Application of boolean logic and GIS for determining suitable locations for Temporary Disaster Waste Management Sites

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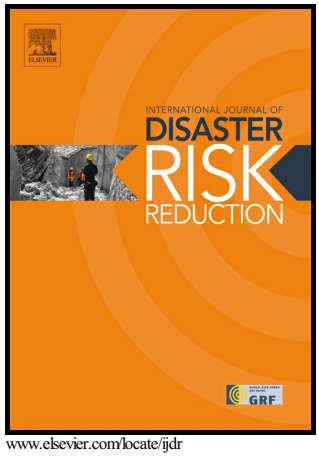

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Application of boolean logic and GIS for determining suitable locations for Temporary Disaster Waste Management Sites

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Abstract

Temporary Disaster Waste Management Sites (TDWMS) play a very important role in post disaster waste management. The selection of candidate TDWMS can be regarded as a land suitability analysis problem. This article reviews literature related to waste management treatment facilities to identify the common processes and methods. Previous studies indicate that identifying and determining weighting criteria as well as mapping and overlapping standardised layers are the four main steps in this process. In this study, ArcGIS was used to conduct the land suitability analysis and the Modelbuilder function was applied to build the analysis model. In addition, Boolean logic was used to standardise the criteria map layers. A total of 45 candidate sites were selected within the case study area. According to the analysis, the distance from ground water, drinking water resources, and public water supplies are the most sensitive criteria.

Keywords: Temporary Disaster Waste Management Sites, Land suitability analysis, GIS, Boolean logic.

1. Introduction

The frequency and severity of disasters have increased recently because of climate change and the sharp rise in population levels [1, 2]. Every year, hundreds of natural disasters occur throughout the world and cause billions of dollar's damage. During the last 10 years, there were 3,906 disasters in total, resulting in 0.75 million lives being lost and 1.68 billion people were affected (Data source: EM-DAT[1]). The damage cost from these events was estimated to be 1,284.9 US$ billion scaled to 2014 (Data source: EM-DAT). Improved disaster management can reduce losses from disasters and shorten recovery time [3].

Waste management is one of the most important activities in disaster management. A substantial amount of waste is typically generated from disasters [4-9]. The waste generated from affected communities can be as

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[1] EM-DAT: The CRED/OFDA International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels – Belgium.