

# **CHAPTER 26**

## **PREPARATION OF A MUNICIPAL SOLID WASTE MANAGEMENT PLAN**

### **26.1 THE PLANNING PROCESS: DEFINITION**

Planning is the conscious process for meeting future requirement and objectives with full consideration of any likely contingencies. The plan should guide intended actions specifying the time and priorities for accomplishing this intended action. The planning process is a systematic method of:

- (1) recognizing the problems that exist;
- (2) collecting and analysing data about these problems;
- (3) assessing the situation in light of the analysed data;
- (4) suggesting actions, the accomplishment of which will serve to change the situation or correct the problem;
- (5) evolve suitable strategy for implementation with respect to time frame; and
- (6) evaluation of the actions taken in light of their success or failure in achieving objectives and modification of the plan, if need be, to meet changing conditions.

A city plan for solid waste management, therefore, should be a written document outlining the activities that the civic body intends to undertake during the life-span of the plan, coupled with a set of directives for achieving those objectives in a given time frame.

### **26.2 DESIGN PERIOD**

Municipal Solid Waste Management involves activities associated with generation, storage, collection, transfer & transport, processing, recovery and disposal of solid waste, which is environmentally compatible adopting principles of economy, aesthetics, energy and conservation. It encompasses planning, organisation, administration, financial, legal and engineering aspects involving inter-disciplinary relationships.

While preparing a municipal solid waste management plan, the following design period (time-frame) involving all such activities as stated above would have to be decided depending upon the necessity of solid waste management plan:

- |       |                  |             |
|-------|------------------|-------------|
| (i)   | Short-term plan  | 2-5 years   |
| (ii)  | Medium-term plan | 5-15 years  |
| (iii) | Long-term plan   | 15-25 years |

The planning process involves close collaboration with other planning agencies at Local, State and National levels to ensure better coordination in allocation of priorities and resources. The collection, transportation, processing and disposal aspects, the facilities, augmentation and replacement of the equipment and sites, allocation of priorities and resources should invariably be decided keeping in view the design period of municipal solid waste management plan.

### **26.3 POPULATION FORECAST**

The design population will have to be estimated with due regard to all the factors governing the future growth and development of the project area in the industrial, commercial, educational, social and administrative spheres. Special factors causing sudden emigration or influx of population should also be foreseen to the extent possible.

A judgement based on these factors would help in selecting the most suitable method of deriving the probable trend of the population growth in the area or areas of the project from the mathematical methods, graphically interpreted where necessary as indicated at *Annexure 26.1*. Worked out examples for estimation of the future population by some of the methods are given in *Annexure 26.2*.

### **26.4 BASIC PLANNING MODEL**

The procedure for developing a city plan for Solid Waste Management(SWM) can be explained by structuring various steps normally considered for the formulation of a plan and can be shown in a simple **9-step model** (Figure 26.1). The planning process is not static, as it may appear on paper, but dynamic and continuous. Various steps in the planning process should also be considered as they may be occurring simultaneously although in preparing the written plan, some civic bodies may prefer to consider each phase in sequence. Each step could, in fact, serve as a separate chapter or section of a civic body plan. A planning model should provide feedback into the system from various planning

process events as these occur (Figure 26.1). The model itself has built-in controls to allow for correction of errors discovered through feedback relationships. Developments outside the planning process also cause corrections or revisions. Social, legal, and environmental changes can affect the plan and need to be considered.

#### **26.4.1 Initial Planning**

Awareness or recognition of a situation is the first step in the planning process and is the catalyst that results in the second action: data collection and analysis. The data and their analysis will provide the basic facts without which planning is impossible. Analysis of data will also point out problem areas and situations requiring solution in the plan. Environmental and Health Impact Assessment (EHIA) study should also be carried out simultaneously (Figure 26.1, steps 1 and 3).

#### **26.4.2 Problem Redefinition**

As indicated by analysis of the data, the next step is to redefine the problem and assess the situations and conditions that will likely to emerge in the future. This requires forecasting (Figure 26.1, step 4).

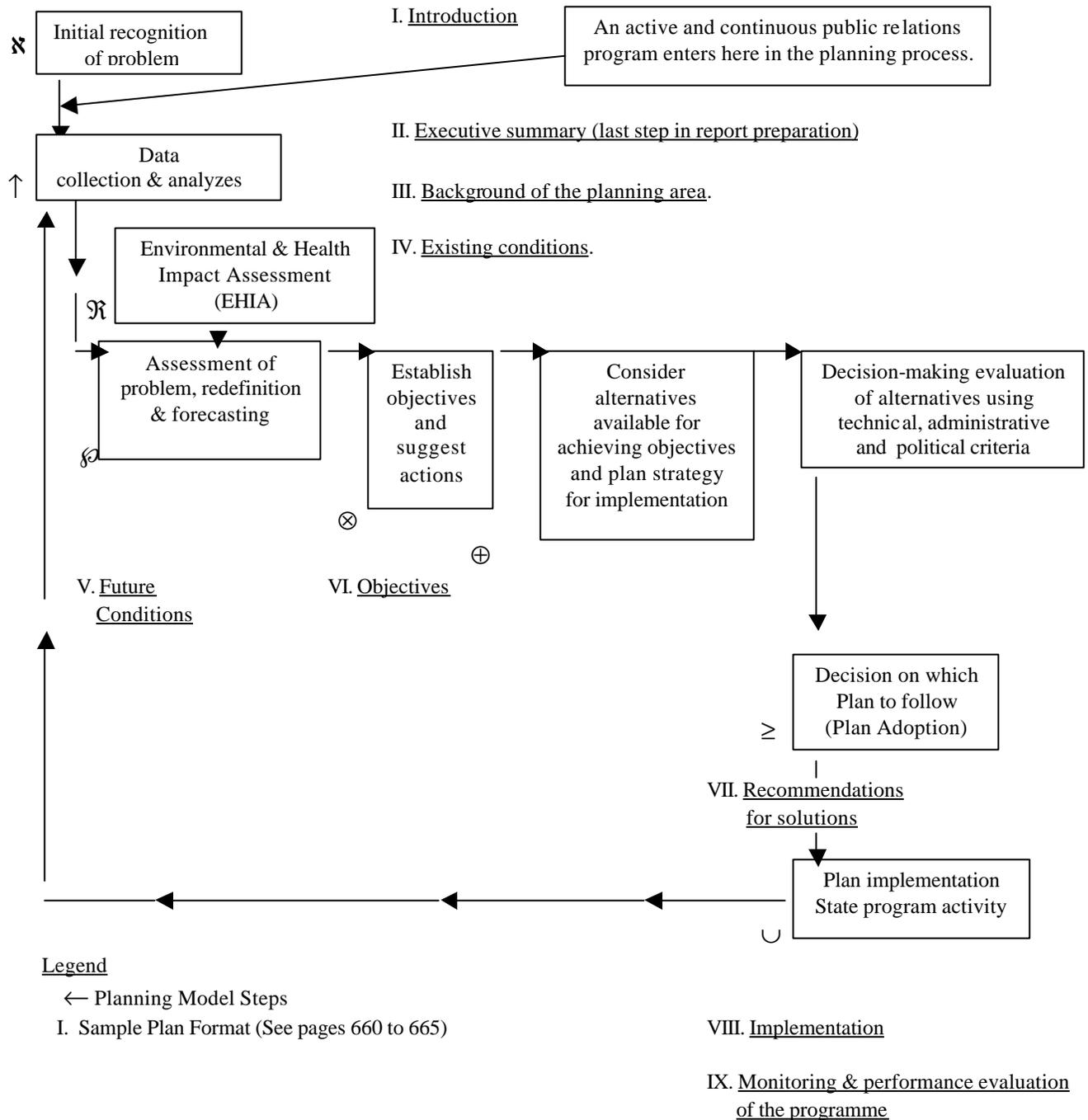
#### **26.4.3 Objectives and Consideration of Alternative Actions**

Having known enough about the problem, specific objectives may be set and strategy for achieving these objectives may be suggested (Figure 26.1, steps 4 and 5), stating clearly what needs to be changed or required to correct the problems. Where should modifications be made? Several alternatives might be available to achieve the set objectives.

#### **26.4.4 Emerging Alternatives and Decisions**

Which alternative or alternatives should the planner select to accomplish the objectives set forth to solve solid waste management problems of the city? The answer to this question will help establish the programme priorities. These decisions are subject to all sorts of influences that must be considered when developing the solid waste management plan (Figure 26.1, steps 6 and 7). Such influences include political, administrative, legal, social, and financial factors, and available technology. Basic among these are technical, administrative and political influences. Because of the technical nature of the decisions, a specialized inter-disciplinary staff, the one that has been developing the plan to this point, should continue to play a role in supplying information and expert evaluation of

## BASIC PLANNING MODEL



**FIGURE 26.1:** (1) In the planning process is awareness that a problem exists and needs to be solved. (2) To collect and analyze data relating to the problem. Such analysis makes possible to assess the situation and redefine of the problem and a forecasting of future situation. (3) The significance of environmental and health impact assessment is aimed at improving the information support for proper management of municipal solid waste. (4) Problem definition for both the present and future situation. (5) Helps to suggest objectives that if achieved would solve the problems. (6) Two or more alternatives might be available for solving the problem and achieving objectives. (7) The feasible alternative or alternatives are selected by considering technical, political, social and other factors. (8) Once this decision has been made a plan for solution of the problems can be adopted. (9) Actual action for carrying out the plan follows. Effectiveness of

the plan is measured during its implementation. This data is fed back into the continuing planning process to guide plan modifications, if needed.

alternative solutions and implementing the plan. Evaluation of existing plans is an important part of this step. Solid waste management plans should be compatible with existing plans, assuming such plans take solid waste needs into account. Therefore, decision-making for the city solid waste management plan will be based to some extent upon political and administrative exigencies, specialized technical analysis, and existing plans.

Those alternative solutions, which appear feasible on the basis of such consideration, should be submitted to the appointed and elected public representatives and the public itself for review and possible adoption, but not without adequate preparation for such a step. This means a program of education of public representatives and the public is a vital and integral part of the entire planning process. **The agency conducting the planning should have initiated an information and education program early in the plan formulation stages, and the public information plan should continue through implementation of the entire plan. Print and electronic media can play vital role in creating awareness and educating the public. News releases, films, articles, and speakers, for example, can help develop public awareness and aid in approval of solid waste management plans and programs.**

#### **26.4.5 Plan Establishment**

Once the decision-making stage has been completed, decisions should be translated into the recommendations and priorities that form the core of the plan (Figure 26.1, step 8). Although, at this point, a city plan for solid waste management has emerged, the planning process has not been completed. Planning will be continuous and proceed concurrently with implementation of previously planned proposals (Figure 26.1, step 9). Original plans will need re-evaluation and modification to accommodate changing situations. Earlier forecasts will require revision. This evaluation and modification will provide new information and along with the results of implementing the plan will be fed back into the planning process, as indicated in the model.

### **26.5 COORDINATION**

The essence of planning is coordination. Planning requires resolution of conflicting interests, allocation of available funds and other resources, inter-governmental and inter-departmental cooperation, and establishment of priorities. From the standpoint of the direction and overall needs of National Government, a solid waste management plan is one among several functional plans, such as those dealing with highways, natural resources, education, health, etc. City solid waste management plans, therefore, should relate to, and not conflict with, other plans of the city. It is essential that the city solid waste management planning be included in the overall plan of the jurisdiction that will ultimately implement it. In this way the solid waste

management agency will be able to compete effectively for funds, personnel, and other resources and facilities.

## **26.6 PLAN OUTLINE**

The basic planning model (Figure 26.1) can be translated into an outline for reporting the established plan. Such a format communicates the logic inherent in the planning procedure. Planning initiative and innovation are desirable, however, and each civic body is expected to formulate its own systematic outline and report, taking into account its particular needs as indicated in the following sample format for the preparation of the Municipal Solid Waste Management Plan.

# SAMPLE FORMAT FOR PREPARING MUNICIPAL SOLID WASTE MANAGEMENT PLAN

Corresponding steps in the model	Elements of the Report
1	<p style="text-align: center;"><b>Foreword or Preface (or both)</b></p> <p style="text-align: center;"><b>Table of Contents</b></p> <p><b>Section I    <u>Introduction</u></b> Purposes of the plan.</p> <p><b>Section II    <u>Executive Summary</u></b> (Note: This section should be written last and may come at the beginning of the report)</p>
2	<p><b>Section III    <u>Background of the Planning Area</u></b></p> <p style="padding-left: 40px;"><b>1.    Jurisdictions</b></p> <p style="padding-left: 80px;">a.    National</p> <p style="padding-left: 80px;">b.    State</p> <p style="padding-left: 80px;">c.    City/Town       (Civic Authorities)</p> <p style="padding-left: 80px;">d.    Location Map</p> <p style="padding-left: 80px;">e.    Population (size and densities)</p> <p style="padding-left: 80px;">f.    Housing (types and locations)</p> <p style="padding-left: 80px;">g.    Land uses (residential, commercial, industrial, agricultural, extractive, recreational, and other relevant land uses)</p> <p style="padding-left: 80px;">h.    Transportation corridors</p> <p style="padding-left: 40px;"><b>2.    Physical Conditions</b></p> <p style="padding-left: 80px;">a.    Environmental conditions</p> <p style="padding-left: 80px;">b.    Geology and soils</p> <p style="padding-left: 80px;">c.    Climatology</p> <p style="padding-left: 80px;">d.    Drainage basins</p>

**in the model**

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- e. Geographical Information System (GIS) (with particular reference of metro & mega cities)
- f. Financial status
  - i. Tax base (assessed valuations)
  - ii. Tax rates
  - iii. Public finance practices
  - iv. Economic base
  - v. Others
- g. Status of legislation

2 & 3

**Section IV Existing SWM Conditions**

1. Arrange data according to specific needs of the planning agency. As far as possible all the information related to municipal solid waste management have to be collected.
2. Describe and analyze all existing conditions affecting management of municipal wastes.
  - a. Storage, segregation and primary collection of waste
  - b. Quantities of wastes generated, with generation rates, collected and disposed of
  - c. Transportation and disposal practices
  - d. General management practices (e.g., utilization of manpower and equipment)
  - e. Public awareness and knowledge about solid waste problems and willingness to pay for better services

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**Corresponding steps  
in the model**

**Elements of the Report**

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- f. Expenditures for solid waste management

3. Environmental and Health Impact study be carried out considering the potential adverse effects of solid waste management activities in formulation of Municipal Solid Waste Management Plan.

4

**Section V Future Conditions and Problem Definition**

1. Relevancy for the future (from the analysis of the data of existing conditions accumulated in sections III and IV, determine which conditions will have a bearing on the future).
2. Future problems defined
  - a. Types
  - b. Locations
  - c. Extent
  - d. Persistence
  - e. Others
3. All existing conditions and problems bearing upon the future should be forecasted at this stage.

5, 6 & 7

**Section VI Objectives**

Objectives should be clearly stated and based upon need to solve problems defined earlier. Civic authority might specify any of the following objectives to solve its solid wastes problems:

1. Acceptable methods for storage, segregation of recyclable waste

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**Corresponding steps  
 in the model**

**Elements of the Report**

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2. Acceptable methods for primary collection of wastes
  3. Acceptable methods for bulk storage of waste at waste storage depots
  4. Acceptable methods of transportation of waste

5. Acceptable waste processing practices
6. Acceptable methods of waste disposal
7. Development of solid waste management organizational structure
8. Development of better trained solid waste management personnel (operating and management levels)
9. Better informed public regarding solid waste problems and service requirements
10. Provision of sufficient financial support for solid waste management
11. Others

8 & 9

**Section VII Recommendations for Solution (The Plan)**

1. This section should specify what the civic authority intends to accomplish in order to solve its solid waste management problems. It should include designation of the following:

- a. System improvement
- b. Timing and priorities of intended action (consider short and long-term objectives)

Corresponding steps in the model	Elements of the Report
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- c. Who should act (i.e. agency, department)
- d. Estimated costs
- e. Problems that will be solved
- f. Others

2. It is suggested that the following aspects be considered in intended action plan. Proposals for this action should be accompanied by procedures for accomplishment and a schedule of initiation of this action.

- a. Establishment of solid waste management operating departments and identifying its jurisdictions

- b. Recruitment, selection and hiring of solid waste management operating personnel
- c. Human resources development programme
- d. Technical assistance to operating units
- e. Provisions for inspection and enforcement
- f. Licensing of facilities
- g. Framing legislation, amendments to rules and regulations
- h. Development of budgeting procedures, financing, cost-effectiveness, special charge features and other operating management features
- i. Public information, education and communication programme/system
- j. Others

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**Corresponding steps  
in the model**

**Elements of the Report**

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**Section VIII Implementation (occurs outside the plan document but is guided by it)**

Appendices

This section of the report should include supporting materials and information used to develop the analyses, objectives, and plan. Content of this section might include:

- a. Charts
- b. Additional tables
- c. References
- d. Legislation and regulations
- e. Definition of terms
- f. Methodologies of research and analyses
- g. Others

**Section IX Monitoring and Performance  
Evaluation of the Programme**

This section of the report should include monitoring of various activities of municipal solid waste management and also evaluation of the performance of all the related activities with reference to the objectives/targets envisaged, once the programme is implemented.



The text of the Municipal Solid Waste Management Plan for a city should explain in detail all the above elements that contained in the plan report conforming to the above outline.

