Spatial Analysis of Land Cover and Land Use in Evaluating Land Degradation in Northwestern Al-Mafraq City, Jordan

A thesis submitted in partial fulfillment of the requirements of the degree of Masters of Art in Geography

By

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Abstract

Studying the human dimensions of environmental phenomena emphasizes mapping land-use/land-cover patterns over space and time. Land degradation is a devastating phenomenon that has accelerated from increasing population growth and changing lifestyles. This phenomenon becomes more critical and dangerous when it occurs in a transition zone between arid and semi-arid regions. Northwestern Al-Mafraq City in Jordan is located in this type of zone, the transition Badia zone. It represents a buffer between the arid and the semi-arid zones with annual rainfall ranges between 150-250 mm. This area is facing a drastic land cover shift that threatens the natural environment, accelerating land degradation. To evaluate and map this phenomenon, two pairs of near-anniversary Landsat imageries, on May 21, 2000 and May 26, 1987, are obtained to perform bi-temporal change detection. Unsupervised classification, due to the deficiency of clear information on land cover in the study area, is performed separately on each image. A post-classification comparison is applied to detect the change between the two images. Change map was created to assess which classes showed the most change. Results show irrigated agricultural land classes have grown in the study site, while rain-fed agricultural fields decreased. Also, urban areas are changing and expanding towards the west. Two reserve ranges in the study area are also deteriorating due to overgrazing. This study provides qualitative and quantitative evidence of land degradation in Northwestern Al Mafraq area that can help policy-makers combat land degradation and control its expansion.
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Chapter One:

Introduction

Land degradation is becoming one of the important global topics due to its impact on human life. It is a dynamic phenomenon to which community should pay attention because about one third of the earth’s land is either arid or semi-arid. These areas are extremely vulnerable to land degradation. Land degradation turns productive areas into unproductive ones and adds them to the already existing arid lands on Earth.

Jordan has more than 85% of its area as arid/semi-arid. Most of the arid areas are located in the eastern and southern parts of the country (MacDonald, 2000). The semi-arid areas are located in a narrow strip that occupies the middle area and extends north-south, while the productive regions of Jordan are located in the northwestern corner (Figure 2.2).

Jordan has a small productive area with comparison to the increasing number of its population. These productive areas must be protected from any misuse that might decrease their productivity.

Land degradation results mainly from human mismanagement in the semi-arid and transitional areas. Hence, the focus of this study will be on an area that is located in this narrow and critical zone. The study area, which is part of the Al-Mafraq Governorate, represents a buffer zone between arid and semi-arid areas where the rainfall