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Regional Plan for Investment in the Environment and Health

Pan American Health Organization
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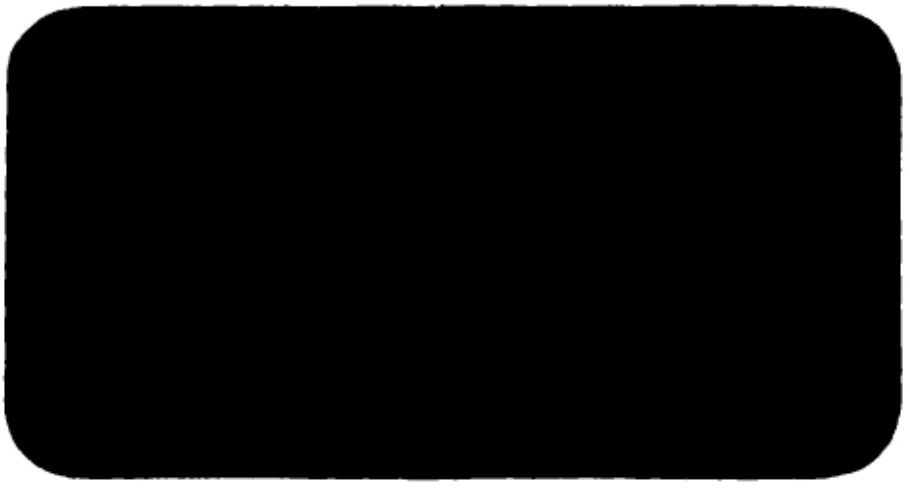

Methodological Guidelines for Sectoral Analysis in Solid Waste

Preliminary Version

Technical Report Series No. 4

Agency for International Development - USAID
Inter-American Development Bank - BID
Pan American Health Organization - PAHO
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PIAS

Regional Plan for
Investment
in the Environment and Health

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ACRONYMS

AID	Agency for International Development (USA)
IDB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
NGO	Non Governmental Organizations
PAHO	Pan American Health Organization
PIAS	Regional Plan for Investment in the Environment and Health
GDP	Gross Domestic Product

INTRODUCTION

The deficient levels of coverage and the precarious quality of health care provision, of basic sanitation, and of environmental pollution prevention and control, represent a significant part of the social debt present in the Latin American and Caribbean region, indiscriminately affecting the urban, periurban, and rural areas.

In environmental related services, the current situation is reflected in both the condition of the hydraulic/health infrastructure and the deficiencies in the managerial, technical, operational, and administrative services operation.

Recognizing this situation, fulfilling the XVII Resolution of the XXXV Meeting of the Directing Council of the Pan American Health Organization (PAHO), and responding to the mandate expressed at the First Ibero-American Summit of Chiefs of State and Governments, the PAHO developed the Regional Plan for Investment in the Environment and Health (PIAS) whose purpose is to incite a reform process in the environment and health sectors in the countries of the Region. The reform will allow the mobilization of national and international investments necessary to overcome the delays in the development of the mentioned sectors for the next 12 years.

The assessments of the efforts and regional achievements in the past decade, if significant considering the critical situation the countries have gone through, accurately reflects the present situation. The reemergence of cholera, linked to the deficiencies in service and availability, alerts the sensibility and responsibility of the population and governments of the Region.

In terms of urban sanitation and municipal solid wastes control, the unquestionable response is to improve the efficiency and quality of collection, transfer, treatment, and disposal services. In the same sense, the quality of service provision from the user satisfaction point of view will improve to the extent that needed and available investments and resources are increased and optimized, at both the country level and at the international level of technical and financial cooperation.

The basic element that the Region needs for appropriate decision making and for the accurate implementation of action is an in depth and overall understanding of the condition of the sector of each country, attained by all and each of the elements that participate in its development.

The sector assessment is the tool that allows the attainment of the above mentioned understanding. The assessment provides precise data on visible and invisible demands and deficits of service coverage, on sector institutional strengths and weaknesses, and on operational restrictions. Moreover, the assessment allows for the subsequent identification of the level of financial and non-financial resources (public or private) needed for the proper development of the sector.

1. OBJECTIVES AND SCOPE OF THE METHODOLOGICAL GUIDELINES

At present there is a consensus among countries of the Region and the technical and financial community to increase support in sanitation and municipal solid and hazardous wastes control in Latin America and the Caribbean.

Within this context, urban solid waste management is critical since an estimated 30% of solid waste generated in the Region is not collected and only half of that collected is properly disposed of, even when local governments make substantial expenditures. In the future this situation will tend to deteriorate due to an increase in wastes generated given the acceleration in growth of the cities and the change of habits of the population which generate more disposable and non-recyclable solid wastes.

The countries and agencies of technical and financial support have conducted diagnostic studies of the solid wastes sector in some countries of the Region. These studies, not necessarily sector assessments, show that the solid wastes sector is typified by the lack of national policies and plans, inefficient use of financial resources, and the limited or lack of support given to local entities that operate urban sanitation services. In most countries these entities are the municipalities.

These studies conclude that the inefficiencies of the sector lie in the institutional, managerial, and financial deficiencies of operating entities or municipalities. In short, low quality and high cost service provision.

However, the studies have responded to the needs of the development of a specific project of a national or international institution rather than to an objective and overall knowledge of the condition of the sector that could be adopted and used by all parts.

Furthermore, present factors like the pressing need to attend to periurban and marginal populations; the demands of conservation; the intense campaign of waste recovery and recycling; and the trends in the Region towards the need for State reform and the modernization of services, determine the growing demand for an overall and strategic handling of solid wastes.

The above reinforces the need for solid wastes sector studies. These studies require a methodological tool to orient and guide its accomplishment and, in turn, will allow the countries to establish consistent strategies and actions in the development of the sector.

1.1 Objectives

The Pan American Health Organization (PAHO), the Inter-American Development Bank (IDB), the International Bank for Reconstruction and Development (IBRD) through its Program of Urban Management, and the United States Agency for International Development (AID) through its Environment Health Project, have jointly developed the present guidelines. The objective of the guidelines is to establish the conceptual framework for the realization and actualization of sector assessments in solid wastes. The assessments will be developed by the agencies and institutions of technical and financial cooperation under national coordination and participation.

The purpose of these guidelines is to orient and to guide the development of solid wastes sector assessments in Latin America and the Caribbean.

Concern from different levels could motivate the realization of a solid waste sector assessment: a national, state, or regional entity responsible for solid wastes management may aspire to an overall sector assessment as a part of the strategic planning of the sector; the ministry or entity of national planning may try to realize an overall sector evaluation in an attempt to accommodate the sector into the national development plan; or one or a group of municipalities and cities, responsible for infrastructure and operation of urban sanitation services may need a sector assessment to promote a new loan program when negotiating with a lending agency.

On the other hand, a multilateral lending agency, or a bilateral agency of technical cooperation may require the realization of a sector assessment; a lending agency may require a general sector assessment as a part of the development of credit for the country; perhaps, a bilateral cooperation institution may want to offer technical assistance to one or various entities with the objective of strengthening the ability of realization and execution of projects and programs to reach national goals in terms of solid wastes.

The use of these methodological guidelines will assimilate the development of the solid waste sector assessment by the use of similar focuses, criteria, and presentation, while maintaining its individual contents specific. This standardization will allow for and facilitate the exchange of data and information between the involved national or international institutions and will permit the complement of actions and assessments of the situation in the studied countries.

By promoting the participation of national institutions and the participation of representative segments of society, the guidelines will lead to the development of multiple use sector studies.

1.2 Scope

The present guidelines are limited to health, protection, and environmental control services exclusively related to the solid waste sector.

At an earlier stage the methodological guidelines for the sector assessment of water supply and sanitation were developed. With the present document the preparation of methodological guidelines that cover the different fields in the area of environmental control and protection is continued.

The concept of a sector assessment applied to the solid wastes field can be seen as a practical tool whose purpose is to provide alternatives for the adoption of strategies that permit viable and sustainable solutions to improve the performance of short-, mid-, and long-term technical handling and management of the collection and sanitary disposal of solid wastes.

In terms of their reach, the guidelines were designed taking into account the following ideas and focuses:

- That the sector assessment elicit policy decisions for preinvestment projects.
- Above all, the focus of the assessment should not only affect the supply, but also the demand of government services, evaluating the restrictions and limitations that impede the fulfillment of that demand.
- The assessment should, in addition to governmental entities, include the private sector, the non governmental institutions (NGOs), and the community.
- To guide the determination of priorities.
- To stimulate sector development and strength.
- To provide the opportunity for intra- and intersector participation and dialogue.
- To encourage the development of policies, plans, programs, and strategies.
- To emphasize that the sector assessment differs from an analysis at the project design level.

- To bear in mind that the search and gathering of data and information is not limited to entities of the solid waste sector, but also comprises entities of other sectors.

- To include all available data on the country in the sector assessment, without the need to resort to additional and specific investigations and enquiries. Or, also, the sector assessment can identify and determine this need for additional studies before developing a policy, program, plan, or project.

1.3 Sector Definition

For the purpose of these guidelines, the solid waste sector is defined as the group of existing institutions and resources of the country, associated with urban sanitation services (sanitation of public routes and areas, collection, transfer, treatment, and disposal of solid wastes), which include the management of solid or semisolid wastes generated in domestic, commercial, industrial, and hospital environments, managed formally or informally in the urban and periurban areas of different sizes and complexities.

With respect to industrial hazardous wastes and sludge of potable water treatment stations, it is proposed to identify the problems of municipal solid wastes management caused by these wastes, as well as, a general appreciation for the in this document noted components to deal with this theme at the governmental level.

All participating elements of the sector will be analyzed: public sector governmental entities, municipal and metropolitan entities, private sector (formal and informal), non governmental organizations, universities, institutions of technical investigation and public works, professional and business associations, and financial institutions.

The sector assessment will broach the knowledge and evaluation of all the sector components, including its management and performance, principally in the following aspects:

- Quantity, quality, continuity, coverage, and service accessibility; need for services not fulfilled;

- Factors that influence performance and functions of the institutions;

- Physical infrastructure and management of the services provided by the sector;

- Economics, finances, and other related areas like policies, infrastructure, available and necessary human resources, etc.;
- Institutional capability and the availability of human resources;
- Socioclutural conditions of the attended communities and its interactions and expectations with respect to the sector;
- Health aspects in relation to the sector;
- Environmental aspects in relation to the sector;
- Sector legal framework and connected laws.

1.4 Users of Methodological Guidelines

The primary users of both the methodological guidelines and the sector assessments will be the countries themselves and the multilateral and bilateral agencies.

1.4.1 *Countries*

The primary users of these methodological guidelines are the countries themselves. The sector assessments developed from these guidelines will constitute an instrument for the development of policies, plans, programs, strategies, and actions consistent with investment and management capacities; as well as to determine actions that tend to improve or optimize the urban sanitation levels in the country object of the assessment.

1.4.2 *Multilateral and Bilateral Agencies*

Multilateral and bilateral agencies require historical data of the sector of the country analyzed and its future prospectus, both in terms of investment capacity and in terms of certain management and performance possibilities. Its purpose is to allow for just and appropriate decisions when conferring the assistance or technical or financial cooperation solicited by the country or whose necessity has been identified.

2. THE USE OF THE GUIDELINES

The sector assessment proposed in these guidelines includes an evaluation of the sector, a general strategy for organizing the assessment, and the procedures for carrying it out.

This chapter describes how the assessment procedures need to be coordinated to carry out the assessment, specifying the functions and stages the participants need to fulfill, indicating the chapters in which the specific indications for the adequate completion of the methodological requirements of each stage can be found.

In general terms, Chapter 3 presents a series of indicators to identify the fundamental performance aspects of the sector. These indicators, when available and reliable, are mentioned throughout the sector assessment report when relevant. Chapter 4 defines the sector assessment components and in Chapters 5 and 6 a series of questions to facilitate research of these components are suggested. Chapter 7 proposes a scheme of structure and order for the final presentation of the sector assessment report.

The assessment team will follow a previously determined setting, defined in the context of motivations that guided the national or international agencies of technical and financial cooperation to realize the assessment and, consequently, to shape the team.

2.1 Team Composition

The size and the composition of the assessment team may vary depending on the depth and the range of issues covered. The specific purpose of the coordinating agency, whether a host country institution or an external donor agency will to a great extent shape the size and composition of the assessment team. A smaller team and a shorter field activity may be appropriate where the assessment is a follow up to a detailed sector assessment conducted only a few years previously. A larger team, in the field for a longer period, will be necessary when the assessment is intended to be exhaustive and there is no recent, extensive work on the sector to rely on.

In either case, the needed expertise includes:

a) Institutional:
- Sector planning process;
- Organization of solid waste services in the sector;
- Governmental and private institutions of solid wastes and their operations;
- Critical aspects of sector policies, common to the parts involved in the sector;

- Familiarity with technical training or direct experience in institutional development, human resource development, and management of the sector.
- Systems of management information.

b) Technical:
- Urban sanitation infrastructure and equipment;
- Technology related to urban sanitation service infrastructure;
- System construction, operation, and maintenance;
- Technical organization in terms of levels of aptitude, ability, and training.

c) Finance and Economics:
- Process of finance and economics planning;
- Preparation of budgets that represent investments of capital for the financing of the extension and maintenance of the infrastructure of urban sanitation;
- Analysis of the distribution and efficiency of the use of available resources within the sector; familiarity with aspects related to cost recovery, formulation of tariffs, technical training in public financing, and implementation of efficient systems of accounting, invoicing, and billing.

d) Community Participation, Health Education, and Environmental Protection:
- Roles of community participation in the design, operation, maintenance, and financing of alternatives of urban waste management systems;
- Roles of non governmental organizations;
- Health and hygiene education;
- Interventions of public sanitation in periurban areas;
- Community development;
- Training of human resources in the community to ensure community participation.
- Programs of solid wastes recovery and recycling;
- Environmental improvement in landfills;
- Socioeconomic promotion of separators.

e) Legislation:
- International rights law and comparative law;
- Analysis of the legal structure of the environment and health sectors;
- Analysis of legislative and political processes which affect the mentioned sectors.

Depending on the needs of the national or international institutions that coordinate the study and the availability of expertise and experienced personnel, the team may consist of national consultants or international sector experts. Frequently,

it will be necessary to balance the aptitudes among the national and international team members. The coparticipation of experts ensures that the points of view of the country are well represented and the study will, in turn, be complemented with international sector experiences.

The national team members may be consultants or officials of one or several institutions of the solid wastes sector and will be designated to work full-time with the institution that coordinates the assessment.

A well balanced team, between national and international personnel, will typically have six or seven members that can cover the five areas of expertise and experience mentioned above.

The time needed to complete the sector assessment will depend on the geographic vastness of the country, the sector complexity, and the availability of previous studies. An average of five weeks is estimated to complete the assessment and the preparation of the corresponding report. In some cases, an additional week of work of one of the team members may be needed for the revision of the final version of the report.

2.2 Stages in Conducting the Sector Assessment

The sector assessment will require a preliminary planning stage. The first step in this stage is an identification mission of the country in question and it will be conducted by national or international agencies interested in the study. The purpose of this mission is to define the objectives of the assessment, to define the coordinating agencies and the participants of the study, to define the contributions of the consultants to the team, and to define the contributions in logistical support needed to carry out the study (offices, administrative support, internal displacements, etc.). Once the above is carried out the assessment team is formed and, subsequently, the study can commence.

The work team responsible for preparing the assessment can follow a process of nine stages described in the following scheme.

Major Stages of a Sector Assessment

1. Define the specific objectives and purposes of the assessment.
2. Determine the characteristics and background of the country and sector.
3. Establish coordination with and between the institutions of the participating country in the sector assessment and identification of the national assessment coordinating agency.

4. Develop initial workshop for the team and the major participating entitles for the explanation of the objectives, procedures, and expected results of the assessment.
5. Plan work schedule with the national coordinating institution.
6. Compile data and carry out interviews at the sector and at utility companies level.
7. Realize the assessment, synthesize findings, and develop recommendations.
8. Prepare and present the assessment report in the final workshop.
9. Approval and final revision of the report.

Stage 1
Define Specific Objectives
The national or international agencies of technical and financial cooperation participating in the sector assessment will have established reason(s) for conducting the assessment. The team should clarify, with the participating institutions, the background and specific reasons for conducting an assessment and the results they expect. The team should identify the possible contradictions of the defined objectives probably due to differences between the national institutions that act in the sector or between the institutions of the country and one or more of the international agencies of technical and financial cooperation.

Stage 2
Determine Country Characteristics and Background
The work team should identify and check existing information on the sector, including comprehensive sector studies and studies or assessments on specific sector themes. The team should also identify past or valid agreements of loans and technical assistance supplied by agencies of international technical and financial cooperation. Key player(s) of the national institution(s) involved in the study could probably assist in evaluating the accuracy and level of confidence inspired by these documents, as well as, to determine the repercussions that said efforts have had on the sector.

Section 5.1 of the protocol at the sector level (Chapter 5) refers to the general country characteristics that should be incorporated into the assessment report. It is probable that many of these general characteristics are found in previous sector assessments of the country or other already existing documents. The information from secondary sources will save time when interviewing since questions on general characteristics can be omitted.

Already available background data should be obtained. It will also be necessary to compile information that allows the determination of the general

macroeconomic situation and the general policy norms that affect the sector. The background assessment should include the important changes that are occurring or could occur in the country in general and within the sector. Of particular interest are changes like the processes of decentralization of responsibility, possible participation of the private sector in service provision, the demarcation and integration of the respective functions and responsibilities of the public and private sectors, the redefinition of the degree of governmental responsibility for provision of subsidized services, and the national or local policies for providing basic services in periurban and marginal areas.

The sector assessment should evaluate the legal implications that could affect the sector. It is not recommended to take measures or develop policies and plans of action without having a clear picture of the legal field and its direct or indirect applications on the sector.

Stage 3
Establish Coordination with and between the Participating Agencies and Institutions of the Country and Identification of the National Assessment Coordinating Agency
The national assessment coordinating agency will have been selected before the work teams are formed. The work team should establish a close interaction with the national coordinating agency and with the participating institutions in the sector assessment. The establishment of this interaction will start with the precise definition of the objectives of the assessment.

The national and international participants and the work team will concede on the results which are expected as a consequence of the assessment. In this way, the results are not limited to the conclusions and recommendations provided by the sector assessment but to the effects that the assessment exercise, the conclusions, and recommendations could have in the short-, mid-, and long-term. In other words, the results consist of the measures or actions taken once the sector assessment has been concluded.

As examples of work team outcomes are the identification of critical aspects and bottlenecks, the formulation of strategies and recommended action, and the proposal of profiles of priority projects. It is expected that the outcomes of the assessment determine modifications in terms of intermediate results of the sector, among which can be mentioned the changes in policies, the reinforcement of capacity, the development of human resources, the capacity for sector self-sufficiency, and the improvement of socioeconomic conditions of the marginal and periurban sectors and of the solid wastes separators. The final results that can emerge from the sector could be illustrated through

modifications that determine improvements in health, life quality and economic growth.

The team must be sensitive to the possibility that expected results may vary among the participating institutions, and must be prepared to negotiate the measure to which the team work is adapted to specific results. In the instance that negotiation is deemed impossible, the team should carry out a study on the divergences that have come up during the assessment. It is possible, even likely in some circumstances, that the institution(s) only use some elements of the conclusions of the assessment, and that the recommendations are curtailed to a subset of the original that the institution is prepared to put into practice. The team should bear in mind that although they counsel, the participating institutions are the actual users of the results and recommendations.

The national coordinating institution will establish with the support of the work team, if necessary, a Steering Committee. The Committee will be composed of a group of high level individuals of the national coordinating institution and other participants, and will be the primary reviewers of the findings and recommendations of the team. With the objective that the Committee is not limited to representatives of planning and financial entities, it would be convenient to have community groups and NGOs represented as well. It would also be indispensable to have the representation of municipalities or institutions responsible for urban waste management services, and the numbers of participants should correlate to their participation in the sector.

The Steering Committee, or the national coordinating institution will appoint a representative that will closely work with the assessment team. This representative, working full-time, will assist in arranging appointments, support logistical aspects, advise team members on any sensitivities or protocol issues, and represent the Steering Committee on a day-to-day basis. His/her counterpart on the assessment team will be the team leader.

Stage 4
Initial Workshop
The sector assessment team, under the official sponsorship of the national coordinating institution, will hold an initial workshop for all institutions involved in the sector. These institutions are typically members of the Steering Committee, however, institutions or private sector groups (formal and informal), the academic and investigation sector, community based groups, or waste stream separators who are not formally on the Steering Committee may also participate. It is important that attempts be made to identify and invite participation from individuals who can fairly represent the perspectives of consumers or beneficiaries.

Given the disperse nature of the sector and the lack, in most cases, of an effective governing body, municipalities and urban waste management service providers, on the basis of a sample of representation that covers the different complexities and ranks of the cities, should be present at the workshop.

The purpose of the workshop is to brief participants on the goals of the sector assessment, the methodologies the team will be using, and the expected outcomes. Ideally, the participating institutions will express the results they expect to see acted on after the sector assessment has completed its work, although these entities will not always be disposed to discuss these results at that moment.

The assessment team can make use of the workshop to secure names of individuals and institutions that could be contacted during the assessment. A considerable amount of cooperation from institutions and groups involved in the sector can be a direct result of the workshop. The workshop could also provide the opportunity to identify three or four direct service providing agencies (city authorities or independent entities related to urban waste management) that participants feel are representative of the sector.

Stage 5
Work Schedule
Once the workshop is concluded the assessment team will need to examine the present document to develop, in collaboration with the national coordinating institution, a work schedule and logistical plan for the duration of the assessment. An analysis of Chapters 4, 5, 6, and 7 (specially the protocols of Chapters 5 and 6) will permit the work division between interviews and data and information gathering among team members. Schedules should be set as closely as possible. It is likely that the national coordinating agency will designate operational staff to assist the assessment team at this stage as members of the Steering Committee are unlikely to be involved in the day-to-day gathering of data and information.

Given the disperse nature of the sector and the importance of the municipalities and urban waste management entities in the cities of the country, a great part of data and answers to the investigation questions should be obtained at this level.

The team members who conduct interviews not only have a responsibility to obtain information and opinions about their own areas of expertise but also to obtain the information the respondent to an interview has on other areas. Because of the role of the respondent many interviews will only focus on a few components of the protocols. However, when interviewed individuals are

knowledgeable on many components all relevant components should be covered.

Stage 6
Compile Data and Carry Out Interviews
The objective of the protocols is to guide data gathering, interviews, and the analysis of the obtained information. The protocols include two types of questions or instructions: a) questions or instructions for the assessment team for data or information gathering, and b) questions to guide the analyses which the report needs to include.

a) *Data and Information Gathering*. These questions or instructions are rarely literal, on the contrary, it will be necessary to paraphrase the questions during the interview when appropriate. In practice, the interviewer will need to examine those components most applicable to the respondent before the interview and also explain the general purpose(s) of the sector assessment to the respondent. Frequently, a question will urge a respondent to provide information or concepts that answer several protocol questions. The assessment team should consider the protocols as guides and should not feel obligated to answer each and every question.

   The length of the protocols may imply to the assessment team that voluminous and accurate quantitative data are readily available for all assessment dimensions. Experience shows that is often not the case. The assessment team should consider that the absence of information often betrays underlying weaknesses in the system. For example, the lack of information in a specific urban solid waste management entity about collection coverage and quantity of solid wastes collected often means that the agency does not have an adequate maintenance and planned replacement program. That in turn means that major capital replacement programs will have to take place sooner than the design life would require.

   The assessment team members in the absence of information should exercise their judgement about the extent and importance to the sector of a problem that cannot easily be quantified or measured. The sector assessment process itself, in uncovering gaps and weaknesses in information about the sector, should be a motivator to the sector institutions to improve the information base. While the protocols are intended to guide the collection and analysis along certain channels, it should not be the cause of frustration when it is found that desired information is not available or is inaccurate.

b) *Analytical Questions/Issues.* These questions are not specifically intended for interview situations, but are a guide to the team on what kind of analysis is expected in the sector assessment report. Before interviewing any particular respondent, in addition to reviewing the data/information gathering questions likely to be used with that respondent, the team member should also review the analytical questions/issues associated with the data/information gathering questions. This review will remind the interviewer of the underlying analytical theme that particular portion of the protocol is pursuing.

Note that an information gathering question and its corresponding analytical question are often similar. For example, one analytical question that the sector assessment team should address in its report is:

> Do municipalities or local entities that provide urban waste management services have sufficient authority to set tariffs or to use other forms of cost recovery to be able to recover the full costs of operations and, if it is their responsibility, make provisions for capital investments in the future?

As an analytical question, it is not intended to be used in an actual interview, but it tells the sector assessment team that the report should address the issue. However, for that issue, it is also useful to learn the perceptions of respondents as to whether service providing entities have sufficient authority to set user fees or use other cost recovery methods. Therefore, a very similar question appears in the data/information gathering protocol for the team to ask about the perceptions of authority. In the assessment report the team would not only present their own findings about whether sufficient authority exists or not, but the team should also report and discuss important differences in perception. For example, it is often the case that officials in central agencies feel service providing entities have sufficient authority, however officials in these entities feel that they do not have sufficient authority. Sector problems may arise from this difference in perception. The data/information gathering protocols therefore appear to repeat analytical questions in order to ensure that the assessment team not only collect specific factual information but also perceptual information.

Data/Information Gathering Questions

1. Data/information gathering through interviews and documents.
2. Assess sector perceptions through interviews.

Analytical Questions

1. Orients the reflection process of the team during the interview.
2. Orients the team as it analyzes the information and develops the sector assessment report.

Sector Level. When possible it is important to begin gathering information through the principal agencies involved at the national or sector level in setting goals and objectives for the sector, planning and financing sector services, and/or regulating or governing the institutions that provide urban waste management services, although there may be an overlap between analysis levels (at the sector level and at the service providing level). Because of the nature of their responsibilities, at least two-thirds of the effort in gathering information and reviewing material should focus on these agencies.

At the sector level, it is likely that several individuals from each of the following institutions or agencies should be interviewed:

- Ministry of Planning/National Planning Agency;
- Ministry(ies) of Health and Social Welfare;
- Ministry of Economy;
- Ministry of Finance;
- Ministry of Public Works;
- Ministry of the Environment;
- Ministry of the Interior;
- Ministry of Community Development;
- Ministry of Social Development;
- Municipal Development Institute;
- Ministry responsible for regional and local government relations;
- NGOs and other community representative groups;
- National Development Bank and/or other financing agencies;
- Private sector urban waste management firms and other large service firms that are involved in maintenance and equipment operation, or in related environmental activities;
- Bilateral and Multilateral financing and technical assistance organizations that have permanent offices or representatives in the country;
- Private firms involved in recovering and recycling of solid wastes;
- Universities and technical institutes educating professional personnel or middle management in the areas of urban waste management and centers of urban waste management investigation.

In the interviews with sector or national level institutions, the team has two purposes. The first is to obtain information and views on the sector as a whole, its current circumstances, bottlenecks, and ideas on strategies for improving

sector services. Second is to assess the efficiency of these institutions to fulfill their roles in the sector.

Service Delivery Level. The interviews at the municipal and service delivery level should be conducted after having obtained, within a few days, a sample of three or four entities which directly supply urban waste management services. The objective of the direct contact with the sample entities is not to make detailed institutional analyses but to comprehend the sector by understanding the criteria of the service providers, just as how the point of view of the financial, normative, and regulating institutions was obtained, and even more so, if the solid wastes sector major part is in the municipalities or in the service operating entities. To concentrate on a detailed institutional investigation of one or several companies because it seems simpler only contradicts the objectives of the sector assessment which is to inform about the most critical themes (the bottlenecks that most affect the sector) and to implement strategies and solutions which could be applied throughout the sector. This last concept will depend on the purpose and scope of the study as it could comprise the entire country, a region, a group of municipalities, metropolitan areas, and others.

The institutional sample should be examined after the greater part of data at the sector or national level has been gathered. The protocols in Chapter 6 contain analytical questions as well as questions derived from gathered data and information relative to entities responsible for the service delivery of urban waste management. Among these could be important urban entities of public sanitation or municipalities of smaller cities.

Stage 7
Assessment, Synthesis, and Recommendations
There will be no clear distinction between the data/information gathering phase and the analysis phase, as the team and the national participating institutions will examine the acquired information as the gathering progresses. Gradually the effort will shift to primary analysis and preliminary written findings. Even when each member of the team employs the instruments and analytical methods of their technical field, the analytical questions contained in each protocol topic provide key guidance as to what a sector assessment should indicate. Careful review of these analytical questions prior to and during data gathering will help ensure that relevant information is collected. At the same time the analytical questions will provide the basis for organizing the assessment and conclusions.

Informal and preliminary discussions between the team and the national coordinating institution should be frequent, especially when the team is

formulating its preliminary findings. The assessment team has to find a balance between what they have found and recommend and what the national coordinating institution finds acceptable. Ultimately, the coordinating institution may have to make arbitration decisions as to how to balance the teams findings and recommendations and what it wishes reflected in the assessment report.

The preliminary report will be presented to the national participating institutions before it is presented to a broader audience. It is possible to include in this preliminary report both "majority" findings and alternative views if there is disagreement, but it should not be presented in the form of dissenting opinions.

Stage 8
Preparation and Presentation of the Sector Assessment Report
The coordinating institution, through the Steering Committee, will convene another workshop near the end of the last week of the sector assessment. At this workshop the national coordinating institution should present the basic findings and recommendations (which, in some cases, could consist in giving additional attention to the possible alternatives instead of giving definitive prescriptions).

Chapter 7 is an annotated outline of the Sector Assessment Final Report. Unless the early discussions with the participating institutions have modified that outline, it should be followed as closely as possible in order to facilitate cross country comparisons.

Stage 9
Approval of the Report and Final Revision
Once the final workshop in which the results are presented is concluded, the national coordinating institution will formally request all the participating institutions to make observations on the sector assessment report. Once all observations are compiled, one member of the team and a representative of the national coordinating institution will incorporate the expressed observations into the final version of the sector report.

3. KEY SECTOR PERFORMANCE AND MANAGEMENT CHARACTERISTICS

The objective of this chapter is to present a series of characteristics which as a whole could provide an impression of the sector situation. A sector assessment should summarize key aspects of sector performance by reporting on several basic performance characteristics.

The selection of the described characteristics is intended to facilitate the evaluation of the sector and the evaluation of the factors that contribute to its efficiency and effectiveness.

Its use for data gathering and the presentation of reports serves multiple purposes:

- It encourages sector agencies to Improve their monitoring and information management so that performance characteristics that may have to be estimated at the time of the first comprehensive sector assessment can be based on more accurate records in the future.

- It describes the sector conditions at a particular moment, in some cases pinpointing potential issues or key bottlenecks that may need to be addressed in order to improve sector performance.

- It facilitates the comparisons of performance and management across countries, a factor which often serves as an important motivator for improved performance.

- Replicate positive experiences.

The categories of selected performance characteristics are:

1. Sector objectives.

2. Solid waste generation, recovery, and disposal.

3. Coverage and access to urban waste management services.

4. Service quality and efficiency.

5. Service management, operations, and finance.

During the sector assessment, the team will collect the necessary data and information on the following performance characteristics. When the information is not readily available from two or three of the national level institutions with whom the team will be meeting, the detailed data and information gathering protocols should

enable the team to make reasonably valid and reliable estimates from the obtained data.

3.1 Objectives

3.1.1 *Health Improvement*

The primary objectives of public areas sanitation and the collection, transfer, treatment, and final disposal of solid wastes are the protection and the improvement of human health and the environment.

The protection and improvement of health of the population can be attained through diminishing the exposure to lesions, accidents and/or illnesses caused, directly or indirectly, by the cycle (generation, storage, collection, transfer, treatment, and final disposal) of solid wastes in a community.

In the specific case of illnesses, many are not completely attributable to exposure to solid wastes, although several illnesses are exacerbated by the inadequate disposal, as well as, by the general life conditions that increase the susceptibility to these illnesses.

Performance Characteristic. Morbidity and mortality rates by zones (urban and periurban) due to illnesses related (directly or indirectly) to solid wastes, as tetanus, cholera, dengue fever, hepatitis, among others.

3.1.2 *Increased Economic Production*

Well structured and efficient services of urban sanitation with a wide coverage of the urban and periurban city population is a factor of economic development as much at the country level as at the local level and is based on the following aspects:

- *At country and local level:* Extensive employment of low grade labor (collectors, drivers, etc.); encouragement of mechanical industries and manufacturers of heavy equipment to manufacture urban sanitation equipment (collecting trucks, automatic sweepers, tractors, automatic shovels, transfer vehicles, etc.); encouragement of mechanical industries for the manufacture of equipment for transfer, recycling, and composting stations.

- *At local level:* Encouragement of small and mid-sized local industries to manufacture tools and instruments used in urban sanitation (sweeping

carts, brooms, plastic covers, hampers for collecting paper, etc.); installation of small industries to recycle paper, plastic, and other elements recovered from the waste stream, through recycling plants or selective collection systems, or through informal separation at the curbside or landfill; potential of contracting private local firms for collection services and street sanitation, maintenance and repair of equipment, as well as, management of transfer, recycling, composting stations and landfill sites. Furthermore, a city with acceptable sanitation practices will attract more tourists, making it an incentive for the economic sector.

Performance Characteristics

a) Number of workers in the solid waste sector.
b) Number of large, mid-sized, and small firms whose work is relevant to urban sanitation (manufacture of mechanical equipment, contracting firms of urban sanitation services, recycling industries, consulting agencies, maintenance workshops, etc.).
c) Weight percentage of recovered solid wastes over total generation of solid wastes.
d) Increase in the number of tourists in comparison to previous year.

3.1.3 *Improvement of Environmental Conditions*

A suitable system of solid wastes management helps control, prevent, or mitigate various negative impacts on the environment and human health. At the same time, other environmental impacts, at a smaller scale, could arise as a consequence of the activities related to the handling of these wastes.

The quality of life and environment could diminish if these impacts, existing or potential, are not evaluated correctly and if no suitable measures are taken to control, prevent, or mitigate the negative effects of the inadequate practices of solid wastes handling.

Moreover, solid wastes not collected and wastes collected but not disposed of properly affect surface and groundwater resources, increase costs of water treatment for public use and increase the costs of maintenance of sewage services in the cities; and, at the same time, diminishes the quality of life associated with recreational zones (beaches, parks, forests, etc.).

Performance Characteristics:

a) Weight percentage of wastes collected over solid wastes generated.
b) Weight percentage of solid wastes sanitarily disposed of over solid wastes collected.

3.1.4 *Improved Social Conditions*

Experience shows that social and cultural aspects are of importance in solid wastes management. Unfortunately, in general, the sociocultural aspects associated with solid wastes management receive limited attention. This is probably due to the fact that no appropriate techniques for the evaluation of these aspects exist, nor is there a good understanding of the effects of socio-cultural factors in waste management.

In the periurban areas where solid wastes collection services is limited, the presence of de waste stream separators and community health education programs could be used as indicators of the sociocultural conditions.

Performance Characteristics:

a) Percentage of periurban population with collection services over total periurban population.
b) Annual increase or decrease of separators at final disposal (in the last five years).
c) Number of health education programs in the community.

3.2 Generation, Recovery, and Disposal of Urban Solid Wastes

a) *Generation:* The quantity of solid wastes generated daily by the inhabitants.

   Per capita generation (kg/person/day).- Total tonnage of wastes collected per day divided by thousands served.

b) *Recovery (%):* Tonnage of components of solid wastes recovered per day divided by tonnage of solid wastes generated per day times 100.

c) *Disposal (%):* Tonnage of wastes sanitarily disposed divided by the tonnage collected times 100.

3.3 Coverage and Access of Urban Waste Management Services

a) *Collection Coverage (%):* Urban population served divided by total urban population times 100.

b) *Coverage in Periurban Areas (%):* Periurban population served divided by total periurban population times 100 (the indicator of periurban population versus total urban population will also be needed).

3.4 Service Quality and Efficiency

a) *Quality:* Tonnage of collected wastes per day divided by tonnage of general wastes per day multiplied by 100.

b) *Efficiency of collecting personnel:* Ton/person/day. Tonnage of wastes collected per day divided by the total number of workers (carriers and drivers).

c) *Efficiency in the use of collection equipment:* Sum of tonnage collected by trucks per trip divided by sum of truck capacity per trip multiplied by 100.

3.5 Management, Operations, and Finance

Indicators:

a) Number of sanitation service employees per thousand people served.
b) Average monthly rate or tariff of urban sanitation per home (US$).
c) Pay capacity: Minimum monthly rate or tariff of urban sanitation versus minimum monthly salary (%).
d) Budget of sanitation service versus total municipal budget(%).
e) Capital investments versus total sanitation budget (%).
f) Income generation through tariffs and through rates versus total costs of service (%).
g) Efficiency of collection (%): collected value divided by billed value multiplied by 100.
h) Unit cost of sanitation service (US$/ton): sum of all annual direct and indirect costs, social benefits, contract payments, financial costs, depreciation, etc., divided by tonnage received at final disposal site per year.

3.6 Privatization of Services

Collection, transfer, treatment, and final disposal of solid wastes administered, operated, or executed by private entities, through concessions, cooperatives, contracting firms, associations, and others.

Characteristics:

a) Collection in % of population covered by private service versus the total population served.

b) Transfer, treatment, or final disposal of solid refuse in % tonnage of solid wastes managed by the private sector versus the total of solid wastes managed in each of the indicated services.

Comment: It is unlikely that these types of indicators are available in the beginning, but the assessment team will be able to make close estimates by using data supplied by the entities responsible for urban sanitation at the local level.

4. ASSESSMENT COMPONENTS

This chapter describes the sector components that should be analyzed for the purpose of the solid wastes sector study. The assessment will be carried out through the use of protocols presented in Chapters 5 and 6 which are designed to guide the processes of data and information gathering and assessment.

The components of the sector assessment are the large groups of aspects that typify the current situation of the sector and its performance--areas that should be analyzed in depth.

The following are the components:

1. General country characteristics.
2. Institutional and legal aspects.
3. Infrastructure and technical aspects.
4. Economic and financial aspects.
5. Health aspects.
6. Environmental aspects.
7. Sociocultural aspects.

4.1 General Country Characteristics

This section identifies the country whose solid waste sector is studied and evaluated. If possible and relevant, a relation between the general country characteristics and the solid wastes sector should be established.

The following subcomponents are considered: organization and political division, population, health, geography and climate, economy, social and educational characteristics, and services.

4.2 Institutional and Legal Aspects

There is evidence that a large number of problems and hindrances currently deter social development, as well as, limit government action and its interactions with the population. Within this context, the current setting of the solid wastes sector should be noted: the objectives and national goals for service provision to the population; how to identify the principal obstacles with the goal of finding a solution; and the reference to solid wastes in national development plans. It is, therefore, necessary to acquire an overall vision of the modernization process of the State to identify concrete actions.

This section includes the subcomponents of institutional structure, legal framework, plans, policies, and programs of the sector.

4.2.1 *Institutional Structure*

Includes all the institutional components of the sector, its entities, functions, performance, and interactions. Among others, the following aspects should be identified and analyzed:

a. Sector Institutions

- Sector institutions.
- Number of agencies in charge of urban waste management services and scope of attention (national, regional, state-wide, local).
- Dependency, interactions, interferences, and coordination between these entities and others outside the sector.

b. Planning - Information

- Economic and sector planning agencies.
- Coordination and planning of solid wastes management.
- National information system for the sector.
- Decision making process.

c. Human Resources

- Quantity of personnel in the sector.
- Structure composition of personnel.
- Management, level of education, and stability.
- Salaries and incentives for personnel.
- Qualification and training programs.

4.2.2 *Legal Framework*

Even when other components include the analysis of certain pertinent legal aspects, this section will still analyze, in general form, the legal framework that regulates the sector. The analysis of the applicable norms will serve the countries to determine the need to revise, create, or actualize legal instruments compatible with the demands of the sector, according to the policies of economic and social development.

a. Legal Context. Within the legislative system of the country, a synthesis of the legislative framework that regulates the sector should be presented, identifying the key problems realted to applicable legislation. As an annex, all

norms directly applicable to the solid wastes sector should be listed together with a brief description of the contents.

In this component the applicable administrative division will be described including the functions and responsibilities of the institutions that participate in the sector, as well as those that have programs or functions that have a direct bearing on the sector. A study of the dispositions that affect the organizational structure of the sector, like ministerial laws, entity creation legislation, decentralization, legislation on appropriation of special funds for the sector and whichever others that are pertinent should be included.

b. Interaction of the Sector with other Sectors. Sectors relative to the solid wastes sector, like water supply, sewage, water resources, health, city planning, tourism, and others should be identified and defined. In this context the legal dispositions relative to the solid wastes sector that are applicable to identified sectors should be analyzed.

c. Technical Legal Aspects. Many technical specifications applicable to the sector are found in legal dispositions. The legislative norms that regulate the technical aspects of the sector should be analyzed.

4.2.3 *Plans, Policies, and Programs*

This section describes aspects of planning at the national level relative to the sector of solid wastes. Its analysis will permit the establishment of the current condition and the probable trends of government decisions relative to the improvement or optimization of the efficiency and productivity of the sector. The ability of the sector to fulfill governmental decisions or attend the needs of the service users and the community in general will be identified.

a. Plans

- Coverage in urban refuse service
  User satisfaction
  Quality of refuse service
  Service continuity
- Outlook and plans for fulfilling goals
- Feasibility of reaching goals

b. National Policies

- Investments in urban sanitation infrastructure
- General and sector administrative organization (decentralization, privatization, contracts with private entities)
- Tariff levels (self-sufficiency, subsidies)

- Labor
- Solid wastes administration
- Environment in general

c. Programs

- Improvement of urban sanitation infrastructure.
- Expansion of coverage.
- Expansion of services provided by entities of the sector.
- Special operational programs (preventive maintenance, recovery and recycling, training, landfill operations) on the improvement of the administrative infrastructure.

4.3 Technical Aspects and Infrastructure

Evaluation of the functional and physical situation of the components of the sector at the country and local levels so that the efforts are coordinated for the adequate provision of services.

4.3.1 *Technical Aspects*

Information and trends on the generation and characterization of solid wastes should be obtained. The activities of urban sanitation executed by the government sector (national and local) and by the private sector (formal and informal) should be identified.

Information on coverage and quality of urban sanitation services, lack of services, type of technology used, norms for the operation of urban sanitation, and recovery and recycling of solid wastes, which are important to characterize the level of technical development of the sector in the country should be obtained.

4.3.2 *Infrastructure*

The infrastructure section intends to present an estimate on the availability of de physical resources: properties, mobile equipment, treatment installations, and final disposal.

Moreover, the section intends to analyze the ability of the private sector to manufacture and maintain equipment, as well as, the ability to provide for parts of imported equipment.

4.4 Economic and Financial Aspects

This section corresponds to the economic and financial framework of the sector, including the availability, origin, and application of financial resources in the country and the analysis of its distribution in the solid wastes and urban sanitation sectors. Moreover, it includes the specification and analysis of the mechanism under which urban sanitation is financed.

4.4.1 *Sector Budget*

- Total annual expenditures.
- Expenditure distribution.
- Sum of total public budget and the share of the sector.
- Sector budget evolution in last three years.

4.4.2 *Sector Representivity*

- Share of the sector as a component of the public sector.
- Share of the urban sanitation service in relation to the budgets of water supply and sewage.
- Evaluation of the number of officials and employees of the sector in relation to the national total of sector workers.
- Equally in the municipalities, workers of sanitation services versus the total of municipal workers.
- Job generation and industrial development potential.

4.4.3 *Sector Financing*

- Primary finance sources.
- Financial obligations (capital and interests).
- Debt interests (internal and external).
- Assistance and external credit.

4.4.4 *Rates, Tariffs, and Cost Recovery*

- Levels of development of tariff studies and approval.
- Payment capacity of users.
- Possibilities of sector self-sufficiency.
- Financial and commercial systems: Accounting, billing, cost recovery.

4.5 Health Aspects

Due to solid wastes composition and the physical, chemical, and biological processes they are subject to, solid wastes have a potential elevated negative impact in public health. This aspect needs to be attended to with seriousness and responsibility.

4.5.1 *Epidemiological Aspects*

The analysis of the effect of solid wastes on public health could be analyzed through the use of epidemiological indicators corresponding to risk groups and the whole population, and the populations of the zones of influence of the final disposal sites. The investigation and analysis of morbility and mortality data will be indispensable.

4.5.2 *Vectors*

Several types of insects, rodents, and other animals could be, directly or indirectly, associated with the transmission of human communicable diseases as a result of the inefficient handling of solid wastes. The potential of transmitting diseases that are brought on by solid wastes is increased by the eventual presence of human or animal fecal material and of toxic and hazardous wastes. Therefore, it will be necessary to investigate the proliferation of vectors in areas where solid wastes are handled.

4.5.3 *Health Education*

Many of the illnesses and accidents related to solid waste management practices are produced or are increased as a consequence of the lack of adequate health education. Therefore, health education activities need to be evaluated.

4.5.4 *Use of Solid Wastes as Foodstuffs for Animals and Humans*

The human consumption of foodstuffs derived from animals that feed on solid wastes (controlled or uncontrolled) and the consumption of foodstuffs extracted from the waste stream constitutes current practices in several countries of the Region. These practices are a serious risk to human health and need to be analyzed.

4.5.5 *Occupational Health*

To collect and analyze information and data on exposed persons and illnesses due to their duties (formal or informal) in sector activities.

4.5.6 *Accidents and Violence*

To collect data on violence at the work place, as well as, accidents with vehicles used to provide sector services, and other types of accidents, such as, waste heap cave-ins, explosions, and fires in final disposal sites.

4.6 Environmental Aspects

Environmental degradation is directly linked to impropriate solid wastes disposal. The direct or indirect environmental and social costs to society of the generation, manipulation, and disposal of these wastes are increasing. To revert this situation, the needed capital investments in development programs should prioritize adequate solid waste management.

In terms of solid wastes handling, the maximum reduction of the quantity of generated wastes, the recycling of all that is possible, and the treatment and disposal of the remainder in an environmentally safe way is what is most emphasized. In this sense, the local level, the service operational entities, and the community play an essential role.

This section is divided into the following two subcomponents:

4.6.1 *Environmental Management*

This subcomponent covers the related mechanisms, actions, and administration of programs of protection, control, environmental study, and pollution prevention or, environmental contamination that are directly linked to solid wastes management. It is important to examine priority, intersector relations, integrated waste management practices, scientific and technical instruments, exchange of information, and other indicators that permit the evaluation of the environmental management in the sector.

4.6.2 *Handling of Wastes*

The following are examined: processes and problems faced, solutions adopted, existing scientific and technical understanding, techniques adopted to mitigate the ecological risks of contaminated sites, possible alternatives, solutions, and future trends in treatment and final disposal of solid wastes in the urban environment. It is important to examine the type of equipment and improper operation that interfere with environmental quality and those that generate adverse environmental impacts, especially, in water supply sources. Matters of sustainable development, such as recycling that involves individual and collective practices for energy conservation and preservation of non-recyclable natural resources need special attention.

4.7 Sociocultural Aspects

The sociocultural aspects are composed of human attitudes, the interactions between solid wastes service providers and the beneficiaries, as well as, the attitudes of the community and operating entities in general. Other aspects could include the distinctive characteristics of the family and community life, such as personal relations, perceptions, values, and culture. This section also includes the social aspects related to solid wastes separators.

4.7.1 *Familial Aspects*

Some of the most important points in familial aspects include familial patterns related to the sector, and the attitudes and conduct of the family or family groups that influence the sector.

4.7.2 *Community Participation*

Community participation involves a series of activities associated with the management of solid wastes. The following are some of these activities: participation in decision making, involvement of community organizations in the sector, sensitivity of the population towards solid wastes separation and management (including informal recycling). The obtainment of information on these aspects and its posterior assessment will be indispensable.

4.7.3 *Social Communication*

Social communication involves several aspects such as health and environment education for the public and employees of the sector and the ability of social communication of the population and sector institutions, and their attitudes towards sector employees (formal and informal).

4.7.4 *Waste Stream Separators and Additional Sociocultural Impacts*

The predicament of waste stream separators is the main social problem within the sector. It is indispensable to tackle this problem and it should be analyzed at the levels of waste generation and collection, at the sites of treatment, transfer, and final disposal. The marketing of recycled elements should also be examined. Equally, the positive attempts and programs, if there are any, of education, relocation and organization of separator groups should be analyzed.

This section should also include other impacts of the sector on sociocultural aspects not mentioned in previous sections.

5. PROTOCOL AT THE SECTOR LEVEL

The objective of the protocol at the sector level is to orient the tasks of the assessment team to carry out, in an orderly fashion, the data collection and the analysis and interpretation of information at the national level.

The components established in Chapter 4 are divided into themes and sections when the protocol at the sector level is formulated. Within each section the following is presented:

a) Data and information to collect and a series of questions that will be formulated during the interviews of officials of institutions conducted by the assessment team, with the purpose of collecting existing or additional data and perceptions relevant to the sector; and

b) A series of analytical questions whose objective is to guide the analysis of collected information; the answers obtained will constitute the basis for the conclusions of the sector assessment when identifying present restrictions and limitations, strengths and weaknesses, for the adequate performance of the sector and, consequently, help define sector strategies in order to overcome them.

5.1 General Country Characteristics

a) Data and Information Gathering

Political Organization

- Government system; state authority; office term; national electoral process.
- Local governments; municipalities; municipal electoral process; local office term.
- Geographic division; number of states, departments, provinces, municipalities.

Population

- Total; by sex; urban and rural.
- National criteria on classification of locations into urban and rural.
- Population growth rate.
- Projection of population growth.
- Larger cities (metropolitan areas). Process of "metropolization".
- Population that inhabits periurban areas. Rates of differential growth.
- Hierarchization or distribution of cities according to the nature of its population.

- Urbanization rate and its evolution.

Health (last five years)
- Rate of gross mortality per 1000 inhabitants.
- Cases and deaths due to diarrheal diseases, cholera, hepatitis, typhoid, dysentery, dengue fever, cysticercosis, teniasis, etc., tied to basic sanitation conditions.
- Life expectancy at birth.
- Structure and function of health and social security services.

Geography, Climate, and Natural Resources
- Geographic location; surface, orographic characteristics; hydrographic basins; hydrogeological characteristics; natural resources; existence of maps and topographic plans and aerial photographs.
- Climate: temperature, average annual rainfall, etc.
- Natural disasters in recent years.

Economy
- Background of the economic situation in last five years.
- GDP trends.
- GDP distribution by regions.
- Public external debt.
- Principal components of economic policy of the country. National budget.
- Inflation rate and trends.
- Exchange rate and trends.
- Economically active population.
- Commerce and tourism.

Social and Educational Characteristics
- % population defined by country as living in poverty.
- Literacy rate (15 years and older) of total, by urban/rural, and by sex.
- % population with primary, secondary, post-secondary education.

Services
- Road infrastructure (surface, air).
- Communications (mail, telephone, radio, TV)
- Electricity.
- Water supply and sanitation services.

b) Analytical Questions/Issues

- Are there current national trends and intentions towards changing the system, structure, or terms of government? What is the possibility that these trends are realized?
- Are there intentions, trends, or processes currently in motion to change the structure of the state? To modify the political division of the country?
- If the municipal authorities are not elected, are there trends or processes in motion to modify, and to shorten or lengthen the terms of the municipal government?
- What are the current policies and trends to defy extreme poverty? What are the subsidy policies? Policies on periurban zones?
- Are there policies and trends on decentralization, private sector, NGOs, and informal sector participation?
- What are the trends of the principal macroeconomic variables?

5.2 Institutional Aspects

This section includes the subcomponents of Institutional Structure; Legal Framework; and Plans, Policies, and Programs.

5.2.1 *Institutional Structure*

This section will start with the identification of the objectives and national goals to provide the population with solid wastes services.

The functions and roles of the different institutional components in all instances and levels of government that have or can have participation in the sector and the NGOs that are involved in the provision of solid wastes services, with the goal of identifying the level of centralization and autonomy of the sector, as well as, the national capacity to support the administrative, operational, and financial development of the components of the sector will be identified and analyzed.

Consequently, all participating elements in sector management should be analyzed. In other words, national, municipal, and private entities (formal or informal), community groups, other NGOs, universities, institutes of technical investigation and institutional promotion, professional and business associations, and financial institutions should be analyzed.

Sector Institutions

a) Data and Information Gathering:
   - Identification of agencies and public entities involved at the municipal, provincial, regional or national levels:
     - Policy setters?
     - Operational?
     - Definers of public investments?
   - What are the role or responsibilities reserved for the State (normative function)? Is the State capable of fulfilling this role?
   - Is there coordination between the different entities, principally with those of environmental control and public health? Coordination of the sector with institutional planning?
   - What are the interactions of the sector with companies or individuals of the private sector, as well as, with NGOs and community groups? Evaluate the operational, technical, and financial capacity of the private sector.
   - What is the degree of autonomy of the sector to execute its programs? In what measure does it depend on higher political decisions? In what ambit are investments and external credits decided?
   - Institutional responsibility for the control of industrial hazardous wastes. Location of the entity in the structure of the government:
     - Hierarchical and functional structure.
     - Responsibilities and duties.
     - Human resources.
     - Analysis and control policies.
     - Relation between control of industrial and domestic solid wastes.

b) Analytical Questions/Issues
   - Is there a dependence or interference between entities? Is there duplicity of functions?
   - Which are the political elements that interfere in the sector?
   - Are there agreements between the different entities? What types?
   - Are there regulations or guidelines for the organization and function of the solid wastes sector to which the entities need to comply with?
   - What is the entity responsible for the approval of rates or tariffs and its control? What are the demands to the operating entitles?
   - Are there privatization, concession, and contracting policies? Analyze the trends. Are there studies on these? In what state is the entity responsible for the implementation of these policies?

- How are decisions on the sector made? Who takes the decisions? Is the process of decision making a bottleneck?

Planning and Information

a) Data and Information Gathering
   - Are there national master plans of the sector?
   - Are there urban plans?
   - Emphasis given to solid wastes sector in national development plans.
   - How are the priorities and goals defined? What mechanisms guarantee the fulfillment of priorities and goals?
   - Which institutions can provide information on the sector?

b) Analytical Questions/Issues
   - Which are the entities of sector planning: structure, responsibilities, subordination? What is the relation between sector planning and the attention given to the guidelines and objectives of national planning?
   - Is there strategic planning of the sector? Which are the responsible entities and what results were reached?
   - Is there a national system of information of the sector?
   - Is there a management information system for the sector?
   - Are there plans and programs of technical and financial assistance (credit) in the country to capacitate the components of the sector?

Human Resources

a) Data and Information Gathering:
   - Personnel composition (age, educational level, managerial personnel, operational personnel, and others).
   - Which entities are responsible for the training of human resources?
   - Do university curricula include courses on solid waste management? Are there research centers that study this subject?

b) Analytical Questions/Issues
   - Quantity of personnel in the sector (national, provincial, and local)? Is the quantity and quality sufficient?
   - What are the salary policies? Are there incentives for the personnel?
   - Level of education of personnel in management posts.
   - What is the process of personnel selection?

- What is the rate of personnel rotation? For example, indicate the average term a manager is at his/her post.
- What is the availability of human resources of the private sector in consulting and in service provision?
- Are there training plans and programs in the sector?
- What are the mechanisms that guarantee its fulfillment and efficiency?

5.2.2 *Legal Aspects*

Although other sections mention or analyze certain pertinent legal aspects, this section will analyze the overall legislation that regulates the sector. The analysis of the applicable norms will help the countries determine the need to revise, create, or modernize legal instruments compatible with the demands of the sector, according to economic and social development policies.

Legal Context. Found within the legal system of the country, a synthesis of the legal framework that regulates the sector should be presented, identifying the key problems related to the applicable legislation. All norms directly applicable to the solid wastes sector should be listed in the Annex together with a brief description of their content.

a) Data and Information Gathering
   - Which laws, regulations, and decrees regulate the sector? What rank of the legislative hierarchy have applicable norms?
   - What sanctions does the legislative branch contemplate for the unfulfillment of the dispositions? What are the mechanisms of control to ensure its fulfillment?
   - Are there specific norms for the property or disposal of solid wastes?
   - Are there laws that regulate urban growth to minimize or prevent adverse environmental effects?
   - Is the country a member of the Basilea[1] Convention? If not, is there legislation to regulate the generation, storage, treatment, recovery, transfer to border areas, and disposal of toxic solid wastes? Are there sanctions against the violators of these norms? Are they employed? Are there control mechanisms that permit the application of foreseen sanctions?

[1] The Basilea Convention is a treaty signed by 116 countries in Switzerland in 1989 and concerns the control of export and import of hazardous wastes.

- Are there laws of an environmental nature that consider dispositions on solid wastes in general and toxic wastes in particular?
- Has legislation tending to fulfill principles contained in Agenda 21[2] been approved? Which are the most important omissions found in the effective legislation with respect to such principles?
- Is the principle "the polluter pays" applied?

b) Analytical Questions/Issues

- Are the applicable laws realistic or objective in order to defy the basic problems of the sector?
- Which of these norms are not applicable to reality? Why?
- What legislative vacuums exist in relation to the needs of the sector?
- How efficient are the control mechanisms (if they exist) that ensure the effective observance of the legal dispositions?
- Are the objectives and the sector policies clearly established in the legislation?
- Are there guides or parameters to justly establish sanctions?
- Is there an excess or lack of regulations and standards that hinder sector performance?
- Are there standards of licenses, permits, control over land and water usage, and public health laws?
- What conflicts exist between sector objectives and effective legislation?
- What laws oppose each other, and, therefore, prevent agile institutional management?
- Are there legislative vacuums that impede the interinstitutional coordination?
- Are legislation and institutional responsibilities clearly assigned?
- Are there consultation mechanisms between the different levels of government, companies, and the public?
- Is there a superposition of norms at the functional and operative levels of the institutions?

Interaction of Sector with other Sectors. Sectors affected by solid wastes such as water supply, sanitation, health, city planning, tourism, and others should

[2] Agenda 21 is a plan of action approved by 172 countries in the Summit of the United Nations on Development in Rio de Janeiro, 1992. By way of this document, the countries commit to the goals of sustainable development so that cultural, economic, social, and environmental interests become harmonized and, in this way, guarantee human development, protect nature, and ensures the future of the coming generations.

be identified and defined. In this context the legal dispositions relative to solid wastes which are applicable to the identified sectors should be analyzed.

a) Data and Information Gathering
   - Which laws applicable to other sectors oppose the legislation applicable to the solid waste sector?
   - What problems of institutional competence present themselves at the base of applicable legislation?

b) Analytical Questions/Issues
   - What legal contradictions exist in relation to norms applicable to natural resources, human establishments, health, urban planning, construction, among others?
   - Are there conflicts between sector objectives and current legislation?
   - Is there a need to create or modify legislation to resolve some of the identified obstacles?

Technical and Legal Aspects. Many technical specifications applicable to the sector are contained in legal dispositions. The legislative norms that regulate the technical aspects of the sector should be identified.

a) Data and Information Gathering
   - What type of standards are contemplated for the handling of solid wastes at the different stages?
   - Do design standards of transfer stations, treatment plants, landfills, dumps, and others exist?

b) Analytical Questions/Issues
   - Are these laws adaptable to the present situation or do they need to be updated with new technical criteria?
   - Are there management standards for treatment, storage, and disposal of solid wastes plants?
   - Are there minimums and maximums on manufacture, use, and disposal of certain matter?
   - How efficient are the technical parameters established to comply with the legal dispositions?
   - Are there control mechanisms to monitor the compliance with these norms? Are the sanctions effective against the non-compliance of technical dispositions?
   - Are technical criteria followed or are they abandoned because of pressures and interests of a political nature when a law of technical character is created?

5.2.3 *Plans, Policies, and Programs*

The analysis of plans, policies, and programs relative to the sector is important in that it portrays the current situation and the governmental mentality in terms of improving or optimizing the efficiency and productivity of solid wastes management services.

Some countries in Latin America and the Caribbean, through the process of governmental decentralization, are trying to make public presence more notable, as a part of a reform plan of the State and its consequent modernization. It is evident that a large quantity of problems and obstacles at present hinder social development, as well, as limit government action and the interactions between them and the public.

State reform and its modernization should search for resources or extend attention of the marginal sectors or groups, alter the interactions of State-society, extend communication between the bureaucracy and the public, extend the rights of citizens in reference to public administration, and guarantee transparency and more effective controls on the government.

In this context the situation of the solid wastes sector should be known, that is to say, the national objectives and goals to confer services to the population, as well as, to identify the principal obstacles, and reference to solid wastes in national development plans.

It is therefore necessary to obtain a general vision of the State modernization process to identify concrete actions that will affect the sector.

The identification of the ability of the sector to fulfill governmental decisions or to attend to the needs of service users and the community is recommended.

a) *Data and Information Gathering*
   - Are there measures for the decentralization of the services? If so, what are the strategies?
   - How are the priorities in the process of decentralization defined? Does it consider the capacity of the entities?
   - Are there plans to overcome the principal obstacles relative to the fulfillment of goals?
   - Are there global and strategic plans of the sector that incorporate new trends that should affect institutional development of the entities responsible for the services?
   - If there is a duplication of efforts or parallel action: are there measures to correct these situations?

- What are the programs for the extension of services provided by the entities that operate in the sector?
- What are the national objectives and goals to provide the population with solid wastes services?
- What are the main obstacles for the attainment of the goals and objectives?
- What modifications to the legal framework is needed to implement the reforms in the sector?
- Are there legislative projects and international loans to finance the modernization of the State? Which? With which agencies?
- Is the concept of extending attention to the marginal sectors or groups well defined in the State modernization program?
- Have the competitive advantages of the national, regional, and local levels been taken into consideration?
- What conditions relative to the legal framework that regulate the sector have been established in loan contracts signed with international agencies?
- Are there conditions that affect the sector that demand the creation or modification of legislature?
- Is the environment a priority for the country?
- What are the main reforms at the institutional, operational, or functional levels within the sector?

b) *Analytical Questions/Issues*

- What is the level of satisfaction of the sanitation service users?
- What are the mechanisms that guarantee the continuity in the provision of services?
- Are there concrete action plans to attend periurban and marginal communities?
- What are the national policies for the preparation of projects and designs and technical development?
- What are the requirements for the preparation of municipal plans?
- What are the policies to attain sector self-sufficiency?
- Are there operational programs for preventive maintenance, quality control, improvement of administrative organization, recovery and recycling, reduction of solid wastes generation and others?
- What proposals exist to improve the interactions of the State with the society and to extend communication between these two sectors?
- What concrete proposals exist to extend the rights of the citizen in reference to public administration?

5.3 Technical Aspects and Infrastructure

The solid wastes sector is traditionally represented by the municipal entities in charge of urban waste management services, whether they are services, departments, metropolitan entities, foundations, public firms, or private firms contracted by these entities or operating under concessions.

Moreover, other activities and institutions that intervene or participate complementarily or secondly in the labors of collection, treatment, and disposal of urban solid wastes such as ONGs, industry, and related private services, the university, communal organizations and others, should be considered, so that a complete view of the sector can be obtained with both its weaknesses and potentials.

5.3.1 ***Technical Aspects***

a) *Data and Information Gathering*

- What are the national technical norms of solid wastes management and what is their reach? Is there an agency or entity (national government or private) that provides technical assistance to operating entities at the national level?
- What is the national industrial sector capacity for the manufacture of equipment (trucks, waste compactors, tilt-frame trucks, transfer trailers, automatic sweepers, etc.) destined for the handling of solid wastes?
- What is the capacity of the sector in terms of maintenance services for the different equipment used in the solid wastes sector?
- What is the capacity of the national industrial sector for the manufacture of appliances and tools used in sanitation and collection, like brooms, shovels, etc.? What is the capacity of the national industrial sector for the construction of waste stream treatment installations, especially in terms of compost, recycling, and combustion facilities?
- At the country level, are low cost and appropriate complexity technology used for the provision of services in zones of precarious or periurban housing schemes?
- Are there plans and projects at the country level to drive selective collection and recycling of materials coming from wastes?
- Are there norms and regulations at the national level for the collection, transfer, treatment, and disposal of wastes of health establishments?

- Are there norms and regulations at the national level for the collection, transfer, treatment, and disposal of industrial hazardous wastes?

b) *Analytical Questions/Issues*

- In the case that there is an entity that provides technical assistance: What is its position in the structure of the government or private entity?
- What type of activities (street cleaning, collection, disposal, treatment) are subject to technical assistance, and in what proportion?
- Are the treatment processes adequate for the country? Are there appropriate technologies for final disposal?

5.3.2 *Infrastructural Aspects*

a) *Data and Information Gathering*. Obtain a summary of studies on solid wastes realized in the country with the objective of obtaining data on physical systems, especially when referring to:

- Types, quantity, and quality of services provided by the government, the private sector, and the NGOs.
- Material property (buildings, workshops, plots, etc.) and mobile resources (vehicles and machines), indicating state of conservation and average age.
- Solid wastes characteristics (country or city level), separated, if possible, into household, commercial, and others, as well as, trends in change, including rate of production, gravimetric composition, degree of humidity, and heat producing capacity.
- Estimate the population not served by solid waste collection services, specifying the absolute percentages and numbers, separated, if possible, into household, commercial, institutional, industrial, and periurban.
- Estimate the number of collection and sanitation teams in the country and their state of repair.
- Estimate the number of sites for the final disposal of wastes and the equipment used. Indicate their state of operation.
- Estimate the number and type of installations for waste treatment. Indicate the sate of operation.

b) *Analytical Questions/Issues*

- Is the property (offices and workshops) infrastructure sufficient and in good enough condition to attend to the demands of services in each of the cities?
- The infrastructure of equipment and machines to attend to urban sanitation services in each city is sufficient and adequate for local needs?
- Is there sufficient capacity to sanitarily operate the sites of final disposal?
- In terms of imported vehicles and equipment, what is the capacity of the representatives in the country to provide maintenance and spare parts?
- Imported equipment and vehicles are supplied with operation and maintenance manuals in the language of the country?
- Is there industrial capacity to process recyclable materials?
- What are the principal bottlenecks that restrict the technical development of the sector in the country?

5.4 Economic and Financial Aspects

The economic and financial framework of the sector, including the origins of municipal resources (own collection, central government transferences, etc.), budgetary availability, or specific financial sources at the central and regional government levels, and its representivity in relation to other sanitation sectors will be analyzed. Furthermore, it includes the determination and analysis of the mechanisms under which the sector is financed in urban and periurban areas. Finally, it includes, from the legal point of view, the mechanisms and feasibility for the implementation of rates or tariffs at the local level that guarantee the self-sufficiency of the service.

5.4.1 *Sector Budget Composition*

a) *Data and Information Gathering*

- Is there a sector budget?
- What are the total annual expenditures in the different government levels for the last year?
- What are the components of the budget at each level of government? (investments, operation and maintenance, debt interest, private companies service providers).
- What is the projected budget and participation of the national, local, and private levels for the next financial year?
- What is the annual proportion of the total sector expenditures aided by the central, regional, and local governments?

- Which are the projected functions of the national, regional, local, and private sectors in terms of sector expenditures?

b) *Analytical Questions/Issues*

- Are the projected expenditures for the current and following years completely self-financed with user fees? If there is a fee, what type is it and what percentage of the total costs is covered by them?
- Do the investment plans consider the participation of the private sector in the provision of services? In what percentage?

5.4.2 ***Sector Representivity (as a component of the public sector, with respect to the national economy)***

a) *Data and Information Gathering*

- What is the total expenditure of the sector in the last three years, according to source? (national, regional, state or provincial government).
- What is the average participation of expenditures with urban sanitation services, in relation to municipal budget?
- Compare the budget allotted to the solid wastes sector to that allotted to the water supply and sanitation sector for the last three years.
- Are there public sector policies that define the proportion that the solid wastes sector should have in the budget of the public sector?

b) *Analytical Questions/Issues*

- What is the proportion of the total public sector budget spent in the sector? What percentage of the GDP does it represent?
- How do the annual rates of growth of expenditures in the sector compare to the rates of growth of GDP?
- The funds assigned to solid wastes handling at the national, regional, and local levels are increasing, decreasing, or remain constant in the budget of the public sector?
- At the local level, does the income for the sanitation service vary in the same sense as the budget of the municipality?
- The expenditure estimates of the sector take into account the growth of the collection or the estimates remain dependent on subsidies of municipal governments?

5.4.3 *Sector Financing*

a) *Data and Information Gathering*

- The financial requirements to satisfy the goals of coverage and quality increase of the services for the next years are explicitly presented? Does the sector planning include explicit financial plans destined to obtain financial resources to reach a wide coverage of the sector?
- Do the financial plans take into account the integration between the different sanitation sectors?
- During the last five years, what have been the primary sources of financing of capital for investments in the sector? What types of financing (government transferences, loans, credit lines, municipal bonds, others)?
- What are the principal financial sources at the national, state, or international agency levels, their characteristics (object of financing, equipment, plots, property infrastructure, training, etc.; guarantees, payment plans, grace period, restrictions to lender, others) and total financed in last three years, as much for the public sector as for the private sector?
- Is there international technical cooperation for solid wastes projects? Which are they?
- What is the participation of the private sector through contracting and service concessions in sector investments?
- What percentage of international donor assistance has in recent years financed capital investments in the sector?
- What are the restrictions for the local governments to receive direct assistance or financing from donors or international entities?

b) *Analytical Questions/Issues*

- Is the public sector in debited in order to finance capital investments or for current expenditures in the sector?
- What is the debt situation and fulfillment of obligations of the lenders (municipalities), in relation to the different sources of financing?
- The financial implications of the goals or objectives of the sector recognize or keep in mind the quantity needed for financing the credit?

5.4.4 *Tariff Policies and Collection*

a) *Data and Information Gathering*

- Are there studies for the creation or implementation of tariff policies for the sector? What are the characteristics: origin and type of regulation (national, state or local; law, decree, regulation, disposition, other), type of tax (rate or tariff), form of collection?
- What are the legal restrictions for the creation of tariff policies for the sector in the different levels of government (national, regional, and local)?
- Are there legal restrictions for the joint collection of sanitation, water, and electricity tariffs?
- Are there legal restrictions for the execution of services and direct collections by the private sector through concessions?
- How is the commercial system of accounting, billing, and collection?

b) *Analytical Questions/Issues*

- Does the public entity or urban sanitation firm have the authority to fix the tariffs or rates, charge for services, and collect in order to satisfy its financial needs?
- Up to what point are the tariffs or rates determined by the needs or requirements of the sector for self-sufficiency? How much does the budget of the public sector contribute to subsidize urban sanitation services? What are the mechanisms to provide these subsidies?
- Up to what point do coverage and quality objectives and its technical and financial demands consider the capacity and will to pay of the society?

5.5 Health Aspects

Due to their composition and the physical, chemical, and biological processes they are subjected to, solid wastes have a potential negative impact on public health. This matter needs to be attended to with seriousness and responsibility.

5.5.1 *Epidemiological Aspects*

The analysis of the effects of solid wastes in public health can be aimed through the use of epidemiological indicators, corresponding to the risk groups and the whole population and, to the populations of influence zones of final disposal sites.

a) *Data and Information Gathering*

- Collect general data on public health (by sex) and, in particular, of the inhabitants of the areas close to solid wastes final disposal sites, as: a) life expectancy; b) mortality rates (by cause): maternal, child, and overall; c) morbility rates: child and overall; d) cases (per thousand inhabitants) of related illnesses, directly or indirectly, with solid wastes or by vectors of diseases (tetanus, cholera, dengue fever, malaria, serious diarrheal disease, teniasis, cysticercosis).
- Data on the risk groups and the percentage of persons of each group that have gotten sick or that are exposed to diseases linked to solid wastes.
- Specify the measures used for the control and/or prevention of illnesses associated with solid wastes.

b) *Analytical Questions/Issues*

- What is the level of understanding in the different sectors of the epidemiological risks involved by solid wastes? Have these risks been identified and characterized?
- Have the probabilities, severities and the costs of adverse effects related to current solid wastes practices been evaluated?

5.5.2 *Vectors*

Several types of insects (flies and mosquitoes), rodents (rats), and other vectors can be, directly or indirectly, associated with the transmition of human diseases. The improper handling of solid wastes can determine the proliferation of these vectors. The potential health hazard is increased by the eventual presence of fecal matter of human or animal origin in solid wastes.

a) *Data and Information Gathering*

- Information on the species of animals that are commonly found at storage and/or disposal sites of solid wastes.
- If available, supply results of studies on insects and rodents (i.e. type and quantity) that proliferate in storage and final disposal sites of solid wastes.
- Estimate the percentage morbility and mortality (in particular, in areas proximal to accumulation and/or final disposal sites of solid wastes) attributable to vectors.

b) *Analytical Questions/Issues*

- Do the inhabitants of areas proximal to solid wastes final disposal sites know the sanitary risks to which they are exposed as a

consequence of the presence of disease vectors? If so, do they adopt measures of control or protection?

5.5.3 *Health Education*

Many of the diseases and accidents related to solid wastes handling are produced or increased as a consequence of the lack of adequate health education.

a) *Data and Information Gathering*
- What is the level of understanding of the population on the concepts of solid wastes and its link to environmental degradation and its potential negative effect in human health?
- What are the resources and materials most used in health education programs?

b) *Analytical Questions/Issues*
- What is the perception of the population on health education programs?
- What is required to improve and extend the programs of health education?

5.5.4 *Use of Solid Wastes as Feed for Animals and Humans*

The consumption of animals fed on solid wastes, in controlled or uncontrolled form, and the human consumption of remains of food extracted from the waste stream constitute current practices in several countries of the Region. These practices involve serious risks to human health and it will be necessary to analyze them, as well as, the problems they cause.

a) *Data and Information Gathering*
- Are solid wastes used as animal feed? What populational sector eventually consumes these animals?
- Is it common that formal and informal workers of the sector consume food directly extracted from the waste stream?
- What type of control do competent authorities exert on these practices?
- What public institution is in charge of this control?

b) *Analytical Questions/Issues*
- Are there statistics or estimates on the effects of health of the persons that consume food extracted from the waste stream or animals fed with solid wastes?

- Is this topic covered by health education campaigns?

5.5.5 *Occupational Health*

Occupational health refers to persons exposed to accidents and illnesses due to their duties (formal or informal) in sector activities.

a) *Data and Information Gathering*
- Is there legislation on occupational hazards? Does it include informal workers?
- Are there programs destined to reduce or eliminate these risks?

b) *Analytical Questions/Issues*
- Have the agents, conditions, and/or chemical, physical, biological, and psychosocial factors that may affect the health of workers been identified? If so, list them.
- What is the attitude of formal and informal employees on the prevention measures of occupational hazards?
- What are the effects of occupational illnesses on service efficiency (i.e. number of absences per year)?

5.5.6 *Accidents and Violence*

This section refers to accidents involving vehicles that provide sector service and other types of accidents such as cave-ins of waste heaps, explosions, and fires in treatment and final disposal sites. Moreover, it includes the problem of violence due to psychosocial causes of alcoholism, drug addiction, and others.

a) *Data and Information Gathering*
- Are there data on accidents and violence (i.e. damages, number of victims) in the sector? Have there been accidents and incidents of fatal violence related to activities of the sector in the country? If so, describe in detail.

b) *Analytical Questions/Issues*
- Are alcoholism and/or drug addiction serious problems of sector employees?
- Under what conditions do the majority of the accidents and incidents of violence related to solid wastes occur?
- Are there methods to evaluate the design and operation of final disposal sites to prevent cave-ins, fires, and other types of accidents?

5.6 Environmental Aspects

Environmental degradation and public health deterioration are factors directly associated with the improper disposal of solid wastes. The environmental and social costs (direct or indirect) that represent the production, manipulation, and elimination of wastes are increasing. To reverse the situation, capital investment programs need to consider the adequate management of solid wastes a priority.

5.6.1 *Environmental Management*

a) *Data and Information Gathering*

- Identify preventive and corrective processes, new investment projects, process changes, and trends (anticipate emerging matters and future situation).
- Characterize resources management for environmental protection (improvement in the systems, increase in efficiency).
- The country has clearly defined environmental policy goals? How is it made concrete (law, decree, other instrument)?
- Do the policies express the complexity of environmental matters? Are societal preoccupations expressed? Are they well formulated and coordinated? Do they reflect the international obligations signed by the country? Are policies widely communicated, in other words, are they common knowledge?
- How are hazardous solid wastes dealt with at the national level? Is there a responsible entity? How many technicians does the field have for the handling of solid wastes and conservation? Is their performance efficient? Why?
- Is there a wastes diagnostic? Is it systematically updated? Is it complete?
- Are there environmental cost recovery estimates due to the inadequate management of solid wastes?
- How is the participation of private initiative manifested in the formulation of sector policies? And of NGOs? How does the community participate at the national level in the establishment and implementation of environmental policies and, more specifically, of health policies?
- Are there in the country identified means in which the environment can help obtain competitive advantages?
- Have there been evaluations of environmental impacts in the last five years? If so, mention them.
- Does the country have a system of information on the environment in operation?

- Are there integration mechanisms among the different entities that intervene in the matter? Cite them.
- Are there natural resources protection and conservation programs with established goals? Does the country have a plan to reach these goals? Is the government aware and interested in these matters?
- Are there estimates of environmental costs, in other words, costs as a consequence of contamination due to inadequate disposal of solid wastes?

b) *Analytical Questions/Issues*

- Are there programs that promote the prevention of generation or reduction of hazardous wastes and/or rehabilitation of contaminated sites? If so, present concrete goals.
- How does the country attend to the matter of minimizing wastes? Present the most significant experiences of the country on this matter.
- Are there regulatory mechanisms and market conditions that stimulate the practices of reuse and recycling?
- Industrial activity counts on economic and normative incentives and support of multilateral cooperation to promote investments directed at "green" technologies and those that produce a minimum of wastes?
- What are the main government encouragements to investigate "green" technologies?
- Are there environmental protection programs in the coastal areas?

5.6.2 ***Waste Management***

a) *Data and Information Gathering*

- Ecologically rational technologies are technologies that generate the minimum of wastes and, therefore, protect the environment, cause less contamination, use more sustainable resources, recycle a larger proportion of its wastes and products, and handle solid wastes in a more acceptable manner than the substituted technologies. Analyze the most significant experiences with ecologically rational technologies in the country.
- Is there a system of authorization for potentially contaminating activities? If so, are landfills, combustion facilities, transfer stations, recycling and composting plants, and others contemplated?

- Is the principle of ecologically rational management of solid wastes practiced in the country? Are there programs of energy conservation, use of biogas, etc.?

b) *Analytical Questions/Issues*

- Does handling of health service wastes involve the separation of pathogenic, infectious, and chemically hazardous wastes from other wastes?
- Are color and identification codes for bags and containers of health services wastes used at the national level? If so, do they obey international codes?
- Are there campaigns within the hospitals for the reduction of volume generated by hospitals? Are hospital and health service wastes incinerated or sterilized by autoclave? If so, in its totality or only the septic wastes? Is there legislation on this type of wastes?
- Are there programs of wastes exchange ("wastes bag")?
- Are techniques and processes of treatment of hazardous wastes applied? Provide examples.
- Is there knowledge of illicit transport of toxic or hazardous wastes? Is there control of the generation and final destination of hazardous wastes in the country? Exemplify.
- What percentage of landfills treat leachate?

5.7 Sociocultural Aspects

Sociocultural aspects include human attitudes, the interactions between solid waste service providers and the beneficiaries, the attitudes of the community as a whole, and the attitudes of the entities that operate in the sector. Other aspects may include the distinctive characteristics of family and community life, like personal relations, perceptions, values, and culture. Likewise it includes the social aspects related to wastes stream separators.

5.7.1 ***Familial Aspects***

Among the most important familial aspects are the familial patterns related to the sector and the activities and conducts of the family or family groups that influence the sector.

a) *Data and Information Gathering*

- Obtain information on the quantity and types of wastes that are generated, the patterns of generation and final disposal for typical families of different areas and different economic levels.
- Obtain information on normal familial arrangements and the sanitation responsibilities within and around the house.
- Data on the type and degree of familial and individual participation by economic level at the different stages of sanitation services.
- Impact (in percentage) of payment for handling of solid wastes in the incomes of several families of different economic levels.

b) *Analytical Questions/Issues*

- What are the most common attitudes and beliefs with respect to disposal, service demands, and interactions between solid wastes management and public health?
- What is the common behavior, typical participation, and attitude of women with respect to solid wastes?
- What is the general attitude (of the public, of the government) towards source separation?
- How do attitudes and practices of the community affect urban sanitation services?

5.7.2 ***Community Participation***

Community participation implies a series of activities associated with solid wastes management. Some of these activities include participation in decision making, involvement of community organizations in the sector, sensibility of the population towards solid wastes handling and separation (including informal recycling).

a) *Data and Information Gathering*

- What is the method and level of public participation in decision processes?
- Are there formal mechanisms within the entities of the sector at the national, regional, or local levels which permit the participation of the public in the different project phases for the management of wastes?
- What divisions or departments of the entities are specifically responsible for realizing or coordinating public participation?
- Could specific groups that participate in the feasibility of sector objectives (professional associations, investors, employees, workers) be identified?

- Is there some type of program that includes community participation through financial resources, materials, or manual labor for the implementation of projects?
- Is it common for the community to organize itself in grassroots organizations that attend to problems due to the lack of services?
- Do the organizations respond to local cultural, political, religious, or other parameters? Does this situation occur with more frequency in certain regions of the country or in specific socioeconomic sectors?
- What form does community participation take on (economic support, manual labor, decision making, service operation, reception of health education programs)?
- Have other methods or mechanisms of community participation that have still not been implemented been identified? Which are they?
- What is the attitude and disposition of the public towards payment of collection and final disposal services?
- What are the formal and informal activities of waste separation?
- Does the community participate in the recovery of recyclable materials?
- What are the uses of recycled materials?
- Are there norms that control the use of recycled materials?

b) *Analytical Questions/Issues*

- Has the participation of specific groups (professional associations, workers) led to the realization of sector objectives? Are there fixed mechanisms or institutionalized mechanisms that offer continuity? Do these mechanisms predominate informal mechanisms?
- Is the focus of service administration favorable with respect to sociocultural aspects?
- Does the administrative area of service providers accept the concept of local communities organizing themselves to promote solutions to problems of solid wastes management?
- Has there been an evaluation of the efficiency or results obtained by the communities that manage the operation and maintenance of solid wastes services?
- What type of evaluations have been realized and what were the results? Have community members intervened in planning processes and data collection?
- What degree of participation have women had in the management of projects and systems?
- What difficulties have surged from the organization of local communities established to administer solid wastes projects

(financial or other resource needs during planning phases and execution, in relation to maintenance and others)?
- What is the populational sensibility with respect to aspects related to solid wastes management?
- What are the current formal or informal separation practices? What are the problems that surge from several separation activities (including the sale of the materials)? What is the attitude of the public towards these practices?

5.7.3 *Social Communication*

Social communication can involve several aspects, such as, programs that provide environmental and health education to the public and sector employees, the capacity of the population and sector institutions for social communication, and the attitude towards the workers of the sector (formal and informal).

a) *Data and Information Gathering*
- Identify and specify the programs that provide health and environmental education to the public and the formal and informal workers of the sector. What methods are employed for this purpose?
- How does the country use the press to communicate messages of wastes generation reduction?
- Obtain information on financial, educational, and other resources that are available for the promotion of community organization with respect to solid wastes.
- Are there materials for the health education of specific groups that inhabit urban or periurban areas?

b) *Analytical Questions/Issues*
- Considering the need for solid wastes services in periurban areas: What are the main difficulties for the development of programs that assist communities to organize and establish local leadership to receive and use waste management services and to apply adequate practices of hygiene?
- Is there an adequate type and amount of material for the use in public education and training to implement efficient programs of training and development? What additional resources and materials are needed?
- Have solid wastes projects stimulated the development of other community projects?
- Has the level of collaboration among the different organisms that operate in the promotion of community associations been

stimulated? What is the frequency of meetings with these associations? Is there a planning mechanism and use of common resources?

- Have the main priorities with respect to future requirements and the needed resources to assist communities to obtain adequate systems for solid wastes management been identified?
- How many community organizations were established in the last five years? How many of them function efficiently?
- What is the public attitude towards formal and informal workers of the sector? What is the capacity of the population and the sector entities for social communication?
- Are there programs for the sensibilization and education of citizens to circulate concepts of recycling wastes not only as a way to reduce generation of wastes but also to prevent the loss of natural resources?

5.7.4 *Waste Stream Separators and Additional Sociocultural Impacts*

The predicament of the waste stream separators is the main social problem within the sector. The problem should be analyzed at the levels of generation, collection, treatment, transfer, and final disposal. It should also be analyzed at the marketing level of recovered elements. Moreover, all other impacts on the social and cultural aspects of the sector that were not considered in previous sections will be included.

a) *Data and Information Gathering*

- Do the urban and periurban areas receive the same level of attention with respect to solid wastes management? If this is not the case, why not?
- Specify the average number of families and the total number of persons that live close to disposal sites. What percentage of these families use these sites or other activities related to solid wastes as a main source of income?
- Are the separators organized? How?
- How do these incomes compare to the national income average or with the minimum salary?
- What is the percentage of children and women of the population that live close to final disposal sites?
- What percentage of the children and women work in activities related to solid wastes?
- How did the presence of treatment or final disposal sites affect the value of the properties in its area of influence? Are the properties adjoining final disposal sites principally public or private?

- How does the presence of final disposal sites affect emigration and immigration and the rates of unemployment or employment in its surroundings?

b) *Analytical Questions/Issues*

- Are populations living in the proximity of disposal sites and employees of solid wastes services exposed to more tension than other populations with similar educational and economic backgrounds? Do they present lower self esteem?
- How does the provision or absence of solid wastes services affect the overall character of the community?
- Have the number and type of businesses established around processing (i.e. transfer stations, recycling plants) and final disposal sites changed?
- Has the increase in traffic of sector vehicles resulted in negative impacts on community welfare (i.e. excessive noise, accidents)?

6. PROTOCOL FOR UTILITY COMPANIES

Urban sanitation services in the majority of Latin American and Caribbean countries are supplied by the municipalities. These services are also supplied by other state institutions and by private entities.

The objective of this chapter is to guide the assessment team in gathering data and to guide the analysis of information at the utility company level with the assistance of protocols that are organized according to components of analyses identified in Chapter 4.

Utility companies have been defined as the institutions or companies charged with the provision of the urban sanitation services and, accordingly, may cover regions (district, state, province, etc.) or municipal areas (localities, metropolitan areas, etc.), depending on their area of work or sphere of influence.

The study should cover areas similar to those analyzed at the sector level (national), with any necessary adaptations and extensions. The team should not attempt a detailed analysis of any service delivery institution. The purpose of the assessment at this level is to examine the sector in its totality, from the point of view of the entity that directly provides the services.

The team should select three to four utility companies that are as representative as possible of conditions in the sector in general. The national coordinating agency should be able to assist in the selection of sample entities. The sample should represent urban metropolitan zones, mid-sized, and small cities. Another criteria for the selection of the sample is the nature and characteristics of the utility companies (example: municipalities, private entity, cooperatives, or others).

As noted in Chapter 2, the team should not allow the time spent on these selected utility companies to dominate the sector assessment. No more than one-third of the entire data gathering and analytical effort, and therefore, about one-fifth of the total sector assessment timetable should be devoted to the sample of utility companies.

It is not necessary that all the members of the assessment team visit and examine each of the companies selected as part of the sample. Subteams composed of two or three team members that dedicate two or three days to each selected institution should be able to interview all management level employees, observe company operations, review financial data, and other aspects necessary to carry out a complete analysis of the company.

The following protocols are designed to accomplish two objectives:

1. Provide depth to the sector analysis by obtaining data and information about a selected set of municipalities or institutions that provide urban sanitation services directly to the population.

2. Provide the team with contrasts, where they exist, between the view of individuals who work at the sector level, typically in national government agencies, and the views of individuals in the daily business of providing services. These opinions will refer to the major issues and constraints in the sector and the possible strategies for addressing these constraints.

6.1 Institutional Aspects

The objective of this subject is to know the conditions of the municipalities or entities responsible for the service, in terms of its organizational structure, administrative and financial resources, human resources, equipment, physical installations and others. The instruments used to define responsibilities of the municipalities and other units that compose the sector organizational structure will be identified. The main obstacles to the quality and quantity of services demanded by the population, as well as, the priority areas to receive assistance in terms of technical and financial cooperation will be studied.

The assessment should contemplate the peculiarities of the municipalities, in addition, to providing different treatment depending on its size and population.

The theme should include an evaluation of human resources available to the municipalities and its correspondence to the institutional objectives. The fulfillment of goals due to conflicts or functional duplications, administrative or normative ties, as well as, imbalances between the formal and actual structures will also be studied.

How the institutional solution is being set up for the metropolitan areas will be studied. In this sense, an evaluation whether there is a trend towards the formation of metropolitan companies in large cities where there are several municipalities is recommended. For example, the functions entrusted to these companies could be the final disposal and transfer, leaving the collection in the hands of the municipal services.

6.1.1 *Institutional Structure*

a) *Data and Information Gathering*

- Location of solid wastes management in the administrative structure of the municipality: centralized or decentralized administration.
- Hierarchical and functional structure - organigram.
- The norms of operational and financial control established by entities of the State with flexibility to permit local adaptation.

b) *Analytical Questions/Issues*

- Autonomy to define and execute its programs. In what measure does it depend on decisions of another entity? Or political obligations?
- Autonomy to fix priorities, operational practices, and procedures.
- Measure to give more agility and administrative and operational autonomy. Are there trends towards the formation of autonomous companies?
- Political factors that affect the process of decision making.
- Administration of material resources (furniture and property) and their acquisition, storage, and distribution.
- Acquisition of spare parts for equipment or for treatment installations. Does it become a problem for the operation of the service?
- Control process of the administration of heritage.
- Measures to strengthen the accounting of the entity, with the goal of identifying costs and to offer subsidies for fixing of rates or tariffs.

6.1.2 *Planning and information*

a) *Data and Information Gathering*

- Identify planning activities realized in the entity.
- Identify objectives and goals of plans in urban and periurban areas, as well as, the existing instruments and mechanisms to reach them.
- Indicate the existence of an efficient system of communication, useful for the coordination of actions and mutual support between different dependencies.
- Indicate the existence of the entity that gathers information on the company and the types of information.

b) *Analytical Questions/Issues*

- Evaluate the institutional and financial feasibility of the objectives and goals.
- Identify the mechanisms for the integration of the plans of the entity with state plans of economic and social development.
- Analyze the priorities and their impact on the services.
- Indicate the existence of a system of management information and its use in the process of decision making.

6.1.3 *Human Resources*

a) *Data and Information Gathering*

- Specify the current number of personnel at the company and its adaptation to the needs.
- State the composition of the employees by the number of technicians, administrative personnel, and workers.
- State the policies of recruitment and selection of personnel. Access criteria.

b) *Analytical Questions/Issues*

- State salary policies and incentives for personnel. Personnel rotation. Duties and salaries in relation to job market.
- Indicate level of education of employees in technical posts.
- Relations with labor unions.
- State the existence of training programs of or through isolated events.
- Indicate whether training programs respond to the needs of the entity and whether the entity has the ability to develop these programs.
- Verify whether there are entities that develop training programs.
- Verify whether trained professionals are employed, specially at the levels of administrative responsibility and decision -making. Is it a notorious weakness of the entity?

6.1.4 *Plans and Programs*

a) *Data and Information Gathering*

- Identify objectives and goals and the mechanisms and instruments to attain them.
- Identify the policies of the entities and its congruence with national managements.
- Identify the use of the goals to evaluate the results obtained with the programs.

- Identify whether there are programs to extend the structure of services supplied, preventive maintenance, quality control, training of human resources, and the improvement of administrative organization.

b) *Analytical Questions/Issues*

- How does the planning process work and who is involved in the process?
- Evaluate the impact of the decisions on the improvement of the service.
- Identify the correlation between the demands and the goals established.
- Compare goals with finance policies, institutional development, human resources, and financial resources. Which mechanisms guarantee its fulfillment?
- Identify the system of assessment of results comparing projected with attained.
- Is there coordination between municipalities for the treatment or final disposal of wastes? If so, evaluate their success.

6.1.5 *Legal Framework*

The assessment of the legal framework that demarcate the functioning of the entity should permit an evaluation of its efficiency with respect to the sphe of action that legislation allows. The suitability of the framework with respec. to the needs of the sector and the operation requirements should be evaluated.

Vacuums that impede participation or decision making and obstacles of a legal nature that interfere in the execution of programs or policies should be identified.

a) *Data and Information Gathering*

- What laws, decrees, and regulations make up the legal framework in which the entity develops? Which are linked to macroeconomic policies (for example: those derived from adjustment policies o stimulation of social investments; the delegation of service provision to the private sector, and others)?
- What laws specifically regulate the entity?

b) *Analytical Questions/Issues*

- What are the functions fulfilled by the service entity according to the norms that control it? What is its dependence?

- The entity operates the services or delegates all or part of this function to local companies or to the community?
- What is its legislative domain and how does it interact institutionally with the delegated services? Do the users have the liberty to contract collection services?
- Are there conflicts between the objectives of the company and the legislation that regulates its activities?
- Has the need to modernize, modify, or promulgate new laws been evaluated?

6.2 Technical Aspects and Infrastructure

Generally, the operating entities are public (at the municipal level) or private working under state contract.

It is of importance to search for information on the activities of communal groups, NGOs, private companies (including those that do not work under municipal control), and the capacity of the private industrial and commercial sector in managing their own wastes.

In this study, as mentioned earlier, there will be a sampling of the most common practices in the country or region, choosing mid -size and small cities that are representative of the different types of operational practices in the sector.

6.2.1 *Technical Aspects*

a) *Data and Information Gathering.* For each analyzed entity, obtain the data of its capacity in the following:
   - Coverage, frequency, and schedule of the collection services provided, separated into domestic wastes, health services wastes, and non-hazardous industrial wastes.
   - Coverage, frequency, and schedule of sweeping and cleaning activities in terms of the cleaning of streets, squares, gardens, drainage system, empty plots, and others.
   - Coverage and frequency of provision of special services, such as, cleaning of fairs and markets, support to transport activities for the municipality, deodorizing and disinfecting of public premises, cleaning of pipes, removal of earth from the streets, etc.
   - What is the estimated useful life of the current final disposal sites of solid wastes?
   - Existence of centers of reference and documentation in the entity or those that are related.

- Capacity of the entity to provide services of collection, transfer, treatment, and final disposal of the total of domestic wastes.
- Capacity of reuse of recyclable materials obtained form solid wastes.

For each analyzed entity obtain the following indicators, if possible:

- Generation per capita (kg/person/day) - Total tonnage of collected wastes per day divided by thousands served.
- Collection coverage (%) - urban population served divided by total urban population multiplied by 100.
- Coverage of street sweeping (%) - length of paved streets attended divided by total length of paved streets multiplied by 100.
- Coverage of final disposal (%) - Tonnage of wastes properly disposed of divided by tonnage collected multiplied by 100. (If possible, separate for types of wastes: domestic, commercial, hospital, and industrial).

Efficiency indicators:

- Number of employees per thousand served. Number of employees of the operating entity divided by the number of inhabitants served multiplied by 1,000. If possible, separate: number of employees per 1000 inhabitants in: collection, cleaning of streets, disposal, administration.
- Efficiency in the maintenance of collection equipment (%): total operative equipment divided by the sum of the number of equipment in operation + stand by equipment + maintenance equipment multiplied by 100.
- Efficiency in the use of collection equipment (%): sum of tonnage collected by trucks per trip divided by sum of design capacity of trucks per trip multiplied by 100.
- Efficiency of collection personnel: (tonnage/person/day): quantity of tonnage collected per day divided by total number of working collectors.

b) *Analytical Questions/Issues*

- Is there the technical ability to design routes for collection and cleaning?
- Is there operational control? If so, what activities are the object of planning?
- In case of selective collection, what percentage of collected wastes falls under source separation?

6.2.2 *Infrastructural Aspects*

a) *Data and Information Gathering*

- Number of waste compacting vehicles for waste collection indicating type, year, and condition.
- Number of non-compacting vehicles for waste collection indicating type, year, and condition.
- Number of vehicles for the sanitation of streets indicating type, year, and condition.
- Number of equipment for landfilling indicating type, year, and condition.
- Type and qualitative and quantitative adaptation for the tools used in collection and street cleaning.
- Availability of maintenance workshops with a brief description of its dimensions, type of construction, machines, and tools and personnel employed.
- Condition and appearance of properties occupied by offices and workshops of the utility company.
- Installations for the processing of urban solid wastes, such as combustion facilities, recycling plants, composting, and others.
- Sites for solid wastes disposal, indicating property, type, capacity, quality, and measures for environmental protection.
- Installations for the transfer of solid wastes indicating property, type, efficiency, construction materials, condition, and schedule capacity.

b) *Analytical Questions/Issues*

- Are collection and street cleaning vehicles used correctly?
- Do the above vehicles receive adequate preventive and corrective maintenance? What entity is responsible for these activities?
- The type of vehicles is in accordance with the needs of its use and the condition of the streets?
- Is there availability or a deficit of operational infrastructure?
- Are there studies on the availability of land for the construction of landfills close to the urban area?
- Identify the principal bottlenecks, in terms of the city infrastructure, that affect the provision of services in terms of quantity, quality, and continuity, as for example:
  - Condition of the streets and highways, in terms of asphaltation, conservation.
  - Traffic conditions in the city, problems, and trends.
  - Condition of rainfall drainage system.
  - Use of empty plots as dumping sites.

- Use of containers to condition wastes, indicating whether they are used correctly.

- What are the principal bottlenecks, in terms of infrastructure of the entity responsible for the services, that affect the provision of services in terms of quantity, quality, and continuity? For example:
  - Quantity and condition of the fleet of collection and sanitation vehicles.
  - Adaptation of the offices and workshops.
  - Availability and adaptation of installations of treatment and final disposal sites for domestic, health services, and other wastes, indicating whether they belong to the public or private sector.
  - Availability and adaptation of installations of treatment and final disposal sites for hospital and industrial wastes indicating whether they belong to the public or private sector.

6.3 Financial Management

In general, in terms of financial resources, the urban sanitation sector is barely allotted with the necessary to operate minimally, which in many municipalities is deficient and is limited to collection and sweeping of commercial areas and high income residential areas. The periurban areas are rarely covered by collection services and, with difficulty by the sweeping service. There are no treatment installations or if there are they are badly operated and maintained. Landfills, in general, are open air dumping grounds, with serious potential harm to the population and environment. A budgetary foresight and adequate financial administration are needed so that the local government can provide to all of the urban population, services that guarantee safe conditions and that do not contaminate the environment. On the other hand, the self-sufficiency of the sector should be sought, through a socially just system. The collection of rates or tariffs should be sufficient to cover all the expenditures needed for the operation and investments in equipment, installations, and infrastructure.

6.3.1 ***Budget***

a) *Data and Information Gathering*

- Obtain the itemized budget of the local government in the last three years.
- Verify if there are explicit public sector policies, statues, decrees, and other instruments that define the proportion allotted to urban sanitation from the public sector budget and economy, or policies

that define the institutional responsibility for the provision of services.

- What are the total annual expenditures for the service of waste management in the last three years, excluding capital investments financed by credits but including debt interests, depreciation of the capital, or other repayment of capital expenditures of previous years, the operation, maintenance, and any capital expenditure carried out?
- What are the projected functions, at the local level, in terms of sector expenditures, for the next three years?

b) *Analytical Questions/Issues*

- What percentage of the expenditures are financed by user fees?
- Is there an accounting system to generate financial information required for planning and management?
- What is the financial policy or the plans of the local government for the next three years in terms of self-sufficiency of the sector?

6.3.2 ***Representivity of Sanitation Services***

a) *Data and Information Gathering*

- What is the proportion of expenditures for the sanitation service in relation to the total of municipal expenditures in the last three years?
- Evaluate, in terms of the budget, the participation of the sector in relation to the expenditures of the water supply and sanitation sector.

b) *Analytical Questions/Issues*

- What is the proportion of officials of the sector, including those of private companies on contract, in relation to the total number of officials of the local government?
- What is the fuel consumption of the sector in relation to the total consumption of the local government?

6.3.3 ***Financing of the Service including Periurban Areas***

a) *Data and Information Gathering*

- Is there participation of sources external to the local government, governmental or not, in the expenditure of sanitation services? In what proportion in relation to local expenditures?

- What is the projection for the next three years, in terms of budgetary participation, of sanitation services in the local government budget?
- Evaluate the financial deficit/surplus of sanitation services. In case of a deficit, what are the origins of the resources for its coverage?
- Analyze the finances contracted by the municipality in the last three years in terms of: financing agency, object of the financing, value, guarantees, grace period, interests, payment terms, and results reached. Are there plans for the obtainment of finances in the next three years? If so, clarify the previous characteristics.

b) *Analytical Questions/Issues*

- What proportion of the budget of the local government is spent on urban sanitation?
- With the implementation of an adequate service, with extended coverage, involving the periurban zones, what would be the proportion?
- What is the capacity for indebtness of the municipality?
- What are the legal possibilities or legal and technical impediments for the contracting of external financing?
- Are there budgetary foresights for the investments in equipment, infrastructure, and new installations (treatment plants, landfills, transfer stations) for the next three years? In what proportion of the urban sanitation budget?

6.3.4 ***Rates, Tariffs, and Collection***

a) *Data and Information Gathering*

- Are there administrative laws or regulations that fix the policies of remuneration (rates and tariffs) for the sector?
- Has there been an analysis on the availability and the payment capacity of the services for the population?
- Who or what institution fixes the rate or tariff of urban sanitation? Is there a methodology for this?

b) *Analytical Questions/Issues*

- What is the percentage of homes served by the service and what bills do they receive for them?
- What is the percentage of paid bills of urban sanitation services?
- What is the percentage of the value charged in relation to the total cost of the system? Indicate the same for the value collected.
- What is the percentage of the average rate of sanitation in relation to the average familial income?

6.4 Health Aspects

a) *Data and Information Gathering*

- Does the entity or the municipal health service have a data bank of the cases and types of human diseases linked to activities in the sector?
- Does the entity have a program for control and/or prevention of illnesses associated to solid wastes, for both the groups of highest risks (i.e. formal and informal workers of the sector) and the population as a whole?
- Does the entity have information on the type and quantity of vectors that proliferate as a consequence of its activities in the sector?
- What are the measures adopted for the control of mentioned vectors?
- Does the entity have a health education program for both the public and the sector workers?
- Is there any didactic material for the formation or training in education?
- Does the entity realize some form of control on the practice of feeding animals with solid wastes? Is it an habitual practice, not censored by the entity?
- What is the attitude of the entity in relation to the separation of food remains from the waste stream for posterior human consumption?
- Does the entity have a program to reduce or eliminate the risks derived from its activities in the sector?
- Does the entity have a program to reduce alcoholism and drug addiction?
- What percentage of its budget does the entity dedicate to occupational health?

- Are there statistics on accidents related to sector activities?
- Is there a training program for the sector workers?

b) *Analytical Questions/Issues*

- Has the entity evaluated the costs and/or effects associated with the impacts of its activities in human health?
- When herbicides and insecticides have been used, have there been adverse effects of these products on human health and the environment?
- Has the entity evaluated the reach and the results of its programs or activities in health education?
- What are the specific needs and the resources needed for the entity to initiate, strengthen, or extend its programs in health education (with emphasis in solid wastes)?
- The use of solid wastes as foodstuffs for animals and humans is a topic covered in the health education programs of the entity?
- What is the main reason for worker absence in the sector?
- Do the workers of the sector fulfill the recommendations on occupational health, including the use of protective clothing?
- In the cases of accidents, does the entity perform an exhaustive evaluation? Are corrective measures taken as a consequence?
- Are controls realized and are preventive measures adopted to prevent accidents that may occur as a result of sector activities?

6.5 Environmental Aspects

Sustainable development in terms of solid wastes management emphasizes the maximum reduction of quantities of wastes generated, the recycling of all that is possible, and the treatment and disposal of the remainder in an environmentally safe way. In this sense, the local level, the service entities, and the community perform fundamental roles.

6.5.1 ***Environmental Management***

a) *Data and Information Gathering*

- Is allowing companies and municipalities to have current information on the most recent state of the art "green" technologies the main purpose for an improved access to information? If so, is such information accessible?
- Does the municipality have the training and resources needed to realize evaluations of environmental impact and to concede authorizations of potentially contaminating activities?

- How does the operating entity guarantee environmental protection and mitigate the risks due to possible inadequacies in the handling of wastes?
- Characterize the principal practices and policies that interfere with the establishment of adequate solid wastes management.

b) *Analytical Questions/Issues*

- What is done with sludge of municipal water treatment plants?
- Municipal wastes (urban, domestic, industrial, special) are disposed of in bodies of water or in ecologically protected zones? The damage to the ecosystems and the biodiversity of local fauna and aquatic and terrestrial vegetation can be identified?
- Is the final disposal of wastes in incline or hanging topographies, such as, ravines or inundated areas (swamps, marshes, estuaries) or subject to inundations significant? What is their proximity to urban areas?
- How many professionals, at the local level, are responsible for environmental control of the wastes? Is there a permanent program of training personnel in this area?
- Are there sufficient funds for the treatment and control of contamination caused by solid wastes?

6.5.2 ***Wastes Handling***

a) *Data and Information Gathering*

- What are the adopted criteria for the authorization of treatment plants or landfills? How is community participation verified in the election of the sites of final disposal of solid wastes?
- Does the municipality undertake analysis of air and water quality supplied to the public?

b) *Analytical Questions/Issues*

- Are the landfills managed with technical rigor, in other words, do they take into account the collection systems, the treatment of leachate, biogas collection, wells for monitoring percolated liquids?
- Is there control of toxic and hazardous materials (inks, solvents, insecticides) in the installations of solid wastes management? Are there landfills in geologically non-secure areas?
- Is there data on organic contamination of the water supply due to leachate?
- The municipality monitors landfill leachate? Are there environmental laboratories and what type of analysis do they realize (bacteriological, physical, chemical)?

- What analysis techniques are employed for atmospheric contaminants?
- In the case that there are waste combustion facilities, What is done with the ash generated? Are the air emissions controlled? Is there equipment (electrostatic precipitators, gas scrubbers) operating and well maintained? Indicate the efficiency of the gas treatment equipment in the removal of toxic gases, particulate matter, etc.
- The locality has a municipal waste combustion facility? What percentage of the operating combustion facilities have equipment for gas treatment?
- Is there the obligation to realize studies of environmental impact for solid wastes management? What mitigating measures of adverse environmental impacts (visual, sonorous, air, surface, water contamination) are used in the systems of transfer, treatment, and final disposal of solid wastes?
- How can the sonorous impact of the transport of wastes be classified? Characterize the burning of wastes in public or residential sites (frequency, legality).
- When generating compost, what percentage is marketed raw, in other words, not stabilized compost (the final stage of the composting process has not taken place)?
- Is the quality and use of the compost stemming from solid wastes regulated and controlled?
- Are the formal and informal sites of municipal hazardous wastes disposal located on the maps?
- Do the design and the construction of landfills fulfill the technical principles and factors of climate, geohydrical, and geophysical (type of surface, groundwater, rainfall) variables?
- What is the origin of the material used to cover the waste at landfills?
- Are there waste composting facilities in the municipality? If so, are physical, chemical, and biological analysis conducted?
- Are there recycling programs or campaigns? If so, how is selective collection of domestic waste done? What incentives or restrictions does the population have to carry out waste separation?

6.6 Sociocultural Aspects

6.6.1 *Familial Aspects*

a) *Data and Information Gathering*

- How much does the user of urban sanitation pay on average? What type of services does the payment include?
- How much do families of different socioeconomic levels pay for urban sanitation?
- Are there specific programs that include aspects related to individual families, such as collection of special wastes?

b) *Analytical Questions/Issues*

- What level of importance does the entity assign the complaints related to the service that originate in the domestic sector versus those of the commercial or industrial sectors?

6.6.2 ***Community Participation***

a) *Data and Information Gathering*

- Has the entity established the mechanisms necessary to promote the participation of the community in its different programs or projects? Identify, for example: regulations that protect the consumer, specific institutions and levels in which the community can derive their demands to have access, continuity, and improvement of services.
- How is citizen participation verified in the establishment and implementation of sector public policies?
- Has the community organized to obtain solid wastes services? Does the entity have a specific division to promote projects with the participation of the public? Do other entities intervene in these projects?
- Have most important institutional priorities with respect to resources to help the community obtain adequate solid wastes services been identified?
- Has technical, financial, or institutional assistance been given to the community so that it can organize and so that it can participate in the process of decision and planning of the system of solid wastes management?
- What type and what level of participation have women had in solid wastes projects? What women groups were activated or were organized for this purpose?

- What is the degree of user satisfaction in relation to the coverage and quality of the services?
- Does the community organize in associations to resolve common problems, such as, the lack of sanitation services? Do the organizations respond to local cultural, religious, or other parameters?
- What type of organized community groups and entities such as religious congregations, schools, cooperatives, juvenile groups, women groups, and local committees have promoted the participation in the development of communal solid wastes services?

b) *Analytical Questions/Issues*

- Is community participation relevant in the execution of the corresponding duties of the responsible entity of the sector?
- Identify the needs of the beneficiaries and the members of the local community in relation to the services of solid wastes. What type of programs or projects have been realized to determine the level of service that is desired by the members of the community and the way in which they would like to receive the service?
- What type of activities do the entities develop that are helping the community to organize, to give leadership and managerial training, and to educate the public on the benefits of having adequate solid wastes services?
- From solid wastes collected from public roads it is probable that cities are soiled more rapidly. Are the entities responsible for urban sanitation aware of the above? Is it due to the lack of or weak community participation?

6.6.3 ***Social Communication***

a) *Data and Information Gathering*

- Does the entity have educational and sensibilization programs directed at the public and at the formal and informal workers of the sector? If so, who is responsible for the programs? Are they isolated events or do they constitute a part of a continuous and comprehensive project?
- What percentage of the budget of the entity is dedicated to programs of social communication?

b) *Analytical Questions/Issues*

- According to the entity, how effective are its programs of social communication? Are there systems to evaluate the results of such

programs? is the greater quantity of solid wastes in public roads an indication that the communication and education programs are not reaching the proposed results?

6.6.4 *Additional Sociocultural Aspects*

a) *Data and Information Gathering*

- Do the urban and periurban areas served by the entity receive the same quality of services? If not, why not?
- Are there training programs or isolated courses for the organizations that provide the service? Who is responsible for the organization of these activities?
- Who decides the participation of personnel in training courses? Does the decision correspond to a professional development plan?

b) *Analytical Questions/Issues*

- If a contributor does not pay for solid wastes services, what is the position and what actions are adopted by the entity?
- Do the employee training programs respond to administrative, operational, or investment needs in the entity? Does the entity have the technical and operational ability to develop these programs?
- Is the activity related to the training the responsibility of an organism that does not belong to the entity?

7. OUTLINE OF THE SECTOR ASSESSMENT REPORT

The following is a scheme to consolidate the sector assessment report.

Outline of the Sector Assessment Report

Executive Summary
Introduction

1. General characteristics of the country.
2. Management and performance characteristics.
3. Institutional and legal analysis.
4. Technical analysis.
5. Financing.
6. Environmental, health, and other social and community aspects.
7. Identified critical aspects.
8. Strategies, policies, and recommended actions.
9. Priority projects profiles.

Annexes

7.1 Executive Summary

The executive summary will provide a synthesis of the completed analysis, emphasizing the conclusions obtained from each component assessed, as well as, the policies and strategies recommended. Likewise, a brief description of the profiles of identified priority projects will be included. The executive summary should honor its strategic function of influencing the executive when decision making.

7.2 Introduction

The introduction will provide a general description of the document, its overall content, the participating institutions, the dates of the study and the conditions under which it was carried out, the reasons for the study, the agencies or entities that promoted it, and the beneficiaries or country counterparts, as well as any limitations or facilitating aspects found.

7.3 General Country Characteristics

The institutional and political organization and the situation and the trends of the principal national macroeconomic variables of the country should be described.

Changes and trends that may affect the sector, such as decentralization, privatization, policies to remedy extreme poverty, community participation, etc., will be identified.

A relation between the above described and aspects of the population will be established: total population, urban and periurban population, rates of growth, metropolitan areas and distribution of cities according to levels of its population, rate of urbanization.

The percentage of the population defined as living in extreme poverty, subsidy policies, and their relation to the educational level of the population will be established.

The overall health predicament will be described and its relation with populational and economic aspects previously defined will be established. Characteristics and trends in morbility and morbidity rates, incidence of illnesses related to deficient basic sanitation, and, as far as possible, a relation between these characteristics and trends in the solid wastes sector are identified.

Available data on the geography, climate, and rainfall will be described. Seasonal variations and natural disasters in recent years will be noted and their impact on the sector, the economy, health, and the environment will be analyzed.

The infrastructure of water supply, sewage, electricity, communications, transport, etc., and the administrative, financial, operational, and commercial situation of the country will be described to compare it to the situation of the solid wastes sector.

7.4 Performance and Management Characteristics

The basic performance characteristics of the sector, mentioning public sanitation coverage, collection, and final disposal of solid wastes in urban areas will be analyzed. The distribution by types of services for the whole country from the point of view of quantity and quality will also be mentioned. Populational concentrations will be noted for the purpose of relating them to the overall country situation. Sanitation problems attributable to inadequate sector performance, restrictions to the growth of tourism and the economy due to insufficiencies or deficiencies of urban waste sanitation services and, also, the contribution to the economy through recovery and recycling will be identified.

The general trends in sector finances, including the degree of self-financing of the sector through the revenue or resources generated within (user fees and other charges and revenues), sources of funds not generated by the sector, and scope of

the external credit for the financing of capital investments of the sector will be described.

The general intra- and intersector management trends, community participation, and health education will be identified.

Moreover, basic management characteristics of the sector, including personnel rotation, planning, commercial, and financial systems of service providing entities, the problems derived from the lack of maintenance of installations and equipment, quality of services, and decrease in value of sector assets will be analyzed. These management characteristics will be related to user satisfaction.

7.5 Institutional and Legal Assessment

The roles, responsibilities, and authority of the principal participating institutions of the sector (national or local) and of the regional, provincial, municipal, and local entities will be analyzed and evaluated. The legal framework that regulates the responsibilities of the different institutions participating in the sector will be evaluated if there is a superposition of current laws. It will be determined whether the current legislation is appropriate, competitive, and compatible with the political, economic, and social trends. The need for the realization of legal reforms or the creation of new norms, when there are legal vacuums will be evaluated, and, legal transformations that may affect the sector in terms of the modernizing trends of the State will be analyzed.

The operational strengths and weaknesses of these institutions, their abilities to fulfill or satisfy their functional responsibilities will be analyzed; the scope or lack of coordination between these sector institutions; the reach or lack of integration between the many institutions responsible and participating in the establishment of policies and goals for the provision of services of urban sanitation, of environmental protection and management, and of sector financing will be analyzed.

It will be analyzed and evaluated up to what point the management personnel of the principal sector institutions, above all municipalities or entities responsible for the services, has sufficient training and adequate competence and training to realize their duties with responsibility from the technical, managerial, administrative, and financial points of view. The evaluation and the analysis will be realized taking as a base a representative sample of operating entities of urban sanitation services, evaluating the general training of personnel, the training to realize the duties to be executed, as well as to adapt the current systems to attract, retain, train, and maintain appropriate and competent personnel.

The institutional policies and institutional procedures for the establishment of goals, long-term planning, and development of operative practices and procedures will be critically analyzed.

The goals, policies, and programs established during the last five years and for the next years destined to improve or optimize the efficiency and productivity of the sector will be described and evaluated. Up to what point goals of coverage, collection, and sanitary final disposal of solid wastes have been reached in urban and periurban areas will be analyzed, as well as, quality, accessibility, and continuity of services.

The success or failure of the policies formulated in terms of investments in infrastructure and transport, processing, recovery and disposal of urban solid wastes will be analyzed.

The administrative managerial organization of the sector, decentralization, privatization, contracting of private entities, tariff levels (financial self-sufficiency, subsidies), labor aspects and relations with the labor unions, special operative programs (preventive maintenance, training, promotion of recovery and recycling, etc.), promotion and support programs of waste steam separators will be evaluated.

The analysis of policies or trends of state modernization, privatization, and decentralization will be emphasized. The mechanisms established to fulfill above policies and the capacity of the sector to fulfill governmental decisions and, at the same time, attend to the needs of the community will be evaluated.

7.6 Technical Assessment

The basic technical characteristics, including detailed information of the coverage reach of the different populational groups (urban, marginal, and other types of differentiation, if appropriate or relevant, capital city versus other cities, etc.), types of coverage or services, frequency of services, and regional disparities, If present, will be analyzed and evaluated.

The improper disposal of solid wastes, the consequent environmental degradation, and the availability of areas to construct sanitary landfills will be analyzed and evaluated. The availability and the appropriate use of skills and technical capacities in the country will be analyzed. It will also be evaluated up to what point project design and the construction of new works satisfy standards from the engineering point of view, or up to what point it is a significant factor in design norms. Taking as a basis a representative sample of entities responsible for urban sanitation, the principal technical capacities and the operative strengths and weaknesses of

service companies will be identified. The training of human resources, the technical successes and failures, and the planning of technical and service operations will be identified and evaluated.

The characteristics of current technical and operational register systems, specially the inventories of the basic infrastructure of services and equipment, will be analyzed and evaluated. Equally, the availability and adaptation of technical equipment used, including instrumentation and the systems of repair and maintenance, will be evaluated.

7.7 Financing

The economic/financial size or magnitude of the sector in relation to other components of the budget of the public sector, the contribution of the debt of the sector to the total debt of the public sector, and the percentage GNP consigned to the sector will be analyzed. In addition, the financial implications of the goals in terms of populational coverage, quantity and quality of services of urban sanitation will be analyzed. In the case of municipalities, the economic/financial magnitude of the sanitation service, the municipal budget, and its contribution to municipal debt will be analyzed.

The analysis should estimate the level of investments required in a determined period of planning (10 to 15 years) for coverage and other sector goals. In this sense, it will be analyzed what that level of investment would represent for the growth of the budget of the public sector and, also, the resulting implications of the change in the debts of the public sector if the coverage goals and other sector objectives were to be reached.

Moreover, a description of the finance mechanisms of the sector should be included and its effectiveness and efficiency evaluated. This section will include a discussion on the availability, origin (governmental, national, regional, municipal, local, and private), and application of financial resources in the sector. On the other hand, it will be necessary to analyze the capacity of the institutions or communities to appropriate these resources and invest them adequately. The mechanisms of mobilizing resources, the current tariff policies and structures, and the payment capacity of users should be evaluated.

On the basis of the analysis of a sample of municipalities and entities responsible for urban sanitation, the adaptation of the systems of financial planning, budget, and accounting employed by the entities with respect to its capacity to project its future requirements in terms of development of long-term financial projections,

identification of investments necessary to extend the coverage of services and, improvement of quality will be evaluated.

Equally, it will be important in the field of urban sanitation to analyze the systems of management and financial administration and its adaptation to estimate the needs of expenditures and investment for the operation and maintenance of services, and to evaluate and control the costs.

7.8 Environmental, Health, and Community Participation Assessment

Environment Assessment
Environmental problems derived from the improper handling of urban solid wastes will be analyzed: surface and groundwater resources affected by solid wastes not collected or by collected wastes not properly disposed; increase in treatment costs to enable the use of degraded water resources; increase in maintenance costs of sewage services in the cities; decrease in recreative zones (beaches, parks, woods, etc); impact of the decrease in tourism due to the degradation of the urban environment. The possible quantity of wastes to recover and recycle, as well as, the perspectives of its use by the industry will also be analyzed.

Health Assessment
The possible effects of improper urban solid wastes handling is analyzed: the incidence of infectious diseases (typhoid, cholera, diarrheal disease, hepatitis, cysticercosis, teniasis, plague, dysentery, dengue fever, etc); the use of food stuffs derived from animals (principally swine) raised in open-air dumps; vector proliferation (flies, other insects, rodents, etc.) in areas contiguous to landfills or clandestine garbage dumps; incidence of accidents, cases of violence, drug addiction, alcoholism among waste stream separators and service personnel.

Social and Community Aspects
The lack of wastes services in periurban and marginal areas and the satisfaction of that need will be analyzed.

Moreover, the interactions between the operating entities, the service users, and the community will be analyzed. The level and reach of community participation in the administration and operation of these services will be identified. In addition, the role of women and their participation in the urban sanitation process will be described.

Health education and educational programs on public sanitation, at both the school and community levels, should be analyzed in terms of their effectiveness.

The social predicament of waste stream separators will be analyzed and possible alternatives to improve their condition will be identified. At the same time, the recovery and recycling processes of solid wastes, the voluntary community participation in this task, the main benefit the separators could obtain from the activity, the marketing process of recovered materials, etc., will be analyzed.

7.9 Identified Critical Aspects

Critical or relevant aspects that could negatively affect sector development are identified. The sector assessment should permit the identification of restrictions, limitations, or ties that interfere with the possibility of providing services efficiently and effectively that ensure overall user satisfaction.

It is recommended that the synthesis be organized into the following headings:

- Critical technical aspects.
- Critical institutional aspects.
  - Problems between institutions (intra- and inter-sector) or of institutional structure.
  - Internal problems of specific institutions.
- Critical legal problems.
- Critical financial aspects.
- Critical social aspects (health, environment, community).

7.10 Strategies, Policies, and Recommended Action

The strategies and recommendations should respond to the restrictions, limits and ties that can be found in the sector and that have been identified in the previous section. All the members of the team should participate in the formulation of recommendations; this discussion will benefit by each member of the team since each one of them will contribute perspectives according to their knowledge and experience within their field of responsibility.

The national coordinating agency of the assessment should also participate in the discussion of identification of policies and actions recommended, with the purpose of improving the efficiency and productivity of the sector. As already mentioned in

Chapter 2 of this document, the work team and the coordinating agency will have to agree on the recommendations that will be included in the report. The recommendations should assist the results that the participating agencies hope to obtain as a consequence of the sector assessment.

7.11 Profiles of Priority Projects

This section describes the profiles of projects that the team and the national coordinating agency consider priorities. The projects are not limited to projects on infrastructure: they may be projects of institutional development, sector restructuration, human resources development, projects to increase recovery and recycling of solid wastes, and others.

The profile will include a brief description of the project, specifying the development problem the project will broach, its goal(s), strategies, a summary description, the geographical area of the project, its beneficiary group, as well as, the actual situation and the situation expected at the end of project.

ANNEX A: Summary of Performance, Management, and General Indicators, Used in the Guidelines

Health:

(1) Morbility and mortality rates due to illnesses related, directly or indirectly, with solid wastes, such as, cholera, tetanus, dengue fever, teniasis, hepatitis, etc., by urban and periurban zones.

Economy:

(2) Number of workers employed in the solid wastes sector.

(3) Number of large, middle, and small companies involved in urban sanitation (fabrication of mechanical equipment, contracting firms of urban sanitation, recycling industries, consulting agencies, maintenance shops, and others).

(4) Weight percentage of solid wastes recovered over the total of solid wastes generated.

(5) Increase in the number of tourists relative to the previous year.

Environmental Conditions:

(6) Weight percentage of solid wastes collected over solid wastes generated.

(7) Weight percentage of solid wastes properly disposed over solid wastes collected.

Social Conditions:

(8) Percentage of periurban population provided with collection services over total periurban population.

(9) Annual increase or decrease in separators in final disposal (last five years).

(10) Number of community health education programs.

Solid Wastes Generation:

(11) Per capita production (kg/person/day): Total tonnage of solid wastes collected per day divided per thousands served.

Recovery:

(12) Tonnage of solid wastes recovered per day divided by tonnage of solid wastes generated per day multiplied by 100.

Final Disposal:

(13) Tonnage of wastes properly disposed divided by tonnage collected multiplied by 100.

Coverage and Access to Urban Sanitation Services:

(14) Urban collection: Urban population served divided by total urban population multiplied by 100.

(15) Periurban collection: Periurban population served divided by total periurban population multiplied by 100.

(16) Urban composition: Periurban population divided by total urban population multiplied by 100.

Quality and Efficiency of Service:

(17) Quality: Tonnage of wastes collected per day divided by tonnage of wastes generated per day, multiplied by 100.

(18) Efficiency of collection personnel: Ton/person/day. Tonnage of wastes collected per day, divided by the total number of workers (drivers and carriers).

(19) Efficiency in the use of collection equipment (%): Sum of tonnage collected by trucks per trip divided by sum of design capacity of the trucks per trip multiplied by 100.

Management, Operation, and Finance:

(20) Number of employees of sanitation service per thousand persons served.

(21) Rate or tariff of urban sanitation monthly average per home, in US$.

(22) Payment capacity: minimum monthly rate or tariff of urban sanitation versus income or monthly minimum salary (%).

(23) Budget of sanitation service versus total municipal budget(%).

(24) Capital investments versus total budget of urban sanitation service (%).

(25) Income generation through tariffs and rates versus total cost of the service (%).

(26) Efficiency of collection (%): Value collected divided by value billed multiplied by 100.

(27) Unit cost of sanitation service (US$/ton): Sum of all direct annual costs, indirect costs, social benefits, contract payments, financial costs, depreciation and others, divided by tonnage received at site of final disposal per year.

Other Recommended Indicators:

(28) Coverage of street sweeping (%): length of paved streets sweeped divided by the total length of paved streets multiplied by 100.

(29) Efficiency of collection equipment maintenance (%): Total equipment divided by number of equipment in operation + reserve equipment + equipment in maintenance multiplied by 100.

(30) Number of bills paid per month versus total number of bills issued per month multiplied by 100.

(31) Billing index (%): Number of homes that receive bills divided by number of homes served multiplied by 100.

The objective of a solid wastes assessment generated in a city or in a region, is to get to know its characteristics so that its dimension can be determined, and to direct the selection of technical alternatives for the activities related to collection, transfer, treatment, and disposal of solid wastes.

At the sector study level the assessments conducted to determine the characteristics of solid wastes are important, but the time and resources needed to fulfill them are difficult to come by.

Moreover, given the heterogenous and variable nature of the waste stream depending on the type of generator, economic level, days of the week, seasons of the year, etc., a representative sample should contemplate a large amount of samples at different times.

In case a special analysis were possible in terms of the wastes characteristics for the sector study, it is recommended to take the methodology of analysis found in: Sakurai Kunitoshi, "Analysis of Solid Wastes", Instruction Manual, CEPIS, PAHO/WHO, 1981.

If there is no time and/or resources available for an analysis in each case, an investigation on existing assessments and the gathering of information on both the results and methodology employed in the studies is suggested.

Available studies are not always realized using the same methodology (since there is no standard method in Latin America), the comparing of results in the long run or between cities is difficult and is subject to mistakes in interpretation.

Under these considerations and minimizing the lack of a standard methodology, it is recommended that the following points are considered:

1. *Sampling*

   - Search for information on how the population sample was determined, as well as, the number and size of the samples.

   - Search for information on the conditions of sampling, that is, what were the selected sources (type of generator and zone of the city), was the sample taken from the domestic waste receptacle or in the collecting truck, and was the climate rainy in the days of sampling.

2. *Weight of Solid Wastes*

What equipment was used to weigh the wastes (in addition to information on the sampling process).

3. *Density of Solid Wastes*

At what stage was the density of wastes measured: before collection (in the container), in the collection vehicle, after the transfer to the treatment site, or at the landfill?

4. *Physical Composition*

In addition to knowing the component composition of wastes another factor of interest is the change and trends in the composition. Wastes components can be classified under the following:

a) Organic matter (food wastes, yard wastes, etc).
b) Paper and cardboard (packaging, newspapers, notebooks, etc).
c) Wood
d) Textiles
e) Plastics (if possible separate into "rigid" (HDPE plastics) and "soft" (PET plastics).
f) Ferrous metals (iron and steel)
g) Non ferrous metals (if possible, identify the percentage of aluminum).
h) Glass (if possible, identify the percentage of colored and non-colored glass).
i) Debris, ashes, stone, bones.
j) Rubber and leather.
k) Fine aggregates (all that passes through 1" square mesh).

5. *Humidity*

Identify equipment and methods employed to measure the humidity of wastes.

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