Assessment of Remote Sensing Techniques and Geographic Information Systems (GIS) for Sustainable Development Case Study: Planning in North Sinai_EGYPT

A Thesis
Submitted to the Faculty of Engineering
Ain Shams University for the
Fulfillment of the Requirement of M. Sc. Degree
In Civil Engineering

Prepared by

Asmaa Hamdy Mostafa Ali
B.Sc. in Civil Engineering, June 2014
Faculty of Engineering, Helwan University

Supervisors

Prof. Dr Ibrahim Fathi Mohamed Shaker,
Professor of Surveying and Photogrammetry
Faculty of Engineering, Ain Shams University, Cairo, Egypt

Prof. Dr Hala Mohamed Adel Effat,
Division of Environmental Studies and Land Use
National Authority for Remote Sensing and Space Sciences, NARSS,
Cairo, Egypt

Prof. Dr Ayman Fouad Mohamed Ragab,
Professor of Surveying and Photogrammetry
Faculty of Engineering, Ain Shams University, Cairo, Egypt

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THESIS APPROVAL

EXAMINERS COMMITTEE **SIGNATURE**

Prof. Dr / Ahmed Khader Taha

Head Division of Civil Engineering, National Research Center,NRC, Cairo Egypt

Prof. Dr / Adel Ahmed Youssef Hagag

Professor of Surveying and Photogrammetry

Faculty of Engineering, Ain Shams University

Prof. Dr/ Ibrahim Fathi Mohamed Shaker

Professor of Surveying and Photogrammetry

Faculty of Engineering, Ain Shams University

Date: 8/8/ 2018

Statement

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of M. Sc. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

Date: …. / …. /2018

Signature: ……..

Name: Asmaa Hamdy Mostafa

Abstract

Due to rapid urbanization in Egypt, the need for job creation and redistribution of population became a top priority for the Egyptian government, Zoning and infrastructure maps for new communities are crucial in solving the problem.

The study area North Sinai is one of the most promising areas for urban developments in Egypt, it is characterized by the richness of mineral resources, lakes and beaches and the need for the development to achieve security and prosperity, in addition to its association with Suez Canal development projects.

The techniques of remote sensing and geographic information systems (GIS) have achieved a qualitative leap in planning studies, land development based on comprehensive integrated visions.

In this research, the data were collected in a geographical database using maps, satellite images and descriptive information and design of a cartographic model using geographic information systems. Scenario - based the suitability index maps for urban development were produced for environmental, economic and a hybrid scenarios.

Several factors and criteria were studied concerning the potential and constraints of land. A GIS-based cartographic model was designed following a Multi – Criteria Evaluation technique.

Economic, social and environmental factors were introduced in the model to identify and map land suitable zones for urban development

using Analytical Hierarchy Process (AHP). The suitability index map for urban development was produced by weighted overlay of the three sub-models themes.

Results of the spatial multi-criteria decision model identified the most suitable sites for urban development in North Sinai.

The model integrates various remote sensing data and geographic information layers in a multidisciplinary approach to produce suitability maps and scenarios (integrated economic and environmental). Such scenarios identify the most appropriate zones for urban development. The researcher concludes that using Multi – Criteria Evaluation technique to develop optimal zones for land use, supports decision makers and provides an integrated vision for development in North Sinai.

Keywords: Analytical Hierarchy Process (AHP), Geographic Information System (GIS), Multi Criteria Decision Analysis (MCDA), Sustainable development, North Sinai.

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