

Site Selection of Municipal Solid Waste Incineration Plant using GIS and Multi-criteria Decision Analysis

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Abstract

The fast population growth and urbanization has increased the generation of municipal solid waste in Oman. Currently, Oman relies on landfills to handle growing amounts of waste, which has burdened the existing solid waste management infrastructure. This situation calls for establishing incineration plants that can considerably reduce the volume of waste, and can simultaneously produce electricity. However, one of the crucial step in the planning of incineration plant is the selection of appropriate site that can overcome environmental and economic implications and eliminates community dissatisfaction. Therefore, to select optimal site for incineration plant in Muscat and South Batinah governorates, where landfills receives highest waste amounts per day, this research identified eleven criteria that covers the environmental, economic and social concerns. These criteria were processed by combining Multi-criteria Decision Making (MCDM) method and Geographical Information System (GIS) software where the suitability of individual criteria were evaluated and then integrated using the weighted overlay analysis to generate a final suitability map for incineration site selection. The final suitability map indicated that only 2% of the land is suitable for setting up incineration plant in the study area, and the most suitable location with adequate area was found in Barka wilaya of South Batinah governorate.