

Landfill Site Selection Using Multi-Criteria Decision Analysis A Case Study for Gulshan-e-Iqbal Town, Karachi

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Abstract : The management of solid waste is a crucial and essential aspect of urban environmental management especially in a city with an ever increasing population such as Karachi. The total amount of municipal solid waste generated from Gulshan e Iqbal town on average is 444.48 tons per day and landfill sites are a widely accepted solution for final disposal of this waste. However, an improperly selected site can have immense environmental, economical and ecological impacts. To select an appropriate landfill site a number of factors should be kept into consideration to minimize the potential hazards of solid waste. The purpose of this research is to analyse the study area for the construction of an appropriate landfill site for disposal of municipal solid waste generated from Gulshan e-Iqbal Town by using geospatial techniques considering hydrological, geological, social and geomorphological factors. This was achieved using analytical hierarchy process and fuzzy analysis as a decision support tool with integration of geographic information sciences techniques. Eight most critical parameters, relevant to the study area, were selected. After generation of thematic layers for each parameter, overlay analysis was performed in ArcGIS 10.0 software. The results produced by both methods were then compared with each other and the final suitability map using AHP shows that 19% of the total area is Least Suitable, 6% is Suitable but avoided, 46% is Moderately Suitable, 26% is Suitable, 2% is Most Suitable and 1% is Restricted. In comparison the output map of fuzzy set theory is not in crisp logic rather it provides an output map with a range of 0-1, where 0 indicates least suitable and 1 indicates most suitable site. Considering the results it is deduced that the northern part of the city is appropriate for constructing the landfill site though a final decision for an optimal site could be made after field survey and considering economical and political factors.

Keywords : Analytical Hierarchy Process (AHP), fuzzy set theory, Geographic Information Sciences (GIS), Multi-Criteria Decision Analysis (MCDA)

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