | 20% | 1.61 |
| Total | 6,920,648 | 6745 | 60% | 4545 | 40% | 11290 | 100% | 1.63 |

b) Waste management and institutional aspects

Institutional aspects of solid waste management in Cairo are linked to key events that resulted in changes to the system. The key events include the creation of CCBA (Cairo Cleaning and Beautification Agency) in 1983, establishment of the Egyptian environmental affairs agency and the publication of the national strategy in 2000 followed by privatization of solid waste management in 2002. These events are discussed in the following sections highlighting the roles and responsibilities of key players at each stage.

Creation of CCBA or the "formalization path": integration of informal workers and local private companies

With the demographic explosion of Cairo from the 60's to the end of the 1970's, the collection system of the traditional collectors (zabbaleen) became increasingly deficient. The Cairo Cleansing and Beautification Authority (CCBA) was created with presidential decree number 284 in 1983. CCBA works under supervision of Cairo Governorate but has a separate budget allocated by the central government. It works in the areas of cleansing and waste management, public parks and green areas, and public lighting.

The main objectives of establishing CCBA with respect to solid waste was to regulate waste management activities, to ensure service to un-serviced low income areas, and to invest in infrastructure such as landfills and waste treatment facilities.. The agency started issuing licenses to zabbaleen working in Cairo to collect waste from designated areas for a fee paid at the door. This led to official recognition of the zabbaleen work. If they were still not considered as service providers, they started to work officially which had good impacts on their work and security. It also contracted local private companies to expand service to un-serviced areas. The contract fees were paid from CCBA's budget. In addition, CCBA provided direct services in street sweeping, cleansing of public areas, and managed waste treatment and disposal sites in Cairo.

Zabbaleen used donkey pulled carts for transferring waste until 1990 when a national decree was issued forbidding the donkey pulled carts from circulation in Cairo. Investment needed in trucks and license fees thus resulted in reinforcement of hierarchy of the zabbaleen community.

The establishment of CCBA resulted in three main players in the waste sector which were: the zabbaleen who collected and recycled waste from households and some commercial units; local private companies who performed street sweeping and cleaning, collecting household and commercial waste from specific locations, and transporting it to dumps or landfill

operated by the public sector; and CCBA which regulated the sector and acquired the governorate workers and equipment to perform sweeping and cleaning streets, and operating dump sites.

Until the 2000's, the zabbaleen were the principal actor in waste collection and had the monopoly of waste treatment through a multiplication a small companies (64). This situation leads to the waste management fragmentation without an integrated vision of waste cycle and thus results in a collection and treatment rates more and more insufficient at the rate of demographic and urban growth. A pro-active policy was needed.

The national strategy and privatization of services: unify the system

The Ministry of State for the Environment and the Egyptian Environmental Affairs Agency, its executive branch, were established in 1994. EEAA is governed by Law 4/1994 and has a mandate to monitor and regulate activities of environmental impact, including solid waste management. In 1998, EEAA issued a draft National Strategy for Integrated Municipal Solid Waste Management that was finalized in 2000. The strategy addresses policy, regulatory, institutional, planning, funding, human resource development, and public awareness aspects of municipal solid waste. It also sets out benchmarking targets and performance measures. Among the key policy directives of the strategy are: (1) central government provides an enabling role while the local government agencies shall acquire full operational responsibility; (2) public cleansing services shall be gradually delegated to the private sector; (3) prevalence of the polluter pays principal; (4) attaching economic value to waste and adherence to “reduce, reuse, recycle, and recover” hierarchy; and (5) complete involvement of served community.

According to the national strategy for integrated municipal solid waste management, and after the national decree that allowed privatization through international calls for tender, Cairo governorate issued calls for tender in its 4 zones (South, North, West, and East). Four different companies were awarded contracts for the different zones, two Spanish and two Italian companies. The contracts were signed at different dates in 2002-2003 after contract negotiations. Some of the companies failed in maintaining the contract and left the market. There are only two international companies left in Cairo now, Ama Arab Environment Company (AAEC or AMA) and EES. Two national companies operate in Cairo, which are the Fostat (CCBA operated company) which serves the south zone, and Misr Service which serves the Marg district of the East Zone. Thus, waste management in Cairo was directed to follow the National Strategy that supported privatization of service.

Cairo governorate also levied general cleansing fees as an application of the “polluter pays” principle set in the national strategy. The fees are leveled according to the social characteristics of the district and the waste production for shops: 1 to 10 pounds per household and 10 to 30 EGP for all economic activities.

The collected fees do not cover the cost of services for different reasons. As many parts of Cairo are non regular areas, each household do not have its proper electricity counter, several household can pay for only one fee. Also the electricity-registered map does not necessarily match with the administrative boundaries. The original idea of full cost recovery is unfortunately not achieved. Fees only cover 65% of the service cost according to the CCBA direction staff member.

The national strategy for integrated municipal solid waste management calls for incorporation of the zabbaleen into the formal system. However, the zabbaleen community was not effectively considered in the privatization efforts. The zabbaleen responded by actions against the international companies in Cairo. The companies proposed to involve the zabbaleen in the formal system as workers for the company. At that time the company offered them the same salary as typical unskilled workers and denied them access to the recyclables. The zabbaleen refused because loss of recyclables represents a big economic loss for them. The first company that succeeded in involving them was the AAEC. The company sub-contracted them through Waheyya with approval from CCBA.

Current Situation:

- Currently, CCBA is responsible for multiple tasks related to solid waste management, including: negotiating and signing contracts with the private sector, supervision and contract monitoring, operation of street sweeping and waste collection services through its subsidiary company “Al Fostat”, and operating dumpsites. These tasks seem to be conflicting in many cases due to contradicting interests. Like many national companies operating in a hierarchy within the government framework, Al-Fostat has inherent problems that prohibit it from providing the desired services.

CCBA operates under the mandate of Cairo Governorate. The Ministry of Local Development (MoLD) is responsible for coordination and integration between the efforts of the governorates in attracting investment and implementation of service projects, and choosing the best management alternatives. Thus, Cairo Governorate and CCBA work within the policy framework set by the MoLD. On the other hand, The Ministry of State for Environmental Affairs (MSEA) and EEAA set environmental policies and strategies, and are responsible for environmental monitoring and regulation. Thus, CCBA’s solid waste activities are subject to

the environmental policies and regulations set by MSEA and EEAA. However, EEAA has limited enforcement role. CCBA also relies on EEAA in planning and technical assistance due to the lack of sufficient internal expertise. Lately, contracts signed by CCBA are reviewed by the EEAA as well as the Ministry of finance for financial terms.

2010: Policy Vision, a new plan for Cairo

The national strategy for integrated municipal solid waste management sets policy vision at the national level as discussed in the previous section. Cairo governorate initiated efforts in applying the strategy by taking responsibility through CCBA, privatization of solid waste services, attaching a fee to the service on electricity bills, and committing to waste treatment through composting. However, these measures were not sufficient to bring about the targeted levels of service as set in the national strategy. Other deficiencies in the institutional/ organizational framework and the contracts, in addition to operational issues related to service providers' approach and public awareness resulted in the lack of adequate service.

Cairo governorate and CCBA have recently collaborated with MSEA and EEAA in revisiting the local policy and re-planning the solid waste services to reach an integrated waste management system with support from higher government. MESA and EEAA's adopted the national policies in their effort which maintained the privatization effort and mandate for recycling and composting of a certain percentage of waste. Initially, the percentage was set at 20% with hopes to increase it with time. Other waste treatment options have not been ruled out but are being explored in other governorates, specifically waste to energy incineration.

Among the main changes concerns the criteria for monitoring enforcement and quality of service, these will now use tonnage collected, treated and disposed as means of evaluating fees paid for these services to the operators while maintaining monitoring of street cleanliness as a separate item. The plan also calls for minimum standards for transfer stations and replacing existing controlled dumpsites with sanitary landfills. EEAA envisions CCBA as a contracting and monitoring agency with no operational branches to avoid conflict of interest while Fostat can be restructured and operated as an independent company. Service fee and public awareness policies for Cairo are also inline with the national policy; however, these policies have not materialized into effective actions yet.

With respect to operational procedures, the new vision is to mandate door to door collection instead of street containers to minimize accumulation of waste in the streets. In order to attract permanent labor for the waste management services, the plan envisions considerable raises in

salaries and benefits and redistribution of work load by limiting the responsibility of an individual to a manageable weight of handled waste or area of service.

The national strategy calls for effective incorporation of the zabbaleen into the formal system. This provision has not been reflected in the privatization efforts and existing contracts. The importance of the informal sector has since been realized by the all major players. Therefore, there is a drift in vision towards incorporating provisions in new plans and contracts that ensure the rights of the informal sector yet maintain environmental, health, and safety standards.

Among the proposed approaches to incorporate the zabbaleen is to allow them to collect door to door from areas they serve under subcontract agreements, and allowing them to sort their waste at intermediate stations specially equipped for that purpose. Thus, they shall receive a fee from the main contacted company for the collection effort and shall also be able to preserve the recyclables. The residues shall be carried away to final disposal by the main contracted company for the service zone which receives payment from CCBA for the full service from collection to disposal.

These envisioned changes have been formulated into an new integrated solid waste management plan for the governorate, sponsored by MSEA and EEA. The new plan is in its early stages of implementation where negotiations are ongoing with current service operators to adjust services according to the proposed plan.

2. Waste management in Historic cairo: statistics and management

a) Management

The World Heritage Site of Historic Cairo and its buffer zone overlap two different zones of Cairo governorate : South and West.

The map 1 below shows the 4 different contract zones in Cairo Governorate.



Map 1. Four zones of Solid Waste Management in Cairo (Boundaries 2008)

Table 4. Historic Cairo' hay and respective waste collection zones

| Zone | Hay |
|-------|---------------------------------------|
| South | Al-Sayyeda Zeinab |
| | Masr al-Qadîma |
| | Al-Khalîfa wa al-Moqattam (a part of) |
| West | Al-Boulaq (a part of) |
| | Al-Wayly (a part of) |
| | Al-Gharb |
| | Al-Mouski |
| | Bâb al-Cha'reyya |
| | Al-West |
| | Al-Abdeen |

Each zone has its own management.

Table 5. Solid waste management and public cleansing in the Historic Cairo Zone

| Zone | Management |
|-------|---|
| South | - Cleansing, collection and transportation : Al-Fostatat (public company of CCBA) - Treatment and disposal: Ecaru (egyptian company) |
| West | AMA Arab Italian company. Delegation contract for 15 years |

South Cairo: In this zone, the service operation differs from others zones in the governorate. In 2003, a call for tender was published in order to delegate the service per segment. Thus, collection, treatment and disposal are operated by different operators.

Cleansing, collection and transportation is operated by the CCBA through a public company named Fostat. The treatment and disposal are operated by an egyptian private company named Ecaru. While the hospital waste collection, transportation and treatment is held by a private egyptian company named EcoConserv.

In the South Zone, the FEDA (Friend of Environment and Development Association) in collaboration with the Ministry of Environment , the Governorate of Cairo, the Ministry of International Cooperation and the Egyptian Swiss Development Fund (ESDF) have started in 1999 an environmental project in Historic Cairo. The project is still ongoing and focus on waste valorization in teaching source sorting to inhabitants. Materials are then sell to a Wakâla where they are recycled.

West: West zones have been delegated to the italian company AMA Arab. In these zones, the company has sub-contracted the main collection zones to the zabbaleen who work under its supervision. Thus, the company focus in streets cleaning, container collection, treatment and disposal, when the zabbaleen offer door-to-door collection. The zones operated by sub-contractors are variable, but mostly the company focus on the most popular zones when the zabbaleen are sub-contracted in healthiest zones of the districts.

In each district (hay) there is a CCBA branch directed by a CCBA district manager. The district manager is responsible for service operation monitoring and reports to the EMU in order to establish the companies penalties.

*Consequences of the ongoing New Solid Waste Management Plan
for Cairo on the WH property*

The New Solid Waste Management Plan for Cairo, aims to offer better waste collection in all Cairo. As we saw, the main changes in waste collection operation are the development of transfer station and the door-to-door collection. Considering that the plan was being discussed before the Revolt of January 2011, nothing assure that it will be continued. The plan as it was thought in 2010, was considering in renewing the existing transfer stations in the dense inner Cairo, to close some and to create others mainly in the residential areas in Cairo North where the urban shape leaves more space for those equipments. Thus no new transfer station was planned in the perimeter of Historic Cairo and the only current two transfer station will remain. This is due to the lake of open space to set these equipment, and to the population density. In some areas transfer stations cause a lot of damage in term of smelt, health hazards, etc.

Concerning the door-to-door collection, if the plan is well implemented this can have a considerable positive impact on the solid waste management in Historic Cairo. Door-to-door collection is particularly well adapted to dense areas and to narrow streets because it doesn't ask for large equipment as container collection. The door-to-door collection is operated by collectors, who climbed the buildings asking for garbage and loading it in a hand-cart, they will empty in a small pick-up waiting at the end of the street. As said before, situation in the Historic Cairo perimeter varies, as different operators serve the area. Anyways, the main problem of this dense area is that in the case of household collection shortages and because container are not available because of the street narrowness, people if they want to litter their garbage properly, have to bring it outside the narrow streets in the containers provided in the main streets. Thus an effective door-to-door collection can facilitate people disposal of their garbage and thus enhance cleanliness in avoiding street littering.

b) Statistics

Unfortunately because Historic Cairo Zone doesn't fit the administrative boundaries of districts and because data regarding waste (collection, production, operation, etc.) are

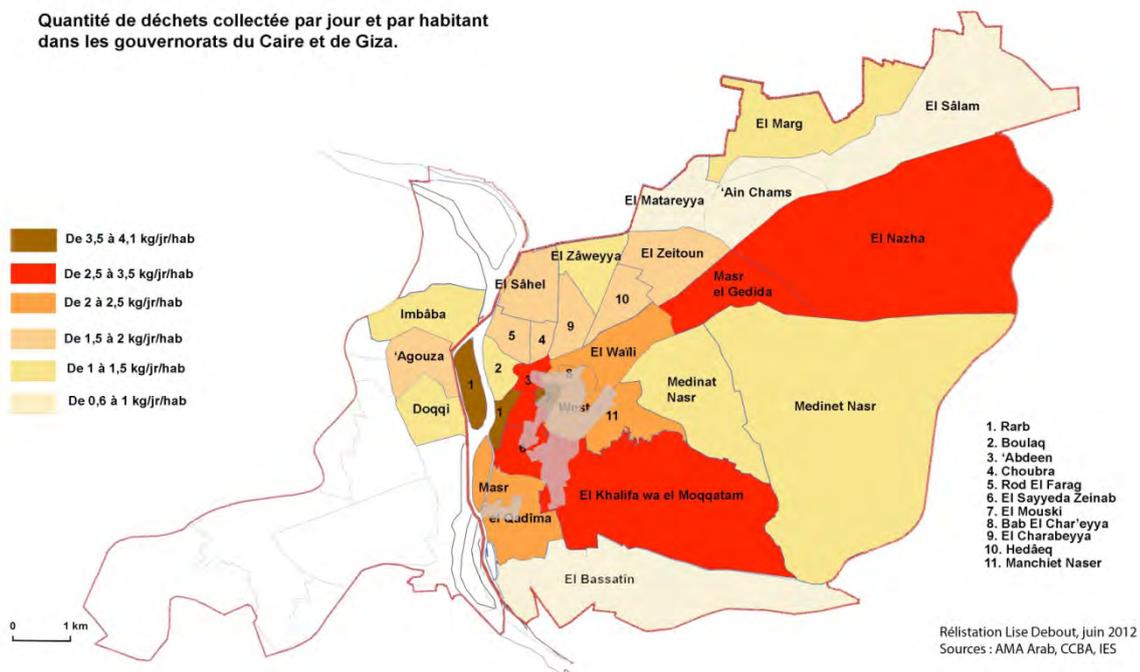
produced at a district level, a keen approach of the situation is difficult. However, according to the available socio-economic and urban shape informations concerning the three different Conservation Zones elaborated by the World Heritage Foundation, extrapolations can be done even if prudently.

Waste generation and Service provision information

Table 6. Waste generation and service provision informations in Historic Cairo

| Zone | Hay | Waste generation T/day | Service provider | Transfer station Waste received per day | Waste treatment and disposal |
|-------|-------------------------------------|---------------------------|--|--|--|
| South | Al-Sayyeda Zeinab | 410 | Fostat and zabbâln as sub-contractors | Bassatin 1200m3 which of 100m3 demolition waste | 15th of May operated and owned by Ecaru. Sanitary landfill 100 feddan 1200T received per day Sorting lines capacity: 1680T/day (7 lines) Treated quantities: 500T/day |
| | Masr al-Qadîma | 500 | | | |
| | Al-Khalifa wa al-Moqattam (part of) | 750 | | | |
| West | Al-Boulaq (part of) | 210 | AAEC (Ama Arab Environmental Company) and zabbaleen as sub-contractors | Gezirat Badran 200T | Al-Qatameyya (idem as follow) |
| | Al-Wayly (part of) | 350 | | | |
| | Al-Gharb | 190 | | Al-Halâbi: 700T/day received. | Al-Qatameyya (I and II) operated and owned by AAEC. Sanitary landfill 40 + 50 fedan 800 + 200 T received per day Sorting lines capacity: 600 + 400 T/day (3 and 2 lines) Treated quantities: 990T/day |
| | Al-Mouski | 180 | | | |
| | Bâb al-Charqeyya | 210 | | | |
| | West | 220 | | | |
| | Al-Abdeen | 220 | | | |

Map 2. Locating Historic Cairo on the daily waste generation per capita map



As seen on the map, the Historic Cairo is one of the highest waste producer of Greater Cairo (Giza plus Cairo governorates). The main producers of waste are the healthier districts as Garden City or Zamaleck, but they are also the commercial and residential ones as Masr el Gedida, Al Moqqattam, down town and historic Cairo. Keeping in mind that data have to be considered cautiously, we may hypothesize that this important generation is due to the commercial and the hand-crafted industries.

Service costs recovery

As explained before, the inhabitants of Historic Cairo are subject to fees. As the main part of the district is considered popular, most of the fees on the electricity bill do not range the maximum as shown in the table below.

Table 7. Fees payed by household in Historic Cairo

| Zone | Hay | Fee payed by household/month |
|-------|---------------------------|------------------------------|
| South | Al-Sayyeda Zeinab | EGP 3 or 6 |
| | Masr al-Qadīma | EGP 3 or 9 |
| | Al-Khalīfa wa al-Moqattam | EGP 3 ; 6 or 9 |
| West | Al-Boulaq | EGP 3 or 6 |
| | Al-Wayly | EGP 3 or 6 |
| | Al-Gharb | EGP 6 or 9 |
| | Al-Mouski | EGP6 |
| | Bâb al-Cha'reyya | EGP6 |
| | Al-West | EGP6 |
| | Al-Abdeen | EGP 6 or 9 |

Source : CCBA

Vehicles

Table 8. Inhabitants per vehicle

| Zone | Vehicles | Inhabitants per vehicle |
|-------|----------|----------------------------------|
| South | 129 | 1 vehicle for 10 943 inhabitants |
| West | 144 | 1 vehicle for 5645 inhabitants |

Source : CCBA

Transfer stations

The districts composing the Historic Cairo World Heritage Zone are desserved by two transfer stations namely Transfer station of Basateen and transfer station of Halbi.

Table 9. Transfer stations deserving the Historic Cairo

| Transfer station | Surface | Operator | Quantities received per day | Desserved districts |
|------------------|---------|----------|-----------------------------|---|
| Al-Bassateen | 2000 m2 | Fostât | 1200 tons | Masr al-Qadîma, Sayyeda Zeinab, al-Khalifa, al-Moqattam, Al-Bassateen, Dar al-salâm |
| Al-Halbi | 3150 | Ama Arab | 700 tons | Gharb, Abdeen, Al-Waily, West, Al-Mousky, Bâb al-Chareyya |

c) Informal activities in solid waste management in Historic Cairo

As in most of the popular areas, a lot of informal activities should take place in the Historic Cairo zone. They are the result of insiders inhabitants mobilization or outsiders. Below are presented the materials concerned and the actors taking place in these recovery activities. The outsiders collectors activities may take place mainly in the areas having high community activities (Community activities rank 2,5-3 and 1,5-2).

*Materials*⁴:

Bread :

There are dealers that pass by the streets by a horse or donkey cart and shouting for bread sellers. People get down and sell them their bread. There are also dealers who are fixed and waiting for people to come to sell them their old bread. The bread price looks to be fixed, as all the dealers gave us the same prices.

⁴ This material list comes from a ground study done by the authors. See : DEBOUT L., 2010, *Solid waste management cycle in northern Cairo*, Cairo, COSPE, pp. 55

Cardboard :

Cardboard is collected by two different dealers. Some zabbaleen from Manchiyet Nasser that are not working under the sub-contractors, pass by the street with hand cart and collect the cardboard mainly from the shops. They do not pay for it. The cardboard collection is their main activity.

There are also some cardboard dealers that are working under order. They are linked to some shops and the shop owner must call him to let him comes and buy his cardboard. These dealers have other activity, the cardboard deal is just a supplementary activity.

Plastic:

The members of the zabbaleen community also used to collected plastic materials.

Bones:

Some bones collectors pass by the butchers and buy them their bones. Either monthly through informal contracts, either per kilo each collection time. Bones are then supposed to be use in soap production or honey filter confection.

Eggs Cardboard:

Some collectors pass by to collect the eggs cardboard. They are interested only in the 30 eggs cardboard. We do not know what they are doing with.

Textile:

Some people from the area buy textile to inhabitants under order or people come to sell it to them. This textile are sold then to factories close to or in Zawia.

The materials that seams to generate more activities are bread, cardboard and bones.

Actors

Roba Vecchia:

As in all Cairo, some dealers are passing by streets asking for «roba vecchia». They buy old stuff to people. They collect almost everything: plastic material, wood material, old broken things... There is just outside the area, on the railway, a place where all this materials are selling on the curbside.

Some Roba Vecchia are also fixed. People bring them there olds thing and they pay for that.

Sarrih:

They are literally scavengers. They are collecting waste (all kind of recyclables or old things). They are clandestine as they do not have agreement with the Waheyya. They collect from containers or piles, must of them are only working in the mains streets and not into the smalls one.

Inhabitants are aware of all this activities and used to sort at home in order to resell their materials.

All these activities lead to a high organic value of waste collected by the company. Regarding the waste piles or containers, it is obvious that only organic materials remain.

3) Principal difficulties in service provision

As this study does not include field survey, the difficulties presented here are inspired by the main difficulties encounter in others popular areas served by the same operators where the consultant have done field research in other working contexts. Considering the informations provided by the Urban Regeneration of Historic Cairo Project (Pini D, 2011, *Urban Regeneration of Historic Cairo Project. Report of Activities 2011*, 71p.), slight difference can be enlighten in regard of Zone three Conversation Zones of the perimeter.

a) Urban shape and people habits

Regarding the urban conditions, the Historic Cairo is a popular district characterized by a high urban density which has important impact on waste generation. Even if people of the low or middle-income areas produced less waste, the high density and concentration of population in low-income areas leads to a higher waste production per km². Thus the need for collection is most important in terms of frequency and capacity. Secondly, the urban physical shape, is also an obstacle to an easy waste collection operation. The narrow streets ask for specific equipments and increase consequently the cost of service provision. Plus, the narrowness of the streets, leaves no space to locate the basic permanent equipment as street containers or transfer station. Thus in case of weak service provision, if people want to bring their waste away, they have to cover a long distance to find the first available container. Most of the time they have to get out their neighborhood to dispose their waste. If they do not, they use to litter their waste in vacant lands and to burn it regularly at night.

So, in order to serve these areas which prevent street collection, operators have to adapt their operation mode. Thus, AAEC furnished a special equipment for these zones with specific small cars or hand-carts in order to allow the narrow streets access. In zones sub-contracted to the zabbaleen, the narrow streets access is not a problem as they use to collect waste with hand-carts. If operators do not provide such specific equipment, the area cannot be well served. As the same, if the service is subcontracted, the delegate has to close control his subcontractors in order to be sure they offer a proper service to people.

Lastly, the global states of the streets which are most of the time not asphalted, impede the service provision, notably street cleansing and sweeping.

Conversation Zones specific problems:

- Cemeteries (Conservation Zone 3):

Socio-economic data available concerning the Historic Zone (illiteracy and unemployment rates) show that the Cemeteries (Conservation Zone 3) are less dense than the other 2 conversation zones. This zone, then may produce less waste per km² than the other zones. Particularly because it seems that this Cemeteries Zones don't host a lot of activities.

But their urban shape and administrative status complicate their service provision. Cemeteries zones are vast and not well deserved in lanes. If main ways surround the cemeteries areas, only little and scarce lanes deserve the inner zone. Plus, the inner lanes are not asphalted and thus are complicated to clean and sweep. Plus cemeteries are not considered as public spaces so they may no fall under solid waste management contract scope (this information has to be confirmed by field interviews).

- Conservation zone 2:

Conservation Zones 1 and 2 are difficult to isolate considering socio-economic information as unemployment and illiteracy are variously spread on the Historic Cairo Perimeter. Differentiation can be more surely done according to the urban density, urban shape and community activities.

The community activities in the conservation zone 2 are important (mainly rate 1,5-2 and less rate 2,5-3) and may lead to a high waste generation and informal activities mobilizations. The population density is mainly low, and high or medium in some shyakha (90-91-92-93) in the west part. The urban structure is variable, but the streets are more or less organized on an orthogonal structure and presents a few dead end lines what make the service operation easier.

- Conservation Zone 3:

This zone if it represents the highest architectural and community activities value, is the one who suffers more from waste problem for different reasons. The zone presents a high population density, the highest of the Historic Cairo Perimeter. It is also the zone of the perimeter where the streets are the narrowest and it hosts the major part of community activities of the sector. These characteristics lead to an high waste generation per km² (either domestic waste and commercial and handicraft industries waste). This density asks for a more frequent collection than other and less dense areas. It also leads to a difficult service provision. Technically, because of the urban fabric shape (dead end street, narrowness, non asphalt, etc.) waste collection cannot be done on a mechanical way and asks for a manual collection which is more expansive and more complicated to provide for the official operators.

The problems of sub-contraction:

Sub-contraction in low income areas is often a problem. Indeed as the zabbaleen are not interested in the poor waste (in terms of valuable materials) generated in popular area, they are not willing to serve it. That is why, AAEC avoid sub-contractors in these zones. While CCBA sub-contract the integral south zone, what leads to service shortages from the sub- contractors.

People habits:

Different habits damage the service provision. First, specially in popular areas where space lakes, people use public space for private use (coffee, mechanic activities, breeding activities, etc.). These occupations complicate the service provision as the streets are occupied most of the time. Second, service operators frequently complain regarding people habits in littering. Most of the people are not aware of public cleansing, as soon as the streets are cleaned, they litter their food papers, plastic bottle, what ever in the streets.

b) Operators shortages

Household collection:

Shortages in the service are also conditioned by the operators capacity to serve the areas. In the North and West parts in the zones directly served by AAEC, the company operates on a regular basis, even if the frequency can be insufficient sometimes. In the zones where the company delegates to the zabbaleen, the service provision regularity is not assured. Since it is frequently difficult for the company to supervise the work of all its subcontractors, irregularity can occurs. People complains about that irregularity.

In the zones served by the CCBA through Fostat, all the household collection is subcontracted to the zabbaleen. The CCBA do not have the operational management to control over the subcontractors. The service is consequently irregular.

Cleansing and street collection:

Even if the cleansing and street collection in the areas under AAEC operation are regularly served, the urban shape and people behavior, prevent the streets from being « clean » all the day long.

Cleansing and street collection from the Fostat company are less operational due to the weak and old fashioned equipment of the CCBA.

In the two cases, employes because of their low salaries, use to have parallel activities (car parking, coffee service, sorting activities, etc.) that damage the efficiency of their work.

PART THREE: METHODOLOGY FOR A COMPREHENSIVE STUDY OF SOLID WASTE MANAGEMENT IN HISTORIC CAIRO

Currently the situation in Historic Cairo remains difficult and there is a need for service improvement. In order to think about the service improvement, a comprehensive study of SWM in the area is needed. As the SWM falls under different actors, we do encourage for deep ground study in order to understand well all the elements that interfere in SWM. The elements collected will be both quantitative and qualitative. The study should focus on three main points as presented below.

1. Data and information collection and production (quantitative)

In order to have a complete overview of waste management in the Historic Cairo areas, different data have to be collected.

Waste data

- Data providers:

Ministry of Municipal Affairs (disposal and treatment information, nationwide data);

Egyptian Environmental Affairs Agency (disposal and treatment information, nationwide data);

CCBA (waste generation, operators equipment, contracts information, sub-contractors information, complaints registers, etc.)

AAEC (waste generation, operators equipment, contracts information, sub-contractors information, complaints registers, map, GIS, etc.).

Data produced in SWM are mainly produced by the private companies. They are produced at the hay level. Speaking about waste generated, most of the time, as the data are generated according to the weighting at the transfer station or at the landfill, they correspond to collected waste and not to the real produced waste.

There is then a need in data production of waste generated and collected at the shyakha level.

As the same, the GIS (geographic information system) needed for service provision, is produced by private operators and is not produced in Cairo South where the CCBA operates. Until the urban details are not knew, a good service operation will be hard to design.

Population and communities informations:

In popular areas communities organizations can play a role in SWM formally or informally. A deep study need to consider the different associations having activities related to SWM in the concerned area. They can be churches or mosques doing awareness, associations having activities in SWM (collection, recycling, etc.), etc.

The associations are registered at the Ministry of Social Affairs, which can provide with these informations.

Mosques and churches are registered at the district level.

Informations regarding household composition, social indicators can be found at the CAPMAS.

Table 10. List of data and informations to be collected

| Data/informations | Data Provider |
|--|---------------------------------------|
| Number of households | CCBA/AMA Arab |
| Person per household | CCBA/AMA Arab |
| Commercial activities and type | CCBA/AMA Arab |
| Equipment (schools, mosques, churches, etc.) | CCBA/AMA Arab |
| Number of associations | Ministry of Social affairs, districts |
| Waste generated per shyakha | CCBA/AMA Arab |

| Data/informations | Data Provider |
|--|---------------|
| Waste generated per person per day | CCBA/AMA Arab |
| Waste generated per street | CCBA/AMA Arab |
| Waste composition | CCBA/AMA Arab |
| Equipment (manpower, vehicles, containers, etc.) | CCBA/AMA Arab |
| Public and private space status | CCBA/AMA Arab |
| Service provision shifts | CCBA/AMA Arab |
| New solid waste management project | CCBA/EEAA |

2. Observation (qualitative)

- Objectives

If interviews and data collection and production are indispensables to a good comprehension of the waste management issue in Cairo, a deep observation is needed specially to explain the reasons of the service provision difficulties and to understand the full circle of waste management in the area, including the communities activities (formal and informal). A daily observation beyond interviews, aims to understand the reality of the situation and to reveals all actors that take part in solid waste management (collection, recycling, littering...) from inhabitants, to school, scavengers, companies employees, religious institutions, etc.

- Method

The proposed observation method is an extended 24h observation. It will consist in time-slot extended observation (3 hours) in the sector (8-11am/11am-1pm/1pm-4pm...) in order to have a 24h vision of the waste management cycle in Historic Cairo. The extended observation will contain two aspects : passive observation and interviews (small questionnaires).

Passive observation will focus on actors having activities related to solid waste, inhabitants behaviors, urban morphology and occupation, waste disposal, waste burning, etc.

Questionnaires will target zabbaleen, scavengers, people having scavenging activities, etc.

The time-slot sequences shall take into account the SWM operators schedule but not only, as main informal activities take place out of this schedule for more security.

The observation phase have to be led in parallel to interviews and questionnaires. The observation would take place as below:

- 1st: complaints register consultation
- 2nd: identification of the areas facing problems
- 3rd: the selected zone for the observation phase shall be devised in 8 observation zones. Each sub-zone will correspond to one time-slot (3hours)
- 4rd: deep observation phase

Material needed for each time-slot observation:

- Authorization from the concerned authority (CCBA),
- Virgin map of the selected observation spots,
- Camera
- Observation grid.

Time-slot organization for each area:

The time-slot observation shall always take place in the same way to make sure that the same informations will be collected.

Table 11. Time-slot organization for each area:

| Steps | Mission | Tasks |
|-------|---------------------------------|---|
| 1 | Register the time | - Quote the starting time |
| 2 | Map the situation | - Quote on the map the street containers location with time - Quote on the map the waste accumulation spots with time |
| 3 | Passive observation | - Quote all the activities observed and the time of observation - Quote all the actors dealing with waste during the observation - Be attentive to the operator activities and presence |
| | Active observation | - Question people meet according the the questionnaires grid |
| 4 | Close the observation time-slot | - Quote the time |
| 5 | Dress the map | - Enter in the observation document the informations observed on the ground |

Questionnaires:

The questionnaires don't represent a real deep survey. They aim to target people difficult to be surveyed, mainly informal actors. The major part of these actors having informal activities in waste, don't leave in the area and will be hard to survey exhaustively. Plus, because of their illegal status they are not keen to be surveyed.

Special precautions:

The expert conducting the time-slot observation shall be provided with an authorization from local authorities (CCBA). As questionnaires are (until now) not allowed in Egypt without a special (and hard to get) authorization and in order to not afraid surveyed people, the expert shall prepare the questionnaires grid but not to directly referred to them in the streets while questioning people.

Output of the time-slot observation:

Time-slot observation method and restitution shall provide UNESCO with a whole comprehensive vision of SWM in the Historic Cairo. Reporting on a map or a GIS all the

informations collected, shall illustrate the main problems in SWM in the zone regarding the mismanagement and highlight potentialities of the area in term of SWM. Knowing well all the actors involved in SWM will allow to think about the valorization of their potentials in a community based participation principle.

3. Community Survey (qualitative and quantitative)

According to the CCBA, people behaviors are responsible for more that 70% of the difficulties faced by SWM. Even though, this affirmation can be discussed, people behaviors have a real impact in SWM but are not well known. Because the data provided by the officials actors don't give any information about people habits, a deep survey would be needed to have a better qualitative and quantitative comprehension of the solid waste issue in Historic Cairo.

The survey will concern inhabitants, shop owners, institutions, etc. It will aim to collect information as littering habits, sorting activities, burden of the cleanliness fees, main problems encountered, willingness to be incorporated in a SWM project, etc.

4. Interviews and meeting (qualitative)

Interviews

The interviews will concern all SWM stakeholders: informal (zabbaleen, scavengers), formal (AAEC, CCBA, comities), inhabitants, NGO (APE)... It will allow to evaluate the knowledge of the different actors about situation and the others actors and thus to enlighten the misunderstanding that can harm the service performance. By interviewing the core actors of the project, we aim to benefit from their general and specific knowledge since they are in a central position in solid waste management.

Information and communication meetings

Along the study, meetings can be organized in order to put all the stakeholders around the table and to discuss about solid waste management issue. Generally, shareholders don't have any space for communication. Most of the time, communication is partial, informal and only bilateral. At this step of the study the objective of meetings is not to discuss about the solutions, but more to inform people and to test their ability to work together.

5. Research planning and study outputs

Research planning

| Steps | Task | Length |
|---------|--|---|
| First | Authorization for field research and for quantitative survey | 3 weeks |
| Second | Data collection | 2 months (flexible) |
| Third | Interviews | 2 months (flexible) |
| Fourth | Observation and analysis | 12 days (observation) + 8 days (analysis) |
| Fifth | Quantitative survey | 30 days (for 300 surveyed) |
| Sixth | Meetings | At least three meetings |
| Seventh | Report Production | 30 days |

The steps can be inverted. However, the first step is non invertible and have to be the first step in the study process. As the same, the observation phase may take place before the quantitative survey in order to take place in a more neutral environment. People that have been surveyed may change their habits or way to interfere with the observers, and that may have a negative impact on the objectiveness of the observation phase.

Research schedule

| Preliminary phase | | First month | Second month | Third month |
|--------------------------|---|---|---------------------|--|
| Authorization 3 weeks | | Data collection | | |
| | Research preparation (questionnaires, observation materials, etc.) | Interviews | | |
| | | Observation and observation analysis | | |
| | | | Quantitative survey | |
| | | Meetings | | |
| | | | | Report production and project proposition |

The above research schedule is indicative and can be either extended according to unforeseen conditions.

Staff

| Position | Task | Working time |
|--------------------------|---|----------------------|
| 1 Team leader and Expert | Research preparation, data collection, interviews, observation analysis, meeting assistance, report production. Team coordination and process monitoring. | 105 days (full time) |
| 2 agents | Quantitative survey, observation | 42 days (full time) |
| 1 Secretary | Meetings Organization, appointments, etc. | 3 months (part time) |

Research outputs

At the end of the field research, the crucial informations on solid waste management in Historic Cairo should have been collected. At the end of the study, the UNESCO World Heritage Center would be provided with:

- ✓ **Quantitative informations (data, informations, etc.)**
- ✓ **Specifics technical problems identification**
- ✓ **Categorization of problematic zones per problem type (collection, generation, capacity to be served, etc.)**
- ✓ **Review of the solid waste management stakeholders in Historic Cairo**
 - Who they are (status, activities, etc.)
 - Their potentialities (equipment, knowledge, wish to participate in the SWM improvement.
- ✓ **Comprehensive approach of the faced problem per area**
- ✓ **Financial resources available**
 - From public authorities, private actors (private companies), inhabitants
- ✓ **Community habits informations**

Those informations would enable the development of a solid waste management action plan for historic Cairo.

- ✓ **Development of a Solid waste management action plan**

Recommendation for a Solid Waste Management Plan for Historic Cairo

The Solid Waste Management Plan for Historic Cairo should combine the different resources and potential of shareholders in order to establish a suitable solid waste management plan. In order to avoid the non durability of the project, the project shall be built hand in hand with the local stakeholders (public authorities, private company, community, informal sector, etc.). Different

form of cooperation can be imagine as for example committees made of representatives of all the stakeholders and headed by people having direct interest in the domain.

The projected plan shall also gather local community, collect its opinion and provide public information.

The informations collected treatment and valorization shall non be only sectorial but transversal. The action plan shall take place both geographically and per sector (ie. recycling consideration at the whole perimeter scale, but organized at the supra-local, committees based on a community level, solution drawn at the global scale and community scale).

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