R E P O R T

On Municipal Solid Waste Management in Georgia

2012

1 . INTRODUCTION

1.1. FOREWORD

Wastes are one of the greatest environmental challenges in Georgia. This applies both to hazardous and domestic wastes. Wastes are disposed in the open air, which creates hazard to human's health and environment.

Waste represents a residue of raw materials, semi-manufactured articles, other goods or products generated as a result of the process of economic and domestic activities as well as consumption of different products. As for waste management, it generally means distribution of waste in time and identification of final point of destination. It's main purpose is reduction of negative impact of waste on environment, human health, or esthetic condition. In other words, sustainable waste management is a certain practice of resource recovery and reuse, which aims to the reduction of use of natural resources. The concept of "waste management" includes the whole cycle from the generation of waste to its final disposal. I.e. it means waste reduction, collection, inventory, transportation, handling, and final disposal.

The present Report is prepared within the framework of the project, "Clean Up Georgia – Raising of Public Awareness and Involvement in Solid Waste Management Improvement" which is implemented by the Consortium of NGOs "Georgian Greens / Friends of Earth Georgia" and "Eco-Vision" financed by Swedish International Development Agency SIDA. The purpose of the Project is to improve the field of municipal solid waste management in the country by means of introduction of the integrated sustainable management system, public awareness campaigns, familiarizing with modern methods and initiatives. The aim of the Project is to build capacity of the society with the western experience existing in the field of municipal solid waste management, modern approaches, also to introduce new practices and create the demand in society for the establishment of the system of municipal solid waste management.

The Report reviews the situation existing in the field of municipal solid waste management in Georgia. It reflects problems and weak points related to municipal solid waste management as related to regions in the field of collection, transportation, disposal, and recycling. The Report also reviews payments/taxes related to the waste in the country and, finally, presents certain recommendations for the improvement of the noted field.

1.2. Modern Approaches to Waste Management

The different waste management practices are applied to different geographical or geo-political locations. It is directly proportional to the level of economic development of the country. The approaches towards waste management are different in developed and developing countries, urban and agricultural regions as well as residential and industrial areas. It is common for all over the world that mainly local municipality provides municipal solid waste management services. As for commercial and industrial wastes - it is the producer's responsibility.

In developed countries the following methods of effective waste management exist:

- reduction of the amount of the waste "at the source";
- waste reuse;
- waste recycling;
- energy recovery from wastes;
- disposal at the landfill.

Once the first four methods are used, there is still certain amount of the waste remained, which has to be disposed at landfills. However, in this case the amount is considerably less. This, by itself causes sustainability of the landfill, considerable increase of term of its operation, and, correspondingly, reduces landfill's negative impact on environment.

With the purpose of reduction of the amount of the waste disposed at the landfill, in many developed countries all over the world there is widely spread the initiative of waste minimization, reuse, and recycling, which is called in short "3R" (Reduce, Reuse, Recycle;) initiative.

To support this initiative, there are different programs developed in the world, which is, for example:

1. **Extended Producer Responsibility, EPR.**
   The program envisages increase of consumer's responsibility also during the further use of the product, i.e. creation of strong motivation for the producer to modify the product, which requires less quantity of raw materials and includes increased capacity for recycling.

2. **Setting the unit prices , so-called PAYT (Pay As You Throw)**
   Increased prices on collection means relatively more fee on disposal of not segregated (unsorted) waste compared to the segregated one. This program also includes imposition of penalty sanctions for municipalities, enterprises, and population for disposal of not segregated waste, what encourages reduction of amount of waste disposed at landfills, "at source" segregation, and increase of the demand for waste recycling. This program will also foster development of recycling activities.

3. **Landfill Taxes**
   This program envisages introduction of additional "landfill" taxes for population and municipalities, which facilitates landfill maintenance, while for the producers of the waste it is certain motivation for waste reduction.

For the implementation of the above-mentioned instruments, the governments of developed countries make lots of effort for the motivation of community and the private sector by means of different policies and programs. For example, waste recycling programs, which envisage encouragement of waste recycling business by means of cheap, long-term credits, payment benefits and other financial means. Besides, there are also other measures, which include different types of governmental subsidies as well as educational programs for members of different strata and age of society regarding the importance of waste segregation and prioritization of recyclable material.

Some countries prefer the incineration (thermal destruction) of domestic waste. However, there is an idea that incineration represents danger from the point of environmental impact.

Final destination of a particular type of waste is their biological treatment. It includes composting of biological wastes, anaerobic digestion, and mechanical biological treatment. However, this process is possible only in case if the waste is segregated at the source: anaerobic digestion is designated particularly for "wet" wastes, while composting is for more dry, food waste.

1.3. Municipal Solid Waste Management in Georgia

According to present administrative-territorial division, Georgia is divided into 10 administrative units) as regions, which include 2 autonomous republics, 64 municipalities, and 5 self-governing cities. Each municipality is a single self-governing unit, which, in its turn, includes executive agency – gamgeoba (administration), and legislative body – sakrebulo (assembly).

The field of municipal solid waste management is coordinated by sakrebulo infrastructure commission, which is authorized to make decisions at a local level, approve budget, and supervise purposeful expenditure of the budget.

In Georgia, municipal solid waste management service is carried out by cleanup services existing at local governments, which mainly are governmental establishments or limited responsibility companies, in which the state holds 100% shares. Because of scarcity of material and technical basis, these establishments can manage only 25-35% of total amount of generated waste, what is limited only by collection and disposal mainly at not managed landfills.

According to preliminary, unverified data, 80% of total amount of the waste generated in Georgia comes on population, 15% on the business, 3% on spontaneously dumped waste, and other 2% on all other sources.

As for the waste collection scheme, it is almost the similar in all regions, and consists of three main systems:

- Container, which means dislocation of plastic and metal containers of small and average size (from 0.24 liters to 1 cubic meter) in the streets of populated areas, from where the lorries carry out collection and transportation of the waste in the intervals determined by each municipality to existing landfills;
- Bunker, which is used mainly in cities, where multi storey residential houses exist, and envisages getting accumulated waste out of the entrance bunkers within the certain intervals. It has to be mentioned, that recently many cities have refused use of such a system;

- So-called "bell" system, which envisages riding the yards with a waste lorry and collecting the waste directly from population.

According to baseline data, the most widespread system in municipalities is the container system, which constitutes 74%, and then the bunker system comes with 16%, and, finally, the "bell" system with 10%.

2. BASELINE DATA COLLECTION

The main goal of the mentioned project "Clean up Georgia – Raising of Public Awareness and Involvement in Solid Waste Management Improvement" is to make public familiar with the municipal solid waste management system in Georgia and to identify and assess existing deficiencies and problems. In this regard the Project Regional Coordinators have been selected, who have been assigned to study the existing systems of municipal solid waste management in local municipalities and collect baseline data for the analysis. Within the framework of the project, 3 types of special questionnaires were created, which were distributed between regional coordinators.

The questionnaires include the following information: the sources of waste generation, waste structure, waste volume, peculiarities of collection of the waste in a particular community, number of people involved in this field, number of equipment, its condition, review of existing legal or illegal landfills, their location and current condition, area, amount of disposed waste, their legitimacy, availability of monitoring, conditions of external and internal roads.

Information has been collected from 85 populated areas in all over the Georgia. The following circumstance is also notable that because of absence of statistical data, the information presented in the questionnaires was mainly collected by means of interviews with the employees of local government and municipal services and does not represent official data. It should also be noted that some questionnaires are incompletely presented because of lack of competence and knowledge of the field by some responsible persons. It is also to be mentioned that they have inadequate attitude to a certain problem. Often, their information is based on the data of the past, or in certain cases on expected results. The questionnaires are mainly completed by local coordinators themselves, based on their visual observation.

3. REVIEW OF THE PROBLEMS RELATED TO MUNICIPAL SOLID WASTE MANAGEMENT IN GEORGIA

Although the information submitted by regional coordinators is in many cases incomplete and scarce, it is still considered satisfactory for baseline purposes and more or less reflects existing situation in the field of municipal solid waste management.

As a result of analysis of baseline data gathered from the questionnaires, the following main problems related to municipal solid waste management in the country have been identified:

- legislative base;
- local municipal solid waste management plan;
- level of proficiency of working force employed in the field of municipal solid waste management;
- obsolete equipment;
- methods and technologies of collection of municipal solid waste;
- statistical inventory of solid municipal waste;
- segregation / separation of solid domestic waste;
- recycling of waste;
- landfills.

At the very first sight it is clear that all above-mentioned problems directly point at the absence of a single system and lack of organization of municipal solid waste management. This unambiguously points at the most important problem – lack of corresponding legal base. Exactly the result of this problem is existence of uncontrolled, spontaneous landfills in the surroundings and streets of populated areas. The question regarding uncontrolled disposal of the waste in ravines, channels, riverbeds, squares, recreation parks and just in streets is still acute in the regions of Georgia. In addition population often openly burns spontaneously dispersed waste, which is one of the most important hazards to the environment. Even certain number of official landfills (18 landfills on the territory of Georgia), the large part of which has been functioning from the 1970s, is located in immediate proximity to the bed of a river or a channel of a small ravine, where spontaneous inflammation of waste occurs periodically, which causes emission of substantial amount of greenhouse gasses into the atmosphere.

To develop management system in any field, setting of united national strategy and objectives as well as establishment of adequate legislative basis represents the first-rate necessity. On the basis of obtained information no municipality has the municipal solid waste management plan, according to which municipal solid waste management will be carried out in the region, city, or populated area. As for development of proper sustainable integrated waste management system, it is

highly required to draft municipal solid waste management plans.

Uncontrolled "throwing" of municipal solid waste has direct adverse impact on the budget of local self-government; since collection and disposal of dispersed waste requires additional workforce and, correspondingly, funds.

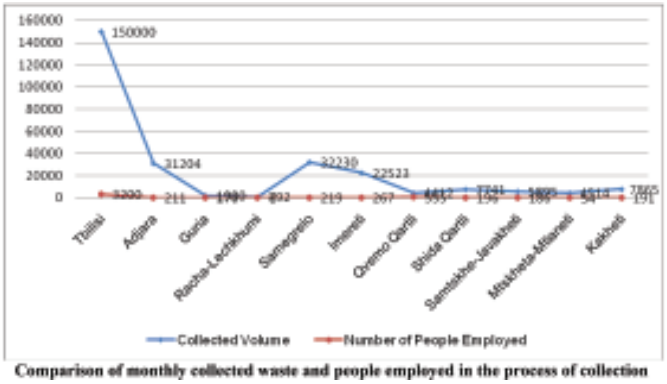
In addition to all the above mentioned, waste is inventoried neither in collection phase, nor at the disposal, which is very important for monitoring and planning.

The awareness of society regarding the issues related to municipal solid waste management is very low. This is notable especially in the regions. Population, just as in many cases even the employees of local government agencies and people employed in the field of municipal solid waste management, does not know what kind of damage is brought by unplanned waste management and how right, sustainable should the waste be managed. This latter exactly causes the rest of the problems, which we encounter in the field of municipal solid waste management in Georgia. These are:

1. Segregation of the waste, which envisages separation of the waste according to types and application of individual methods of final disposal for separate streams. At this stage, waste segregation does not occur at any level. Therefore, together with domestic waste, the medicine, different chemical substances, electric goods, and other are damped at landfills. Apart from that, it can quite easily be distinguished such kind of waste, which can be used as raw material, secondary product, and etc within the municipal solid waste.
2. Composting of biological waste, which envisages obtaining of ecologically pure and effective fertilizer from all kinds of food, leaves, and other so-called "green" waste. Today, we encounter in Georgia only individual cases of composting, which indicates at lack of awareness in society. Compost includes high-concentration Nitrogen, and it is a good fertilizer for vegetables. It is relatively cheaper than mineral fertilizer, and does not have adverse effect over soil.
3. Waste recycling. There are only a few enterprises in Georgia, which carry out recycling of different types of product, such as paper, plastic (so-called "PET" – Polyethylene Terephthalate) bottles, hard plastic, glass, etc. Development of such industry, which is based on waste recycling, will contribute to the reduction of the amount of the waste, although this is directly connected with development of legislative basis and public awareness and is practically impossible without introduction of segregation practice.

3.1. Collection and Transportation of Municipal Solid Waste

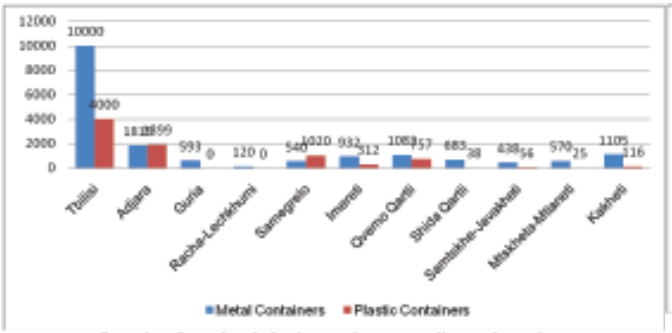
It should be noted that in a whole the municipalities (municipal services, limited companies) do not have adequate amount of equipment and workforce involved in the field of waste collection. For example, according to basic data, in Georgia from 85 populated areas in total 5261 people are employed in collection of the waste. However, the vast majority of people come from Tbilisi and large cities (Tbilisi – 3200, Rustavi – 270, Batumi – 80, Kobuleti – 120, Ozurgeti – 150, Zugdidi – 90, Marneuli – 105, Gori – 80, Khashuri – 70). It is clear that in these regions there is obvious lack of trained staff.



Comparison of monthly collected waste and people employed in the process of collection

As for collecting equipment, in the field of municipal solid waste there are in total involved 209 dust-trucks, 190 compaction dust-trucks (of whom 153 are in Tbilisi, and 26 in Rustavi), 10 dump trucks and 3 motorcycles. It has to be mentioned that waste collecting equipment is obsolete or amortized especially in the regions and requires renovation. Special attention deserves motorcycles, which are used in Signagi and Samtredia, as in many cases the motorcycle is the best solution for collection of the waste, especially in such residential areas, where a lot of narrow and inaccessible roads exist. At the same time, motorcycle is much cheaper compared with the lorry.

In the regions, lack of waste containers is also notable. According to baseline data, in all municipalities there are in total 17878 metal and 8223 plastic containers. However, just as in previous case their majority are located in Tbilisi and other large cities (Tbilisi – 10000 metal units, 4000 plastic ones; Rustavi – 560 metal units; Batumi – 1178 metal units, 1244 plastic ones; Kobuleti – 400 metal units, 600 plastic ones; Ozurgeti – 500 metal units; Zugdidi – 450 metal units, 500 plastic ones; Zestaphoni – 107 metal units, 60 plastic ones; Gori – 447 metal units, 23 plastic ones; Khashuri – 100 metal units; Kaspi – 136 metal units; Borjomi – 260 metal units; Mtskheta – 410 metal units, 20 plastic ones; Sagaredjo – 260 metal units; Lagodekhi – 200 metal units; Akhmeta – 228 metal units, 18 plastic ones; Dedoplistskaro – 300 metal units).



Quantity of metal and plastic containers according to the regions

According to baseline data, total amount of the waste collected daily is 8186.3 cubic meters, monthly this number reaches 269166.1 cubic meters. These data cannot be considered as correct, as, unfortunately, there are no exact data of the waste inventory available. Exactly the absence of proper inventory of the waste is one of the problems existing today in the field of municipal solid waste management.

Much worse is the situation in the areas far from administrative centers, where practically no containers exist and collection and removal of the waste is either badly organized or absent at all, which by itself causes pollution of woodlands, ravines, and riverbeds by different types of waste.

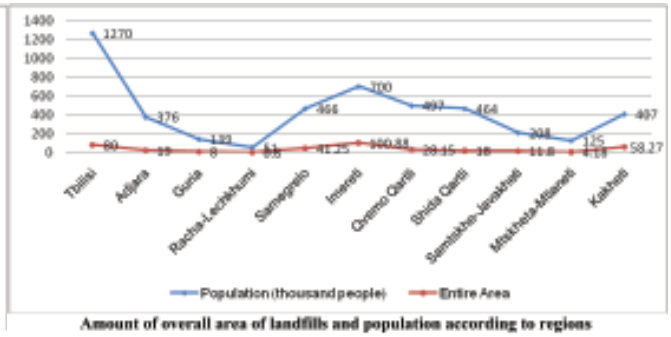
The above-mentioned points at the fact that municipalities do not have any united municipal waste management plan, where necessary equipment is registered, number of workforce, collection schemes for particular places, clear procedures, logistical plan and operations plan is present. No integration with other systems such as, for example, spatial development, urban planning, land management, etc., occurs and the analysis of expected activities does not exist at all.

Proceeding from this, it is possible to make the list of basic problems in the field of municipal solid waste collection and transportation:

- lack of qualified personnel;
- lack of adequate equipment (motorcars and other collection equipment);
- lack of containers;
- lack of waste inventory;
- lack of municipal solid waste management plan.

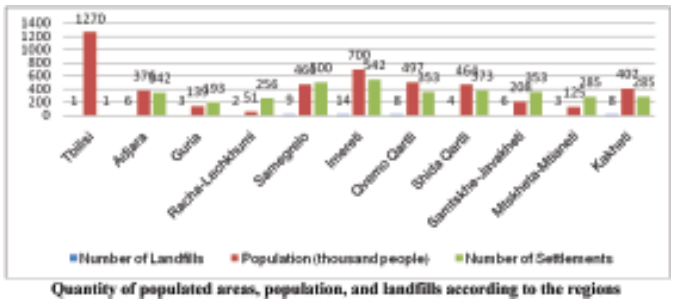
3.2. Landfills

Landfills are generally one of the most problematic issues in the field of waste management. All official landfills registered in Georgia belong to the municipalities hence the municipality takes responsibility for its legality, sanitation control, and care.



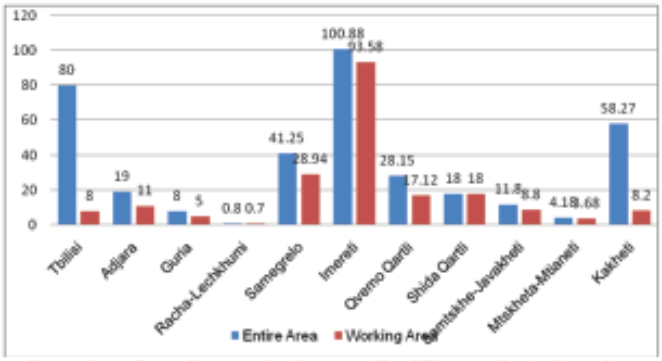
Amount of overall area of landfills and population according to regions

According to existing data, there are 63 landfills officially registered in Georgia (information of the Ministry of Environment). Apart from that, many illegal, spontaneous locations of the waste are notable, which, just as the majority of legal landfills, are mainly located near populated areas, motorways, natural water reservoirs, and in most cases in the riverbeds and bottoms of ravines.



Quantity of populated areas, population, and landfills according to the regions

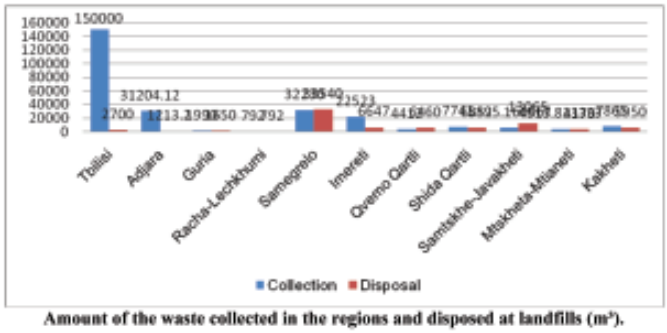
On the grounds of baseline data, landfills occupy in total more than three hundred hectares, from these 203 hectares are active landfills. Among regions, the largest area is occupied by the landfills in Imereti (100 hectares), then come Tbilisi (80 hectares), Kakheti (58 hectares), Samegrelo (41 hectares), Kvemo Kartli (28 hectares), Adjaria (19 hectares), Shida Kartli (18 hectares), Samtskhe-Djavakheti (11 hectares).



Comparison of overall area and active area of landfills according to the regions

As a result of special processing of this information, the maps of volumes of municipal solid waste disposed whether legally or illegally have been created within the framework of the project. At the same time, the map prepared in GIS has also been created, where information regarding municipal solid waste is reflected.

The amount of the waste disposed at landfills comes into controversy with collection data. According to these data, 22716 cubic meters of waste will be disposed daily at the landfills, whereas the volume of the waste collected daily in the same municipality is 8186 cubic meters. The same applies to the rate of monthly disposal, respectively 82560 cubic meters and 269000 cubic meters.

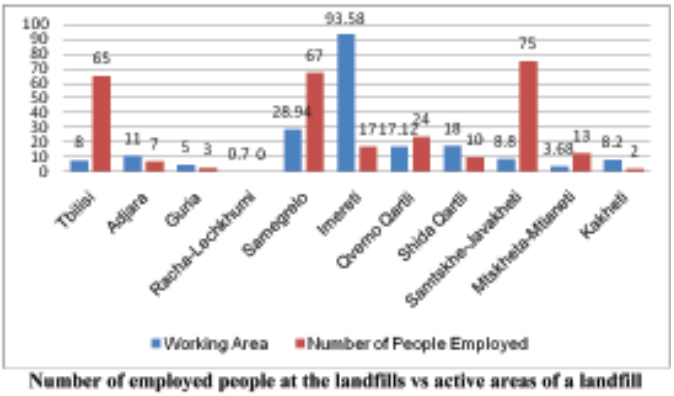


Amount of the waste collected in the regions and disposed at landfills (m³).

Almost all official landfills operate back from Soviet times and correspond to those-time standards and norms, which today are already obsolete and unacceptable, while they have been operated since those times inadequately.

On the whole, only 22 landfills are fenced, in some cases "partly", and the security is located at 21 landfills, although the issue of safety is arguable. Only 16 landfills have good access and internal roads, while in other cases moving on the territory of the landfill is practically impossible, especially in rainy weather.

In total 283 people, 9 bulldozers, and 14 excavators are employed on the average at the landfills. It is impossible to rely on these data because of lack of baseline information.



Number of employed people at the landfills vs active areas of a landfill

In 2007, the Law on Environmental Impact Permit entered into force. According to the Law, all operating companies of landfills are obliged to prepare and approve EIA report, based on which the Ministry of Environment of Georgia issues the permit for environmental impact.

Obtaining of corresponding documentation confirming their legality proved impossible at either of the landfills. The validity of the landfills is also uncertain. The exact term of functioning of the landfills is known only in a number of cases.

In majority of cases (except for new landfills of Tbilisi and Rustavi) there is no landfill construction design presented, neither EIA nor environmental impact permit. There is no plan and/or disposal procedure, and waste inventory occurs nowhere. Only at 18 landfills the existence of environmental monitoring is reported, which is quite suspicious, especially as it has not been possible to submit corresponding documentation, although existence of the network of observation boreholes is observed at 50 landfills.

One more problematic issue is landfill scavengers, people, who collect different materials and products at the landfills with the purpose of their further selling. These people are considered being in a high risk health group, just as they impose danger to the health of others because of spread of different infectious diseases. This phenomenon is of more social nature, since people engaged in this activity are below poverty line.

Proceeding from above-mentioned, the main problems connected with landfills can be formulated as follows:

- absence of private landfills;
- existence of illegal, spontaneous landfills;
- lack of landfill infrastructure (fencing, security, internal road, weighing machine, other helping facilities and etc);
- lack of qualified personnel;
- lack of corresponding documentation;
- incompatibility with sanitation norms and rules;
- lack of landfill construction design;
- insufficient location of landfills (near riverbeds, populated areas, absence of watertight layer, spontaneous inflammation etc);
- absence of environmental impact permit;
- absence of environmental control and monitoring;
- absence of waste inventory.

All above-mentioned problems can be easily addressed through creation of corresponding legislative base and development of municipal solid waste management plans, which actually mean development of integrated sustainable waste management system.

4. FINANCIAL OVERVIEW

Today in all regions of Georgia one type of municipal fee exists, which is called cleaning fee. Legislative body of each municipality and sakrebulo (assembly) establishes the amount of cleaning fee by its decision for a particular municipality. The payment is determined in accordance with active legislation of Georgia. Its withdrawal is also determined by the legislation, although in many cases the total withdrawal of the payment is impossible. Because of this, the income of the municipality is also unpredictable.

The large part of the sum coming from the fees is applied directly to cleaning, collection of the waste, and its final disposal.

As we have mentioned, limited companies carry out cleaning of municipalities, in the majority of which 100% belongs to the state. These companies are fully subsidized by the state, and are not responsible for collecting the fees. The budget allocated for municipal solid waste management is largely low and does not correspond to requirements of modern waste management, since quite substantial sums are needed for the introduction of new technologies and purchase of equipment.

One of the most effective instruments for sustainable waste management is close partnership between three sectors – state, community, and private sector, which envisages involvement of much larger part of private sector into the service cycle. This will cause sound competition between private companies at the waste management market, which, in its turn, will have positive effect on reduction of prices and improvement of service quality. This time the role of society is monitoring of management process, while that of local government is control and inspection. In order to make municipal solid waste management business attractive to private sector, it is necessary to have adequate support and motivation from the state, which at least in the initial period will be expressed through cheap credits, tax benefits and different type of subsidies, without which it is impossible to attract investment in this field.

It is also to be mentioned that imposition of the payment by private sector should occur under strict control of the state, since extremely high payment can make population again illegally "throw" the waste, which itself will cause the growth of number of spontaneous landfills.

5. DATA ANALYSIS ACCORDING TO THE REGIONS

5.1. The City of Tbilisi

By information of 2002, approximately 1 270 800 people live in the city of Tbilisi. Tbilisi is ruled by sakrebulo and city mayor. Tbilisi sakrebulo is an elective representative body. The Mayor of Tbilisi is the highest official of the city and head of the government. Tbilisi has municipal solid waste management plan. Apart from this, in 2010 GTZ developed waste management concept, in which the issues connected with waste management in Tbilisi are discussed in details.

5.1.1. Collection

The container system of waste collection functions in Tbilisi. It constitutes 97% of the whole system. For years the bunker system has functioned in residential blocks. The bunkers represented amortized, unclean sources as well as sources of many infectious diseases. By the initiative of the Mayor of Tbilisi, the bunkers have been closed in multi-flat residential houses, and they have been replaced by special containers. However, the "bell" system still exists in some areas of Tbilisi (3%).

Approximately 3200 people are employed in the collection service. Their qualification is satisfactory.

Waste inventory is not carried out in the phase of collection. In the table below, the main data, related to the field of collection of municipal solid waste of the city of Tbilisi, are reflected. All data are approximated, obtained by local coordinators during the collection of baseline data.

5.1.2. The landfill

Near the city of Tbilisi, adjoining the village of Norio of Gardabani region a new landfill of solid waste, corresponding to international standards was built and already put into operation. It has environmental impact report, design, and permit. Its owner is the Mayor of the city of Tbilisi. The new landfill is equipped with watertight protective layer, it is distanced from ravines and populated areas.

Total area of the landfill is 80 hectares. It is enclosed by the fence and has the security. Both access and internal roads are in good condition. At present only 8 hectares are active on the whole territory of the landfill. Its term of activity is defied until the 2035. The height of disposed waste layer is up to 4 meters. About 900 mi of waste are disposed daily at the landfill; respective monthly figure is 2700 m^3. Up to 65 people are employed at the landfill.

According to baseline data, the problems associated with municipal solid waste management can be considered specifically for the city of Tbilisi.

The situation here compared to the regions is normal, as it has been hardly several months since Tbilisi landfill was put into operation, and is considered as a building corresponding to EU standards. The collection system is also adjusted, there is municipal solid waste management plan and other environmental documentation. Although there are still deficiencies from the point of united national strategy and integrated sustainable waste management system. The issues of involvement and awareness of the society are to be reconsidered. There is no precise inventory of the waste either, therefore the amount of collected and disposed waste are not equal with each other. The issue of fee is also to be developed. It is exactly because of lack of inventory that today the so-called cleaning fee is attached to electricity payment, which is not recommended.

5.1.3. Analysis

Based on information of Tbilisi population increment index (0.74%), present demographic situation (1

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
5 000	150 000	10 000	4 000	3 200	153 dusttruck compactor

270 800 people), and EC Eurostat statistical data, according to which the yearly amount of generated domestic waste per capita in Europe is 320-423 kilograms, which corresponds to approximately 0.7-1.2 mi ($1m^3$ = 350 kilograms).

According to these data, the yearly amount of generated solid domestic waste municipal solid waste constitutes 1 270 800 X 1,2 = 1 524 960 m^3. Correspondingly, the daily amount of generated waste will be 4 178 m^3.

Let us calculate capacity of Tbilisi landfill by the time of expiration of its working term, i.e. by 2035.

Considering population increment index, by 2035, the amount of population will have been 1 520 4402 inhabitants. Proceeding from this, in 2035, Tbilisi landfill will receive approximately two million cubic meters of waste 1 520402 X 1,2 m^3 = 1 824 483 m^3 and the total volume of waste received will equal to 41 760 853 m^3. It is obvious that in order to considerably minimize appalling volume of waste there have to be applied appropriate measures as soon as possible.

5.2. Adjara

Adjara is located in south-western part of Georgia. Its area is 2900 km^2, population is about 376 000 people. The administrative center of the autonomy is the city of Batumi. There are 342 populated areas on the territory of the autonomy, among them: 2 cities: Batumi, Kobuleti; 7 settlements: Makhindjauri, Chakvi, Ochmakhuri, Keda, Kelvachauri, Shuakhevi, Khulo, and 333 villages.

According to the Constitution of the Autonomous Republic, the legislative body is Supreme Council of Adjara Autonomous Republic. Executive body is the Council of Ministers. Administrative units of Adjarian Autonomy are: 1 city hall, 5 municipal administrations (gamgeoba), 3 settlement assemblies (sakrebulo), and 56 village assemblies (sakrebulo).

5.2.1. Collection

The container system of waste collection functions in whole Adjara. It constitutes about 80% of the whole system. In the cities, where there are residential blocks, there is bunker system functioning. The bunkers are amortized. The "bell" system constitutes about 8% of the total collection volume in some municipalities of Adjara.

Overall in Adjara, there are up to 211 people employed in the collection service. From these, 80 are in Batumi, while 120 are in Kobuleti.

Waste inventory is not carried out in the phase of collection. In the table below, basic data, connected with the field of municipal solid waste collection are reflected. All the data are approximated during collection of obtained basic data by local coordinators.

5.2.2. The landfill

In Adjara, city of Batumi, and other 5 municipalities municipal solid waste landfills exist, which are legal according to the information of local municipalities. Although it was not possible to present environmental impact report and permit. Batumi and Kobuleti landfills have construction design. All landfills are owned by local municipality. No landfill is equipped with water resistant protective layer. Only Khelvachauri landfill is located near the river and seashore. Their distance from populated areas is acceptable. At no landfill there is sanitation control and monitoring. Protection and presence of fencing is noted only at Batumi and Kobuleti landfills. Access and internal roads are amortized everywhere and need rehabilitation. Up to 7 people are employed at the landfills.

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
1106,76	31204,12	1814	1899	211	no data available

Total area of Adjara landfills is unknown. Only total area of Batumi landfill – 19 hectares – is known, where 11 hectares are active. The term of validity of the landfills is determined only for Batumi landfill – until 2013, all the others were established in 1960s of previous century. Determination of the height of the layer of disposed waste is impossible without detailed exploration. The amount of waste disposed daily at the landfills is unknown because of scarcity of data, although it is possible to determine approximate amount of originating waste.

According to baseline data it is possible to consider the problems connected with municipal solid waste management particularly for Adjara region.

The collection system is more or less adjusted, although there is no solid domestic management plan and other environmental documentation. There is no sufficient quantity and adequate qualification of personnel. New well maintained equipment is not sufficient both in the field of collection and disposal. Public involvement and awareness issues are undeveloped. There is no exact inventory of solid domestic waste; therefore the amount of both collected and disposed waste will not be equal with each other. The issue of payment is to be developed and improved. Information regarding location and volume of spontaneously disposed waste is given in attached maps.

5.2.3. Analysis

Based on today's demographic situation (376 000 people) and statistical data of EU Eurostat, according to which the amount of average yearly generated domestic waste in Europe per capita is 320-423 kg, which corresponds to approximately 0.7-1.2 m^3 (1 m^3 = 350 kg). Based on these data, the maximum amount of yearly originated municipal solid waste should constitute 376 000 X 1,2 = 451 200 m^3. Correspondingly, the amount of the waste generate daily is approximately 1236.16 m^3.

5.3. Guria

In the region of Guria there are the following self-governing units: Ozurgeti, Lanchkhuti, and Chokhatauri municipalities. Population is 139 800 people, population density per 1 square km – 73 people. The administrative center of the region is the city of Ozurgeti. There are 193 populated areas in the region, including: 2 towns – Lanchkhuti, Ozurgeti, 5 settlements – Laituri, Narudja, Nasakirali, Ureki, Chokhatauri, and 186 villages.

In the region, governmental supervision over the activities of local self-government bodies is carried out by authorized state governor appointed by the President of Georgia.

5.3.1. Collection

In whole Guria the container system of waste collection functions. The bunker system functions no more. The "bell" system is still exsiting in some settlements. Unfortunately, there are no precise data regarding collection systems.

In the whole region of Guria there are up to 176 people employed in the collection service. From these, 150 are in Ozurgeti, while others are in Chokhatauri and Lanchkhuti.

Inventory of waste is not carried out in the phase of collection. In the table below, basic data regarding the field of municipal solid waste collection in Guria are reflected. All data are approximated during the collection of obtained basic data by local coordinators.

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
73	1990	593	-	176	5 compactors 5 dusttrucks 5 dump trucks

5.3.2. The landfill

In Guria, in the municipalities of the cities of Ozurgeti and Chokhatauri, there are municipal solid waste landfills, legality of which was possible to have been confirmed by local municipalities' workers through submitting appropriate documentation, neither construction design have been submitted, nor environmental impact report and permit. Both of the landfills are owned by local municipalities. As for the landfill located in Lanchkhuti, it has not been possible to identify its owner, and, as it proved, it has not been registered at all. It should be mentioned that there is construction design of the latter (?). Neither landfill is equipped with water resistant protective layer. Lanchkhuti landfill is located at the distance of 500 meters from the river, while that of Ozugeti – in the proximity of 1 km from the populated area. Sanitation control and monitoring is carried out at neither of the landfills and there is no fencing. The security is present only at Chokhatauri and Lanchkhuti landfills. Access and internal roads at Ozurgeti and Chokhatauri landfills are in good condition. Internal road at Lanchkhuti landfill is amortized and needs restoration. Up to 3 people are employed at the landfills.

Total area of Guria landfills is 8 hectares, of which 5 hectares are active. The term of validity of neither of the landfills is not determined; all the three were established in 60s-70s of previous century. Identification of the height of the layer of disposed waste without detailed exploration is impossible. The amount of the waste disposed daily at the landfills is 55 m^3, whereas respective monthly figure is 1650 m^3.

According to baseline data, the problems concerning municipal solid waste management specifically for Guria region can be considered.

The collection system is largely adjusted, although there is no municipal solid waste management plan and other environmental documentation. There is no sufficient quantity and adequate qualification of personnel. New well maintained equipment is insufficient both in the fields of collection and disposal. There are not enough waste containers. The issues of public involvement and awareness are undeveloped. Precise inventory of municipal solid waste is not carried out, therefore the amount of collected and disposed waste is not corresponding. The fees issue is to be developed and improved. Information regarding location and volumes of spontaneously disposable wastes is presented in attached maps.

5.3.3. Analysis

Based on present demographic situation (139 800 people) and EU Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1,2 m^3(1 m^3= 350 kg).

Based on these data, the maximum amount of municipal solid waste generated yearly must constitute 139 800 X 1,2 = 167 760 m^3. Correspondingly, the amount of the waste generated daily is approximately 459,6 m^3.

5.4. Racha-Lechkhumi

The region of Racha-Lechkhumi and Lower Svaneti is in Western Georgia. It includes the following administrative-territorial units: Ambrolauri, Lentekhi, Oni, and Tsageri municipalities.

The area of the region constitutes 4 954 km^2, population – 51 000 people, population density per 1 kmI is 10 people. The administrative center of the region is

eas, including: 3 towns – Ambrolauri, Oni, Tsageri; 3 settlements – Kvaisa, Lentekhi, Kharistvala, and 251 villages.

The executive authority in the region of Racha-Lechkhui and Lower Svaneti is carried out by the authorized official of the President of Georgia. Local self-government in the region is carried out by representative (sakrebulo) and executive (gamgeoba) bodies according to the following administrative-territorial units. The region's administrative units are: gamgeobas of 4 regions, sakrebulos of 56 villages.

5.4.1. Collection

Collection of data occurred only in the region of Racha-Lechkhumi, municipalities of Ambrolauri and Oni. The container system of waste collection functions in the region. The bunker system exists no more. The "bell" system in some settlements is still actual.

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
26,4	792	120	-	6	1 compactor 3 dusttrucks

Unfortunately, there are no exact data regarding the collection available.

Only 6 (!) people are employed in the collection service in the whole region.

Waste inventory is not carried out in the phase of collection. In the table below, the basic data connected with the field of municipal solid waste collection in Racha-Lechkhumi are reflected. All data are approximated, during the collection of basic data by local coordinators.

5.4.2. The landfill

In the municipalities of the cities of Ambrolauri and Oni there are municipal solid waste landfills, the legality of which was not possible to have been confirmed by local municipalities' through submitting appropriate documentation. There are construction designs for both landfills, but no environmental impact assessment and permit is available. Both landfills are owned by local municipalities. Neither of the landfills is equipped with water resistant protective layer. Ambrolauri landfill is located nearby the river, while that of Oni – in the proximity of 1 km from the populated area. No sanitation control and monitoring is carried out at either of the landfills, and there is no fencing, but presence of the security is to be mentioned. Access and internal roads at both landfills are in good condition. The number of people engaged at the landfills is unknown.

Total area of Racha-Lechkhumi landfills is 0.8 hectares (!), of which 0.7 hectares function. The term of validity of the landfills is 5-7 years; both of them were established in the 60s-70s of previous century. The height of the layer of disposed waste is about 0.2-1.5 meters, although it is impossible to determine it exactly without detailed exploration. The amount of the waste disposed at the landfill per day is 26.4 mi, whereas respective monthly figure is 792 mi.

According to baseline data, it is possible to consider the problems connected to municipal solid waste management specifically for Racha-Lechkhumi region.

The collection system is mostly unplanned; there is no municipal solid waste management plan and other environmental documentation. The quantity of qualified personnel and equipment is insufficient both in the fields of collection and disposal. There is no enough quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either. The issue of fee is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

5.4.3. Analysis

Based on present demographic situation (51 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1,2 m^3 (1 m^3 = 350 kg).

Based on these data, the maximum amount of municipal solid waste generated yearly must constitute 51 000 X 1,2 = 61 200 m^3. Correspondingly, the amount of the waste generated daily is approximately 167,7 m^3.

5.5. Samegrelo

The regions of Samegrelo and Upper Svaneti are located in Western Georgia. Samegrelo and Upper Svaneti include the following administrative units: the city of Poti, Abasha, Zugdidi, Martvili, Mestia, Senaki, Chkhorotsku, Tsalendjikha and Khobi municipalities.

The area of the region constitutes 7441 km^2, population – 466 000 people, density of population per 1

kmI is 63 people. The administrative center of the region is the city of Zugdidi. There are 500 populated areas in the region, including: 8 cities: Abasha, Zugdidi, Martvili, Senaki, Poti, Tsalendjikha, Djvari; 3 settlements: Chkhorotsku, Mestia, Khobi, and 490 villages.

Administrative units of the region are: 1 self-governing city and 7 municipalities. The state rule is carried out in the region by the authorized state governor appointed by the President of Georgia.

5.5.1. Collection

The collection of data occurred only in the region of Samegrelo. The container system of waste collection functions largely in the whole area. The bunker system is maintained in Senaki and Tsalendjikha (10%). The "bell" system still functions in some settlements. Unfortunately, there are no precise data regarding the collection systems available.

In the whole region of Samegrelo up to 219 people are employed in the collection service. From this, 90 are in Zugdidi, while all the others are in municipalities. The minimal figure is observed in Khobi – 8 people.

Waste inventory is not carried out in the phase of collection. In the table below, the basic data connected with the field of municipal solid waste collection in Samegrelo are reflected. All data are approximated, obtained during the collection of baseline data by local coordinators.

5.5.2. The landfill

In the region of Samegrelo there are municipal solid waste landfills, from which only 4 (Zugdidi, Tsalendjikha, Djvari, Chkhorotsku) are considered as legal, although local municipalities' did not manage to present confirming documentation. Martvili landfill is notable, which is "temporary" one. It was not possible to present environmental impact assessment report and the permit. There are construction designs available for Tsalendjikha, Djvari, Chkhorotsku, Abasha, and Senaki landfills. All landfills are owned by local municipalities. Neither of the landfills is equipped with water resistant protective layer. Their location is largely satisfactory, at a distance from water reservoirs, population, and rivers; only Poti landfill is located near all the three sensitive receptors. No sanitation control and monitoring are carried out at either of the landfills. The fencing is observed at Chkhorotsku and Senaki landfills, the security is present only at Zugdidi and Chkhorotsku ones. Access and internal roads at the landfills are in good condition. The internal road at Tsalendjikha, Chkhorotsku, and Djvari landfills is amortized and needs rehabilitation, although these figures are quite optimistic. The quantity of people engaged at the landfills is up to 67.

Total area of Samegrelo landfill is 41.25 hectares, where 28.94 hectares are active. The term of activity of the landfills is uncertain at each of them. All of them, except for Zugdidi, Tsalendjikha, Chkhorotsku and Martvili landfills, are established in the 60s and 70s of previous century. The thickness of the layer of disposed waste fluctuates from 0.3 to 5 meter, although definition of its precise width is impossible without detailed exploration. The amount of the waste disposed daily at the landfills is 222 m^3, while respective monthly figure is 33 540 m^3.

According to basic data, it is possible to consider the problems connected to municipal solid waste management specifically for Racha-Lechkhumi region.

The collection system is largely organized, although there is no municipal solid waste management plan and other environmental documentation. The quantity of qualified personnel is relatively sufficient, although their qualification is inadequate. New well maintained equipment is insufficient both in the fields of collection and disposition. There is no enough quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either, therefore the collected and disposed amount does not equate with each other. The issue of fee is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
227	32230	540	1020	219	1 compactor 16 dust trucks

5.5.3. Analysis

Based on present demographic situation (466 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1,2 m^3 (1 m^3 = 350 kg).

Based on these data, the maximum amount of municipal solid waste generated yearly must constitute 466 000 X 1,2 = 559 200 m^3. Correspondingly, the amount of the waste generated daily is approximately 1532 m^3.

5.6. Imereti

Imereti region is located in Western Georgia. Imereti region includes the following administrtive-territorial units: the city of Kutaisi, municipalities of Bagdati, Vani, Zestaponi, Terdjola, Samtredia, Sachkhere, Tkibuli, Tskaltubo, Chiatura, Kharagauli, and Khoni. The area of the region constitutes 6552 km^2, population is 700 000 people, the density of population per kmI is 108 people. The administrative center of the region is the city of Kutaisi. There are 542 populated areas in the region, including: 10 cities: Kutaisi, Vani, Tkibuli, Tskhaltubo, Chiatura, Bagdati, Zestaponi, Terdjola, Samtredi, Sachkhere, Khoni; 3 settlements: Shorpani, Kulashi, Kharagauli; and 529 villages.

The administrative units of the region are: 4 city halls (Kutaisi, Tskaltubo, Chiatura, Tkibuli), 8 regional administrations (gamgeoba), 2 settlement assemblies (sakrebulo) and 161 village assemblies (sakrebulo). State administration is carried out in the region by an authorized official appointed by the President of Georgia.

5.6.1. Collection

The container system of collection mainly functions in the whole region. The bunker system of small scales is maintained in Kutaisi, Zestaphoni, Chiatura, Tkibuli, and Terdjola and Tsalendjikha (1-10%). The "bell" system functions in some settlements, especially in Tsageri, Tkibuli, and Terdjola. Unfortunately, there are no exact data regarding the collection system.

Up to 267 people are employed in the collection service in the whole region of Imereti. They are almost equally distributed in all municipalities (20-40 people), although it is notable that the data about Kutaisi, Khargauli, and Terdjola are not available.

Waste inventory is not carried out in the phase of collection. In the table below, the basic data connected with the field of municipal solid waste collection in Imereti are reflected. All data are approximated, obtained during the collection of basic data by local coordinators.

5.6.2. The Landfill

In the region of Imereti there are 14 municipal solid waste landfills, from which only Bagdati landfill is considered as legal. Local municipalities' did not manage to present confirming documentation for all the others. It was not possible to present environmental impact assessment and the permit either. There are construction designs for only 5 landfills. All landfills are owned by local municipalities. Neither of the landfills is equipped with water resistant protective layer. Their majority is located near some populated area, while in Tsageri, Kutaisi, Bagdati, and Zestaponi they are in the close proximity from rivers. No sanitation control and monitoring are carried out at either of the landfills. The fencing is observed only at Bagdati, Khoni, and Terdjola landfills, the security is present only in Samtredia, Tkibuli, and Terdjola. The condition of access and internal roads at the landfills is generally satisfactory, although these figures are quite optimistic. The quantity of people engaged at the landfills is up to 17.

Total area of Imereti landfill is 100.88 hectares, where 93.58 hectares are active. The term of validity of the landfills has expired at each of them. All of them,

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
777	22523	932	312	267	1 compactor 58 dust trucks 5 dump trucks 1 motorcycle

except for Kharagauli and Zestaponi landfills, are established in the 60s, 70s, and 80s of previous century. The thickness of the layer of disposed waste fluctuates from 0.5 to 10 meters (Kutaisi), although definition of its precise width is impossible without detailed exploration. The amount of the waste disposed daily at the landfills is 224.7 m^3, while respective monthly figure is 6647 m^3.

According to baseline data, it is possible to consider the problems connected to municipal solid waste management specifically for Imereti region.

The collection system is largely organized, although there is no municipal solid waste management plan and other environmental documentation. The quantity of qualified personnel is insufficient and their qualification inadequate. New well maintained equipment is insufficient both in the fields of collection and disposal. There is not sufficient quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either. Therefore the collected and disposed amount does not equate with each other. The issue of payment is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

5.6.3. Analysis

Based on present demographic situation (700 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1,2 m^3 (1 m^3 = 350 kg).

Based on these data, the amount of municipal solid waste generated yearly must constitute 700 000 X 1,2 = 840 000 m^3. Correspondingly, the amount of the waste generated daily is approximately 2301,4 m^3.

5.7. Kvemo Kartli

Kvemo Kartli is located in the Eastern Georgia. The region of Kvemo Kartli includes the following administrative-territorial units: the city of Rustavi; the municipalities of Bolnisi, Gardabani, Dmanisi, Tetri Tskaro, Marneuli, and Tsalka.

The area of the region constitutes 6528 km^2, which is 10% of the total area of Georgia. Population is 497 000 people. The density of population per 1 kmI is 76 people. The administrative center of the region is the city of Rustavi. There are 353 populated areas in the region, including: 7 cities: Rustavi, Bolnisi, Gardabani, Dmanisi, Tetri Tskaro, Marneuli, Tsalka; 8 settlements: Didi Lilo, Kodjori, Kazreti, Manglisi, Tamarisi, Shaumyan, Bediani, Trialeti, and 338 villages.

The administrative units of the region are: the city hall – 1, administration (gamgeoba) of the region – 6, settlement assembly (sakrebulo) – 8, village assembly (sakrebulo) – 86. State administration is carried out in the region by the official authorized by the President of Georgia.

5.7.1. Collection

The container system of collection mainly functions in the whole region. The bunker system still exists in Dmanisi, Rustavi and Garadabani (60-100%). The "bell" system functions in some settlements, especially in Tertritskaro region and Rustavi. Unfortunately, there are no exact data regarding the collection system.

Up to 555 people are employed in the collection service in the whole region of Kvemo Kartli. Majority are employed at Rustavi (270), Bolnisi (99) and Marneuli (105).

Waste inventory is not carried out in the phase of collection. In the table below, the baseline data connected with the field of municipal solid waste collection in Kvemo Kartli are reflected. All data are ap-

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
150	4412	1082	757	555	26 compactor 26 dust trucks 2 dump trucks

proximated, obtained during the collection of basic data by local coordinators.

5.7.2. The landfill

In the Kvemo Kartli region 7 municipal solid waste landfills exist, from which only Tsalka and Gardabani landfills are considered as legal. Local municipalities' did not manage to present confirming documentation for all the others. It was not possible to present environmental impact assessment report and the permit either. There are construction designs available for only Marneuli, Tsalka and Gardabani landfills. All landfills are owned by local municipalities. Neither of the landfills is equipped with water resistant protective layer. Their majority is located far distant from populated areas, while in Tsalka the landfill is in the close proximity from river (50 m). No sanitation control and monitoring are carried out at either of the landfills. The fencing is observed only at Tsalka and Marneuli landfills, the security is present only in Gardabani and Tsalka. The condition of access and internal roads at the landfills is generally unsatisfactory and need to be rehabilitated. The number of people engaged at the landfills is up to 24.

Total area of Kvemo KartLi landfill is 28.15 hectares, where 17.12 hectares are active. The term of validity of the landfills is unknown. All of them are established in the 60s, and 80s of previous century. The thickness of the layer of disposed waste fluctuates from 0,8 to 10 meters, although definition of its precise width is impossible without detailed exploration. The amount of the waste disposed daily at the landfills is 215 mi, while respective monthly figure is 6460 mi.

It is worth mentioning that currently construction of new, EU standard landfill has already been completed in Rustavi.

According to baseline data, it is possible to consider the problems connected to municipal solid waste management specifically for Kvemo Kartli region.

The collection system is largely adjusted, although there is no municipal solid waste management plan and other environmental documentation. The quantity of qualified personnel is insufficient and their qualification inadequate. New well maintained equipment is insufficient both in the fields of collection and disposal. There is not sufficient quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either, therefore the collected and disposed amount does not equate with each other. The issue of fee is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

5.7.3. Analysis

Based on present demographic situation (497 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1,2 m^3(1 m^3 = 350 kg).

Based on these data, the maximum amount of municipal solid waste generated yearly must constitute 497 000 X 1,2 = 596 400 m^3. Correspondingly, the amount of the waste generated daily is approximately 1634 m^3.

5.8. Shida Kartli

Shida Kartli is located in the eastern part of Georgia. The northern part of the region includes the large part of South Ossetia territory. The region of Shida Kartli includes the following administrative-territorial units: the city of Tskhinvali; municipalities of Gori, Kaspi, Kareli, Khashuri, and Djava.

The whole area of the territory is 6200 km^2 (including 4807 kmI, which is under the jurisdiction of central power). Population of the region is 464 000 people. Administrative center is the city of Gori.

In the part of the region controlled by the central power of Georgia, there are 373 populated areas, including: 5 towns: Gori, Kaspi, Kareli, Khashuri; 2 settlements: Surami, Agara, and 366 villages.

In Shida Kartli, executive authority is carried out by the state official authorized by the President of Georgia. Local self-government in the region is executed by representative (sakrebulo) and executive bodies according to the following administrative-territorial units: Gori municipality; Kaspi municipality; Kareli

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
258	7741	683	38	196	33 dust trucks

municipality; Khashuri municipality; Eredvi municipality; Kurti municipality; Tagvi municipality.

Administrative units of the region are: 1 city hall, 3 regional administration (gamgeoba), 2 settlement assembly (sakrebulo), 65 village assembly (sakrebulo) (including Eredvi and Kurti assemblies).

5.8.1. Collection

The container collection system functions largely in the region. The bunker system is considerably weakened, although it is still active in Khashuri and Kareli. The "bell" system is still existing in many settlements.

About 196 people are employed and 33 dust trucks are engaged in the region of Shida Kartli collection service. Waste inventory is carried out neither in the phase of collection, nor that of disposal. In the table below, the basic data connected with the field of municipal solid waste collection in Shida Kartli are reflected. All the data are approximated, obtained during the collection of basic data by local coordinators.

5.8.2. The landfill

4 landfills are registered in the region: those of the cities of Gori, Khashuri, Kareli, and Kaspi. In spite of the absence of relevant documentation, the first three landfills are reported as legal. It was not possible to present environmental impact assessment report and permit. The terms of validity of the landfills are also unknown. It is to be mentioned as well that Gori and Khashuri landfills are owned by local municipalities, while, according to basic data, Kareli landfill belongs to Kareli municipal service company, while that of Kaspi – to "Komuna Ltd". These data are to be made precise. Legality of this latter is also under question.

The first three of the enumerated landfills of the region are located close to populated area, river ravines are also close. According to the location, the better situation is in Kaspi.

Total area of all the four landfills is 18 hectares (!), from this all 18 hectares is active territory. The total amount of daily disposed municipal solid waste is 216 mi, respective monthly figure is 6352 m^3. Thickness of the layer of the waste is dispersed and is from 1.4 m to 7 meters. Presence of construction design and fencing is observed at Gori, Kareli, and Kaspi landfills, while the security is noted only in Kareli and Kaspi. Access road is in good condition at each site, inner roads are stone paved, but need restoration and renovation. In total, 10 people are employed at the landfills.

According to baseline data, it is possible to consider the problems connected to municipal solid waste management specifically for Shida Kartli region.

The collection system is quite organized, although there is no municipal solid waste management plan and other environmental documentation available. The quantity of qualified personnel is insufficient and their qualification inadequate. New well maintained equipment is insufficient both in the fields of collection and disposition. There is not sufficient quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either, therefore the collected and disposed amount does not equate with each other. The issue of fee is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

5.8.3. Analysis

Based on present demographic situation (464 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1,2 m^3 (1 m^3 = 350 kg).

Based on these data, the amount of municipal solid waste generated yearly must constitute 464 000 X 1,2 = 556 800 m^3. Correspondingly, the amount of the waste generated daily is approximately 1525,5 m^3.

5.9. Samtskhe-Djavakheti

The region of Samtskhe-Djavakheti is located in South Georgia. The area of the region constitutes 6413 km^3, population is 208 000 people, density of population per 1 kmI constitutes 32 people. The administra-

tive center of the region is the city of Akhaltsikhe. There are 353 populated areas in the region, including: 5 cities: Akhalkalaki, Akhaltsikhe, Borjomi, Vale, Ninotsminda; 7 settlements: Bakuriani, Bakuriani Andesite, Tsagveri, Akhaldaba, Adigeni, Abastumani, Aspindza, and 254 villages. Local self-government is carried out in the region by representative (sakrebulo) and executive bodies according to following administrative-territorial units: Adigeni, Aspindza, Akhalkalaki, Akhaltsikhe, Borjomi, and Ninotsminda municipalities.

State administration in the region is carried out by the authorized official appointed by the President of Georgia.

5.9.1. Collection

The container collection system functions largely in the region. The bunker system is considerably weakened, although it is still active in Akhalkalaki, Borjomi, and Akhaltsikhe (about 30%). The "bell" system still exists in many settlements. About 186 people are employed and 22 dust trucks are engaged in the region of Samtskhe-Javakheti collection service. Waste inventory is not carried out neither in the phase of collection, nor that of disposal. In the table below, the basic data connected with the field municipal solid waste collection in Samtskhe-Djavakheti are reflected. All the data are approximated, obtained during the collection of basic data by local coordinators.

5.9.2. The landfill

6 landfills are registered in the region: those of Ninotsminda, Akhalkalaki, Aspindza, Adigeni, Borjomi, and Akhaltsikhe. Most of them are considered as illegal. Only in case of Aspindza and Adigeni they are considered as legal, although it was not possible to present relevant documentation. It was also not possible to present environmental impact assessment report and permit. The terms of validity of the landfills are also unknown. All landfills of the region are owned by local municipalities. Location of most of the landfills is satisfactory from the point of distance from sensitive receptors. Only Adigeni landfill is located close to the river and populated area.

Total area of all the four landfills is 11.8 hectares (!), from this 8.8 hectares is active territory. The total amount of daily disposed municipal solid waste is 475.7 mi, respective monthly figure is 13065 mi. Thickness of the layer of the waste is dispersed and is on the average from 2 m to 5 meters. Presence of construction design and fencing is observed at Akhalkalaki, Aspindza, and Borjomi landfills, while the security is noted only in Akhalkalakii and Aspindza. Access roads are in good condition at each site, inner roads are stone paved, but needs restoration and renovation. In total, 75 people are employed at the landfills.

According to baseline data, it is possible to consider the problems connected to municipal solid waste management specifically for Samtskhe-Djavakheti region.

The collection system is functioning, although to be adjusted. There is no municipal solid waste management plan and other environmental documentation. There is no sufficient quantity and adequate qualification of personnel. New well maintained equipment is insufficient both in the fields of collection and disposition. There is not sufficient quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either, therefore the collected and disposed amount does not equate with each other. The issue of payment is to be developed and improved. Information regarding location and volumes of the

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
140	5895	438	56	186	22 dust trucks

wastes to be spontaneously disposed is presented in the attached maps.

5.9.3. Analysis

Based on present demographic situation (208 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1.2 m^3 (1 m^3 = 350 kg).

Based on these data, the amount of municipal solid waste generated yearly must constitute 208 000 X 1.2 = 249 600 m^3. Correspondingly, the amount of the waste generated daily is approximately 683.8 m^3.

5.10. Mtskheta-Mtianeti

The region of Mtskheta-Mtianeti is located in Eastern Georgia. The region of Mtskheta-Mtianeti includes the following administrative-territorial units: Akhalgori, Dusheti, Tianeti, Mtskheta, and Stepantsminda municipalities.

The area of the region constitutes 6785 km^2, population – 125 000 people, density of population per 1 kmI is 18 people. Administrative center of the region is the city of Mtskheta. There are 285 populated areas in the region, including: 2 cities: Mtskheta and Dusheti; 7 settlements: Zahesi, Akhalgori, Zhinvali, Pasanauri, Tianeti, Sioni, and Stepantsminda, and 582 villages.

Administrative units of the region are: 5 regional administrations (gamgeoba), 4 settlement assemblies (sakrebulo), 54 village assemblies (sakrebulo). The jurisdiction of Georgia does not spread on 2 assemblies of Akhalgori region. State administration is carried out in the region by authorized official of Georgia – the Governor.

5.10.1. Collection

The container collection system functions largely in the region. The bunker system is abolished altogether. The "bell" system is still actual in many settlements, especially in Dusheti. About 54 people are employed and 14 dust trucks are engaged in the region of Mtskheta Mtianeti collection service. Waste inventory is not carried out neither in the phase of collection, nor that of disposal. In the table below, the basic data connected with the field municipal solid waste collection in Mtskheta-Mtianeti are reflected. All the data are approximated, obtained during the collection of basic data by local coordinators.

5.10.2. The Landfill

3 landfills are registered in the region: those of Dusheti, Mtskheta, and Tianeti. Their legality is uncertain. The process of legalization proceeds only at Mtskheta landfill, although it was not possible to present relevant documentation. It was also not possible to present environmental impact assessment report and permit. The terms of validity of the landfills are also unknown. All landfills of the region are owned by local municipalities. Location of most of the landfills is satisfactory from the point of distance from sensitive receptors. Only Mtskheta landfill is located close to the river and populated area.

Total area of all the four landfills is 4,18 hectares (!), from this 3.68 hectares is active territory. The total amount of daily disposed municipal solid waste is 138,13 mi, respective monthly figure is 4170 mi. Thickness of the layer of the waste is dispersed and is on the average from 1 m to1.5 meters. Mtskheta and Dusheti landfills have construction designs in place, presence of fencing is observed at all the three landfills, while the security is noted only in Dusheti and Tianeti. Access roads are in good condition at each site, inner

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
150	4514	570	25	54	14 dustcarts

roads are pebbly, but need restoration and renovation. In total, 13 people are employed at the landfills.

According to baseline data, it is possible to consider the problems connected to municipal solid waste management specifically for Mtskheta-Mtianeti region.

The collection system is quite satisfactory, although there is no municipal solid waste management plan and other environmental documentation. There is no sufficient quantity and adequate qualification of personnel. New well maintained equipment is insufficient both in the fields of collection and disposition. There is not sufficient quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either, therefore the collected and disposed amount does not equate with each other. The issue of fee is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

5.10.3. Analysis

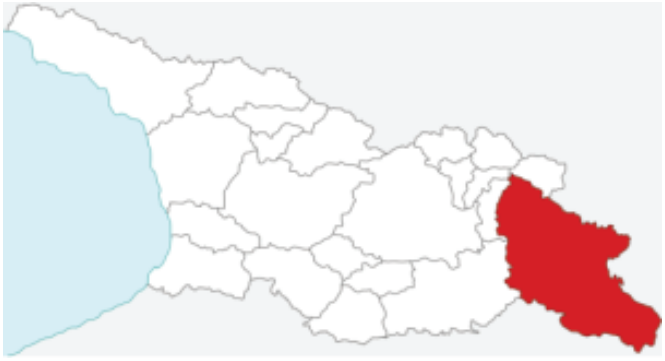
Based on present demographic situation (125 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1.2 m^3 (1 m^3 = 350 kg).

Based on these data, the amount of municipal solid waste generated yearly must constitute 125 000 X 1,2 = 150 000 m^3. Correspondingly, the amount of the waste generated daily is approximately 410.9 m^3.

5.11. Kakheti

The region of Kakheti is located in Eastern Georgia. Kakheti region includes the following administrative-territorial units:Akhmeta, Gurdjaani, Dedoplistskaro, Telavi, Lagodekhi, Sagaredjo, Signagi, and Kvareli municipalities.

The area of the region is 11310 km^2, population is 407 000 people, density of population per 1 kmI is 36 people. The administrative center of the region is the city of Telavi. There are 285 populate areas in the region, including: 9 cities: Akhmeta, Gurdjaani, Dedoplistskaro, Telavi, Lagodekhi, Sagaredjo, Signagi, Kvareli, and Tsnori, and 276 villages.



The administrative units of the region are: 1 city hall, 8 regional administrations (gamgeoba) and 110 village assemblies (sakrebulo). State administration in the region is exercised by the authorized official appointed by the President of Georgia.

5.11.1. Collection

The container collection system functions largely in the region. The bunker system still exists in Telavi and Kvareli. The "bell" system is also still actual here (in Telavi 40%, Kvareli 10%), which still functions in many settlements. About 191 people are employed and 30 dusttrucks are engaged in the region of Kakheti collection service. Waste inventory is not carried out neither in the phase of collection, nor that of disposal. In the table below, the basic data connected with the field municipal solid waste collection in Kakheti are reflected. All the data are approximated, obtained during the collection of basic data by local coordinators.

5.11.2. The landfill

8 landfills are registered in the region: those of Telavi, Sagaredjo, Lagodekhi, Signagi, Gurdjaani, Akhmeta, Kvareli, and Dedoplistskaro. Their legality is generally uncertain. Legality is observed only at Gurdjaani and Kvareli landfills, although it was not possible to present relevant documentation. It was also not possible to present environmental impact assessment report and permit. The terms of validity of the landfills are also unknown. It is notable that a number of landfills have been established after 2000 (Lagodekhi, Signagi, Dedoplistskaro), but construction design is available only for Sagaredjo, Signagi, Kvareli, and Dedoplitskaro landfills.All landfills of the region are owned by local municipalities. Location of most of the landfills is satisfactory from the point of distance from sensitive receptors. Only Gurdjaani landfill is located close to the motorway and populated area.

Total area of all the four landfills is 58.27 hectares; from this 8.2 (!) hectares is active territory. The total amount of daily disposed municipal solid waste is 202.67 m^3; respective monthly figure is 5950 m^3. Thickness of the layer of the waste is dispersed and is on the average from 0.7 m to 5.0 meters. Presence of

Amount of collected waste		Number of containers		Amount of workforce engaged in collection	Amount of equipment involved in the process of collection
per day (m^3)	per month (m^3)	metal	plastic		
277	7865	1105	116	191	30 dust trucks

fencing is observed at all landfills, while there is no security in Telavi, Gurdjaani, and Dedoplistskaro. Access roads are in good condition at each site, inner roads are pebbly and uncomfortable. They need restoration and renovation. In total, 2 people (!) are employed at the landfills (there are no data available).

According to basic data, it is possible to consider the problems connected to municipal solid waste management specifically for Kakheti region.

The collection system is quite organized, although there is no municipal solid waste management plan and other environmental documentation. There is no sufficient quantity and adequate qualification of personnel. New adjusted equipment is insufficient both in the fields of collection and disposal. There is not sufficient quantity of waste containers. The issues of public involvement and awareness are undeveloped. There is no exact inventory of municipal solid waste either, therefore the collected and disposed amount does not equate with each other. The issue of payment is to be developed and improved. Information regarding location and volumes of the wastes to be spontaneously disposed is presented in the attached maps.

5.11.3. Analysis

Based on present demographic situation (407 000 people) and EC Eurostat statistical data, according to which the average amount of domestic waste generated yearly in Europe per capita is 320-423 kg, which corresponds approximately to 0.7-1.2 m^3 (1 m^3 = 350 kg).

Based on these data, the amount of municipal solid waste generated yearly must constitute 407 000 X 1.2 = 488 400 m^3. Correspondingly, the amount of the waste generated daily is approximately 1338.1 m^3.

6. RECOMMENDATIONS

It should be noted that all ongoing agreements or conventions connected with the EU to which Georgia is a Party implies the harmonization of the national legislation with the EU legislation where particular priority is assigned to environmental and climate change issues.

In the presented Report for the solution of marked problems both the state as well as each its citizen shall understand that environmental protection is the debt of everybody and the basic reforms carried out in the field of municipal solid waste management, in particular formation of integrated sustainable waste management system all over the country would facilitate to the solution of environmental protection issues, as well as improvement of human health and economic state.

To ensure this, the state should pay special attention to the public awareness rising in the field of municipal solid waste management and with regard to the full and transparent involvement of the public in the decision making of municipal solid waste management issues and their implementation. The public shall be provided complete information about the damage caused by unmanaged wastes and means of their sustainable management. The state shall use all its efforts for the formation of new approaches and behavior of the society with regard to the waste.

One of the most significant factors is development of relevant legislation and introduction for the purpose of creation of united, integrated sustainable waste management system by the state. It is necessary to create a beneficial environment in this field for the attraction of investments. The responsibility and independence of local self-government bodies and the role of private sector shall be increased.

Strengthening and expanding the industry of waste recycling is also very significant because the increase of rate of waste recycling is directly proportional to the reduction of waste amount. Development of the business connected with the municipal solid waste management will cause creation of new jobs and employment of local population.

Within the framework of the project the manual for municipal solid waste management has been prepared. The manual describes in details the modern approaches and methods of the municipal solid waste management. The manual will enable the self-governing bodies' staff and the members of city councils to have knowledge about the western practice of municipal solid waste management. With the help of the manual all interested people will get acquainted with the mechanisms and tools spread all over the world for integrated, sustainable management system formation and municipal solid waste management plans development.

7. CONCLUSIONS

On the basis of the information collection within the framework of the project we can conclude that the existing practice in Georgia with regard to the management of solid domestic wastes does not correspond to the requirements of EU and is lagging far beyond the international standards. The issues connected with the management of municipal solid waste need to be resolved, particular attention should be paid to the awareness rising of general society and state employees in this field which is still very low until now; this is creating big obstacles to the introduction of modern methods for the management of solid domestic wastes in the country.

On the basis of the submitted report and the basal data we can create a list of problematic issues in the form of a short resume:

- weak legislative base;
- insufficient budget;
- absence of management plans for the municipal solid waste;
- spontaneous and unsystematic disposal of the waste;
- non-qualified workforce in the field of the waste
- obsolete equipment;
- lack of containers;
- old methods and technologies for waste collection;
- absence of waste survey;
- absence of waste segregation;
- lack of waste recycling business;
- landfills.
  - √ lack of qualified workforce;
  - √ lack of adequate equipment;
  - √ absence of waste inventory;
  - √ absence of private landfills;
  - √ existence of illegal, spontaneous landfills;
  - √ absence of landfill infrastructure (fencing, guard, inner road, scales, other supportive facilities, etc);
  - √ discrepancy with sanitary rules and norms;
  - √ absence of landfill designs (their location near riverbeds, absence of water resistant layer, spontaneous inflaming and others);
  - √ absence of environmental impact permit;
  - √ absence of environmental monitoring and control.

All above listed problems could be solved if in the field of municipal solid waste management there is formed united State Strategy, relevant legislation and the system of integrated, sustainable waste management system is introduced in the country where both general society and private sector would be involved transparently.

All this is directly connected with finances, although the improvement of the field of municipal solid waste management would be followed exclusively with positive results, such as mitigated negative impact on the environment, elimination of spontaneous illegal landfills, lessened amount of wastes, improvement of human health and economic state, awareness and conscious raising of public, development of statistics of solid domestic wastes management and creation of data base which is so important for the issues of integration of the country into the EU.

To say it briefly, in order to come from "minus", or absence to well-being it is necessary that time (T) and financial resources ($) are defined.