STUDY ON LAND FRAGMENTATION IN SOUTHERN PROVINCE, SRI LANKA; BASED ON LANDSCAPE ECOLOGY THEORY

J.N.D. JAYATHUNGA

189505 A

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Department of Town and Country Planning
Faculty of Architecture

University of Moratuwa
Sri Lanka

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DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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Dr. Amila Jayasinghe
Name of Supervisor:

UOM Verified Signature

Signature of the Supervisor: Date: 20/07/2023

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ABSTRACT

Study on Land Fragmentation in Southern Province, Sri Lanka; Based on Landscape Ecology Theory

As the landscape is where the majority of economic and human activities take place, it is an effective geographical scale for investigating the long-term consequences of anthropogenic activities on the environment. Land use changes in Sothern province, Sri Lanka, have increased significantly during the last three decades due to increasing of human needs. This research aims to better understand the interplay between land use/cover change and landscape fragmentation in Sothern Province by analyzing the dynamics of these processes. The study comprised three key stages as quantify and examine land use/cover change on landscape structure in terms of fragmentation; examine spatial transformation processes in landscape; detect land use land cover (LULC) changes in the landscape from 1988 to 2021. For this purpose, the United States Geological Survey (USGS) uses satellite images taken in 1988, 2005, 2016, and 2021 to categorize land use and land cover. Arc GIS 10.3 and QGIS 3.28 were used to process satellite images and maximum likelihood classification method was employed. FRAGSTAT 4.2 and MS Excel used to analyze class level metrics of fragmentation and spatial transformation. Agricultural land, home gardens, paddy fields, and vegetative cover have all risen in size and number since 1988, leading to a steady rise in patch density (PD). The low large patch index (LSI) and rapid reduction in PD both point to a severely fragmented landscape. Agricultural land, paddy land, vegetation, and dense vegetation cover are all negatively affected by the fragmentation. From 2005 to 2021, there was a greater amount of disaggregation in the LSI of agricultural land, home gardens, and vegetation cover. That was clear evidence of the landscape's increasing complexity. Further, perforation is the first step in the chain reaction that leads to vegetation fragmentation. Findings further show the agricultural areas have been indicated to have a positive link with the vegetation (correlation value 0.77139), while home gardens have been found to have a negative correlation (correlation value -0.81306). The results of this study provide a foundation for quantifying and analyzing land use change and land fragmentation, which in turn allows environmental planners to assess the current state of affairs, forecast possible future developments, and develop effective spatial planning strategies and land monitoring mechanisms in pursuit of sustainable development.

Keywords: Land fragmentation, Landscape metrics, LULC change, Sothern Province, Spatial transformation

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIO

CA	Class area
ED	Edge density
GIS	Geographic Information Systems
IJI	Interspersion and Juxtaposition Index
LPI	Large patch index
LSI	Landscape shape index
LULC	Land use land Cover
NP	Number of patches
PD	Patch Density
PLAND	Percentage of landscape
USGS	United States Geological Survey