

# Research on solid waste management system: To improve existing situation in Çorlu Town of Turkey

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## Abstract

Over the past decades, uncontrolled population growth and rapid urbanization and industrialization have resulted in environmental problems in Çorlu Town, Turkey. One of the most important problems is solid waste due to inadequate management practices. Nowadays, increasing public awareness of the environment compels local authorities to define and to adopt new solutions for waste management.

This paper presents a general overview of current solid waste management practices in Çorlu Town and principles of the recommended municipal solid waste (MSW) management system. In Çorlu, 170 tonnes of municipal solid waste are generated each day, or 1.150 kg per capita per day. Approximately one-half of the municipal solid waste generated is organic material and 30% of the MSW consists of recyclable materials. The recommended system deals with maximizing recycling and minimizing landfilling of municipal solid waste, and consists of separation at source, collection, sorting, recycling, composting and sanitary landfilling. This study also analyzed the recommended system with respect to feasibility and economics. To evaluate whether the suggested system is cost effective or not, the operating cost of the recommended system and market prices of recyclable materials were compared, and the results show that the recommended system will reduce required landfill volume up to 27% of compared to the present situation. The profit of the recommended system is estimated to be about 80 million US dollars.

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## 1. Introduction

Management of the increasing quantities of solid waste is a global environmental issue. The issue of waste is not only because of the increasing quantities but also largely because of an inadequate management system. In general, there is a lack of organization and planning in waste management due to insufficient information about regulations and due to financial restrictions in many developing countries, like in Turkey.

In Turkey, there are 3215 municipalities, and 16 of them are metropolitan municipalities. A total of 2984 municipalities have solid waste management services. In summer and winter seasons of the year 2002, 12.70 and 12.67 million tonnes of solid wastes were generated by the municipalities that have solid waste management services. In Turkey, the solid waste generation rates in summer and in winter are 1.32 and 1.34 kg per capita per day, respectively. In Turkey, there are 12 sanitary landfills, 4 composting plants and 3 incineration plants. About 45.9% of the wastes are disposed in landfills belonging to municipalities, 15.5% of wastes are disposed in landfills belonging to metropolitan municipalities, 27.8% of wastes are disposed in sanitary landfills, 2.9% of wastes are disposed in landfills belonging to another

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municipality, 1.5% of wastes are composted, 0.9% of wastes are burned, 0.8% of wastes are discharged into rivers, 2.0% of the wastes are buried and 2.85% of wastes are disposed using other methods. In most municipalities, medical wastes are not collected separately from other wastes. Separate collection of medical wastes is only practiced in 471 municipalities. The number of municipalities in compliance with the regulation due to a lack of information about the regulation is 864, and the number of municipalities due to financial restrictions is 1867. Besides these deficiencies, lack of technical capacity, lack of sufficiently trained personnel and uncontrolled population growth and urbanization have contributed to the solid waste management problems (SIS, 2004).

In Turkey, municipal, medical and industrial wastes are managed according to the *Solid Waste Control Regulation (1991)*, the *Medical Waste Control Regulation (1993)* and the *Hazardous Waste Control Regulation (1995)*. These regulations address the principles of collection, transportation, recycling, reuse, recovery and disposal of municipal waste and the largely hazardous, medical and industrial wastes. According to Turkish Regulations, management of solid wastes is the responsibility of municipalities. Regulations clearly define that wastes have to be disposed in sanitary landfills. Moreover, it is also clearly defined that hazardous wastes have to be disposed separately from non-hazardous wastes in sanitary landfills. Leachate and gas control practices are also well defined in these regulations. In sanitary landfills, a leachate collection system should be operated and percolation from the landfill should be prevented by a liner system.

Although, according to the regulations, the term “waste management”, refers to source minimization, collection, transformation, reuse or/and recycling and disposal, in Çorlu Town, like in many municipalities of Turkey, it only refers to collection and unsanitary landfilling of wastes. In Çorlu, uncontrolled disposal activities have threatened the quality of soil, air and water resources and the health of people relying on these resources. Air pollutants generated as a result of fires at the landfill site have adverse effects on human health. Since there is not a liner system, disposal of solid wastes in unsanitary landfills is often associated with soil and water pollution problems. In such a case, the water that percolates through wastes at landfill sites dissolving various materials is considered the most serious environmental impact of a landfill and causes surface and groundwater pollution. In Çorlu, although significant health problems relating to leachate contamination have not been reported, health hazards associated with groundwater utilization for public water supply should be taken into consideration (Tımmaz and Öngen, 2004).

In Çorlu Town, although the problem of solid waste appeared before the 1990s, the first study on solid wastes

in the literature was conducted in 1993. In that study it was reported that the amount of MSW generated was 51 tonnes per day and 17% of the waste was recyclable, 29.5% was organic waste and about 50% was ash (Baştürk and Demir, 1993). The conclusion of the study was that municipal solid wastes should be disposed in a sanitary landfill.

Although the previous study suggested that municipal solid wastes should be disposed in a sanitary landfill, it is clear that disposal of solid waste is not the only option for solid waste management. The quantity and characteristics of municipal solid wastes have changed with population growth, industrialization and urbanization since 1993. In the 1990s, while sanitary landfilling was suggested as the only option for waste management, nowadays, recycling, composting and sanitary landfilling of municipal solid wastes produced at Çorlu Town are suitable management practices because of the change in characteristics of the wastes.

This paper addresses current waste management practices and problems in Çorlu Town and evaluates various management methods for suitable solid waste management practices. In order to decide which management system is the most appropriate one, it is important to know the quality and the quantity of solid wastes. In order to have sufficient data on quality and quantity of wastes, lab-scale and field-scale analyses were conducted. In this study, different methods of solid waste management were also evaluated with respect to environmental and economic conditions and feasibility. The recommended system involves separation at source, collection, sorting, recycling, composting and sanitary landfilling.

## 2. Description of Çorlu Town

Çorlu, located in the Trakya Region of Northwest of Turkey, lies between the 41°07'30" eastern longitude and 27°41'00" northern latitude. Çorlu is the fourth largest town in Tekirdad Province. The area of Çorlu is about 991 km<sup>2</sup>, at an altitude is 193 m, and receives a yearly rainfall of 545 mm. Çorlu is the second richest area in groundwater resources in the Trakya Region and is in a region where industrial activities have rapidly increased. Good transportation routes (E-5 Highway, TEM Motorway, Çorlu Airport, Harbor of M. Eredlisi and existence of a railway that can be developed), existence of rich subterranean waters, and large enough areas for the construction of factories are the reasons for rapid development. Çorlu has received significant migration, especially from Bulgaria. In the report of the State Planning Organization entitled “Social-Economical Development of the Town”, Çorlu is in 16th place (Çorlu Chamber of Commerce and Industry, 1997).

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