Geoinformatics & Geostatistics: An Overview

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Integrating Analytical Hierarchy Process (Ahp) And Grey Relativity Analysis (Gra) in Suitable Landfill

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Abstract

Introduction The rapid increase in human increase of developing countries including Ghana within the past few decades and its resulting accelerated urbanization phenomenon demand development of environmentally sustainable and efficient waste management systems and policies. Landfill studies constitute one among the core primary methods of municipal solid waste disposal.

Keywords

Integrating Analytical Hierarchy Process, Grey Relativity Analysis.

Introduction

Waste management in Tarkwa [1] and its environs is especially by open space dumping which can results into contamination of both surface and underground water around these open dumps' areas. The siting of suitable landfill areas should meet both the economic and environmental requirements of a landfill site. Optimized siting decision making process have gained considerable importance to make sure minimum damage to the varied environmental subcomponents also on reduce the stigma related to the residents living within the study area, thereby enhancing the overall sustainability related to the life cycle of a landfill. Present study addresses the problems of siting a replacement suitable landfill area utilizing Multi-criteria Decision Analysis (MCDA) and Geographic data system (GIS) approach [2]. Several geo-environmental factors like land use and land cover, water bodies, slope, Digital Elevation Model (DEM), railroads, roads and geology of the study area obtained from the Survey and Mapping Division Department of the Lands Commission of Ghana were extracted and utilized in the acceptable siting process. Analytical Hierarchy Process (AHP) was integrated with Grey Relativity Analysis (GRA)in assigning weights to every criterion depending upon their relative importance and ratings in accordance with the siting process. Spatial analysis was administered in ArcGIS environment to point out areas suitable or unsuitable for siting a landfill site [3]. The results showed different classes of the study area with regards to their suitability in siting a landfill site with11% of the world highly suitable (in compliance with the set rules and regulations), 59% of the world less suitable (not in compliance with the set rules and regulations) and 30% not suitable. Atuabo, Anyinakrom, and Atoboareasare highly recommended for construction of engineering landfill sitesaccording to the results achieved during this study. Additionally, it's situated within the Birimian system with low potential of contaminating ground waters and possess good geophysical and geotechnical.

Properties as highlighted in previous studies of the world. Integrating GIS and MCDA techniques have proven to be an efficient tool for choosing suitable sites for landfill site selection and really useful in determining places of suitable and unsuitable for future planning and redevelopment of the study area. The proposed raster map is often employed by decision makers for future siting of suitable landfill areas within the study area. Moreover, it's recommended that, soil chemical test, detailed geomorphological studies, [4] and socioeconomic impact assessment of the chosen areas should be evaluated. additionally, the authorities should put measures in situ to mix education and enforcement of laws to prosecute offenders who are found throwing solid wastes at unsuitable areas to bring sanity to the environment. Solid waste management has become one among the main problems in Tarkwa and its environs thanks to very low waste collection and has giving rise to open dumping at inappropriate locations this is often because there's an existence of just one open dump site at Aboso to accommodate a large amount of waste generated daily in Tarkwa and its surrounding communities The composition of the solid waste within the study area mostly comprise of the household waste, yard trimmings, agricultural and industrial wastes Conversely, a greater proportion of the household waste is formed from organic and inorganic material substances [5].

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