SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (1)

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LANDFILL SITE SELECTION THROUGH THE INTEGRATION OF MULTI-CRITERIA DECISION ANALYSIS WITH GIS: A CASE STUDY OF AKURE, ONDO STATE, NIGERIA.

Abstract

Nigeria is a fast developing country, with her population surpassing over 130 million people. Therefore, due to quest for improved standard of living and access to social amenities amongst its citizens, there has been continual rapid migration to urban centres, thereby resulting in large municipal waste generation in major cities. One of the major problems in urban areas is the shortage of land for waste disposal. Though there have been efforts by the government to reduce generated waste through recycling, landfill is still the most common method for waste disposal. Existing landfill sites are becoming insufficient, and new potential sites have to be explored. A major challenge to be resolved in any fast developing city is the selection of land which is suitable as a major waste disposal site and still maintains a proper balance with the ecosystem. In achieving this, a holistic approach which involves thorough consideration of environmental, social, and ecological factors affecting landfill were considered. The aim of the study is to propose suitable landfill sites in Akure, Ondo State, by the integration of Geographical Information System (GIS) – based Fuzzy Overlay to assimilate rasterized themes of datasets evolved from Multi-Criteria Decision Analysis (MCDA) – coupled - Analytical Hierarchy Process (AHP). Nine (9) input map layers – geology, slope, geomorphology, roads (major minor), rivers, lineaments, soil, land cover, and topsoil resistivity (ohm-m) were taken into consideration for analysis. Pair-wise comparison matrix of (AHP) was used to calculate weight value for each criterion. Sensitivity Analysis (SA) was conducted to check the robustness of the final outcome against slight changes in the input data. The study area was classified into three zones – unsuitable, moderately suitable and suitable. Through field checks, the result showed areas that were in accordance with the selected criteria.

Keywords: Landfill, GIS, MCDA, AHP, Sensitivity Analysis