MONITORING SPATIAL AND TEMPORAL URBANIZATION PATTERN IN THE JAFFNA PENINSULA USING REMOTE SENSING TECHNIQUES

S .RAVEENDRAN

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Department of Town & Country Planning

University of Moratuwa

Sri Lanka

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Abstract

This research examines the spatiotemporal pattern of urbanization in the Jaffna Peninsula using Remote Sensing and spatial analysis techniques. The spatial and temporal information on urbanization pattern in the Patna Peninsula is very essential for various planning and development related activities. There was no research undertaken on the pattern of urbanization in the Peninsula for the last few decades. This research has studied the urbanization pattern based on spatial data for the last 50 years compiled from satellite images and Aria! photograph. Medium resolution images of the study area were analyzed to map out the pattern through the techniques of Geographical Information System and Remote Sensing. Supervised classification techniques were used to analyze the images to recognize the spatial pattern of urbanization. The recognized pattern of land use changes were analyzed using the techniques of spatial metrics.

A dynamic spatial pattern of urbanization has been observed in the peripheral areas towns, Jaffna, Chavakachcheri, Nelliyadi, Point Pedro and Chunakam towns and ribbon development along the main transport routes in the Peninsula. Substantial changes in the urbanized area have been prevalent around the Jaffna town which is largest town in the Peninsula. Urbanization took place at a slow growth rate in the 1960s and 1970s but has grown rapidly since the 1980s. Again in 1990s, the growth rate had declined due to the intensive war centered in the Jaffna Peninsula. There has been significant urban growth in the Peninsula during the last decade as a result of the political changes in the country.

The urbanization process has developed fragmel'lted and heterogeneous land use combinations in the fringe areas of towns in the Peninsula. However, the regeneration process in the city core during the last few years has shown a decreasing trend in the peripheries.

The study also shows that the urbanization trend in the Jaffna Peninsula has been causing numerous consequences economically and environmentally. Further research works deploying high resolution satellite images to survey the urbanization pattern are required in the future.

DECLARATION

I declare that this is my own work and this 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.

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CERTIFICATION

The above candidate has carried out research for the Master dissertation under my supervision.

.....

Signature of the Supervisor

Prof. P. K. S. Mahanama

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List of Abbreviation

Abbreviation	Description
ArcView	GIS Software
ArcGIS	GIS Software
AVHRR	Advanced Very High Resolution Radiometer
dpi	Dot Per Inch
ED	Edge Density
ERDAS	Image Processing Software
FCC	False Color Composite
Fragstat	Fragmentation Analysis Software
Ft	Feet
GIS	Geographical Information System
GeoEye	One of the Very High Resolution Satellite
GPS	Global Positioning System
HRV	High resolution Visible (Imaging System)
IKONOS	One of the High Resolution Satellites of United State of America
ILWIS	Integrated Land and Water Information System (GIS and Image Processing Software)
IR	Infrared
IRS	Indian Remote Sensing Satellite
Jpeg	Joint Photographic Expert Group
KKS	Kankesanthurai
Landsat	Series of Earth Resources Satellites of United States of America
LB	Local Board
LiDAR	Laser Induced Detection and RangingLISS Line Spectral Scanner (Sensor Used in the Indian Remote Sensing Satellite 1C)
MAUP	Modifiable Area Unit Problem
MC	Municipal Council

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MIR	Middle Infrared
MODIS	Moderate-Resolution Imaging Spectroradiometer
µm	Micrometer
MSS	Multi Spectral Scanner
MX	Multi Spectral
NIR	Near Infrared
Pan	Panchromatic
PD	Patch Density
Pixel	Picture elements
ppi	Pixel Per Inch
PMC	Pune Municipal Council
PS	Pradeshiyasaba
Quickbird	One of the High Resolution Satellites of Japan
RADAR	Radio detection and Ranging
RMSE	Root Mean Square Error
RS	Remote sensing
SPOT	French Satellite
TM	Thematic Mapper
UC	Urban Council
USGS	United States Geological Survey
USA	United States of America
UTM	Universal Transverse Mercator
WiFS	Wide Field Sensor
WGS 1984	World Geodetic System 1984
XS	Multi Spectral

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