CHAPTER 1
INTRODUCTION

1.1 Introduction

As a technology, GIS has evolved through three board application domains. The first, and that which lends to its name, is the use of GIS as an information database for coordinating and accessing geographic data. The second, and more recent, is the use of GIS as analytical tools for specifying logical and mathematical relationships among map layers (i.e. modeling) to yield new derivative maps. Building upon two, we now see the third stage as a decision support system for deciding how to act upon the analyses produced.

In the context of evaluation site suitable for particular purposes, we have seen that map-overlay techniques can be combined with the methods of Multi-Criteria Evaluation (MCE) by assigning weights to individual layer of data and by representing factor within each layer by score that can contribute to the weighted overlay operation. Selecting the most suitable area for tourist accommodation involves uncertain information. Many of the physical processes are not fully understood. Data for numerical processing are seldom complete, may have low accuracy, or may not exist at all. Even in an ideal situation where data are perfectly assembled, they still change with time, either naturally or artificially. The selecting process, therefore, should be flexible enough to cope with changes in our understanding of the physical process, or when data have to be updated.

Decision Supporting Systems (DSS) is a well-established area of information systems (IS) application. While there are many definitions of a DSS, there is a general agreement that these systems focus on specific decisions and on a supporting role rather than replacing the user's decision-making processes. Definitions of DSS also emphasize the need to support semi-structured and unstructured decisions. In addition, there is a consensus in the definitions of DSS that interface, database, and model components are usually required to fully support decisions.

In the period, since DSS came to prominence there has been considerable growth in the importance of geographic information systems (GIS). This growth in GIS reflects the decreased cost of the required technology and the increasing availability of appropriate spatial data.

Many areas of decision-making depend upon the accumulated knowledge and experience of experts. It was very difficult to extract knowledge from expert to make the most suitable essential indicator as the criteria and weighting of parameter to find the suitable area using GIS. Expert from different field have different background knowledge. In the same situations, experts give the weight of environment factor differently. Hadipriono and others (1991) studied on three experts' opinion in satellite data interpretation for determining a landfill project. The expert, based on his/her judgments and experience, usually performs the observation of data subjectively. Expert assesses the color and tone of the image in order to determine the soil texture of a site for an engineered project. The result of this assessment is frequently expressed qualitatively using linguistic values. These qualitative expressions are inevitable because human tend to think approximately instead of exactly. However, presently there are no consistent standard or methods for interpreting these measures. Miss interpretation of such measures may result in an error in making decision for an engineered project. The concept of fuzzy sets was used in this study to obtain consistent measures of values provided by the experts and to reach a consensus if the expert provides different values.

Landscape evaluation and site selection are the interesting fields for fuzzy approaches, because it happens on the transition line between natural and social systems. Both are very complex. Therefore, the transformation of scientific results to political significant statements on environmental problems demands intelligent support. Particularly landscape planners need methods to gather natural facts of an area and assess them in consideration of its meaning to the society as a whole. Since each land unit is heterogeneous, a special methodology is necessary.

1.2 Objectives

The purpose of this study is to develop and apply fuzzy logic in environmental criteria scoring stage to increase accuracy, suitable to real world. The process will investigate GIS applications with the following objectives.

The first objective of this thesis was to develop and test suitable method to help GIS users to find suitable and practical criteria to locate a suitable area by GIS. The second objective was to develop and compare algorithms for finding the suitable area with recent practically method and fuzzy weighting criteria.

1.3 Significance of the Study

The study intended to explore how fuzzy logic can be applied to GIS criteria weighting. The complexity of the data and analysis requires use of GIS. Since the studies and the appropriate techniques for weighting are evolving, this study attempted to develop new techniques for environmental analysis for using GIS application in suitability site selection. The analytical process has been divided into two parts: the first part identified the key indicator of potential environmental affects when tourism accommodation development. The second part used the key indicator that invented in the first part to find the suitable area for developing tourists accommodating area.

Moreover, this study can be used as a case study to illustrate the application of fuzzy logic and GIS to find the new methods fir finding the suitable criteria be concerned. Usually decision-making involves different groups and individuals that have different agenda and rationales. How to resolve the conflicts among them and come to final decisions, and especially how to incorporate conflict resolution in GIS software design, is important for environmental decision-making. In this study, some physical environmental categories, e.g. soils erosion, surface water runoff, groundwater contaminated, etc. were investigated about their variation effects.

The study demonstrated applications of fuzzy set theory in MCE, conflict resolution, and decision selection processes. Decision-making deals with criteria, the evaluation of which involves substantial subjectivity and is, therefore, a fuzzy

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