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Optimal Locating of Landfill Urban Solid Waste By Using Analytic Hierarchy Process (Case Study: City of Boukan)

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Introduction

The process of locating and selecting proper land fill site is an important step in the management of urban waste. From environmental engineering point of view, the main purpose of locating waste is to be sure that new facilities and equipment are installed in such sites that potentially have priority and protect public health and environment in terms of natural traits and land use. Locating proper land fill depends on each area's legal and natural conditions. Meanwhile selecting a proper land fill site is matter of particular significance. The reason for this is that improper locating of land fill will result in a lot of economic, environmental and hygienic problems. Various models and methods are involved in selecting proper land fill site, each of which, in turn, is important. The model utilized in the current study is Analytical Hierarchy Process (AHP) which is based on scientific field. This model helps to improve the process of decision making and the structure of AHP formed enables all members of

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the team to observe all criteria and sub- criteria systematically and determine all priorities. Then based on those optimal locations select optimal landfill sites.

Material and Methods

This study is applied in terms of objectives and in terms of method it is descriptive-analytical which is conducted in the form of space analysis by means of geographical information systems, AHP model, and Super Decision software. The statistical population of the study is the areas of Boukan city where parameters, criteria and standards of proper location of landfill selection for hygienic dumping are identified, evaluated and decided through examining standards of environmental organization, ministry of the interior, international experience. In this study, in order to locate the proper landfills, the information related to 150000 maps, statistics of West Azerbaijan and Population and housing census of 2012 were used. The geographical information collected from different sources was process and analyzed through ARC GIS software. The implementation of the method is based on AHP model in which to assign weight for layers supper decision software is used to create clusters and sub clusters. Clusters were classified in terms of goals, choices and criteria and then AHP was formed.

Discussion and Conclusions

The overall results show that among the criteria used less dense grassland criterion with 0.199643 weight is of greatest significance. Then, the criteria of residential area, well, eroded and low quality lands were of the greatest significance. The rate of compatibility of all compared matrices was less than 0.1; therefore, the comparisons had significant stability. The results of study show that including all the factors and other effective things in tackling the problems will show the location of the landfill and three priorities to dump waste will be selected. Of all the studied areas, 149 hectares with suitable potential and minimum area was designated to bury waste

hygienically. The analytical output maps were obtained based on Analytical Hierarchy Process (AHP). After all analysis, totally 19 areas were obtained. 2 areas were unsuitable, 1 area was suitable and 16 areas were optimal. Suitable area (1) which had relative compatibility was removed due to being lower than 90 hectares. Optimal areas had the highest compatibility but 15 areas were removed because of being lower than 90 hectares. At the end, only 3 areas were left to locate and dump the waste.

Conclusions

In this study after determining the purpose of the study, the criteria, necessary layers, faults, city and residential areas, roads, surface water, geology, erosion, slope and etc, were done. Then the preparation, standardization and weight assigning of the layers were determined. By combining layers and implementing models to obtain proper hygienic dumping landfill in AHP, the result of the study in the shape of 3 areas were shown in the final map and the most suitable area were selected to dump the urban solid waste. Of all the identified areas, 3 areas were selected to dump the urban solid waste. The first chosen area with 149 hectares had desirable distance with urban and rural areas and had complete compatibility with chosen site. The advantage of this choice over others is the optimal distance to road access which reduces the expenses.