EXAMINING THE EFFECT OF URBAN SPRAWL IN THE CITY OF TEMA: A SPATIO-TEMPORAL ANALYSIS OF LAND USE COVER CHANGE IN THE TEMA ACQUISOTION AREA

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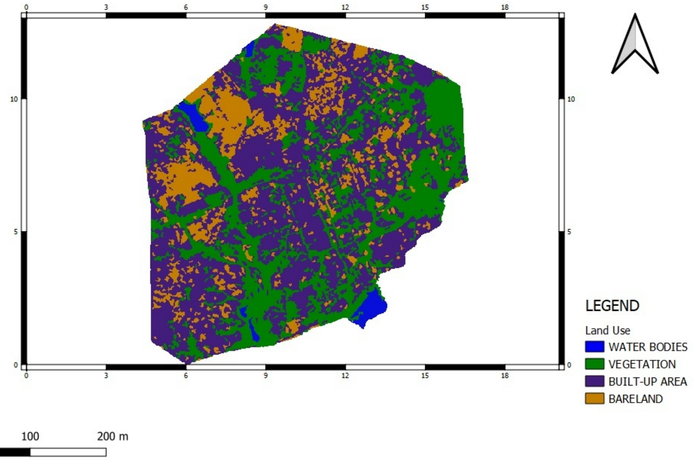
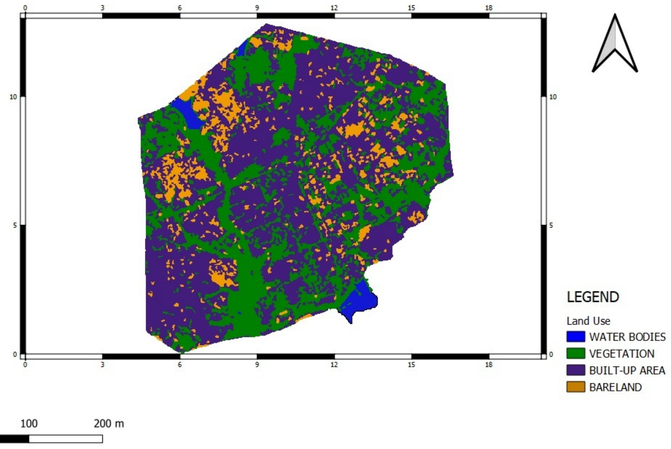
IMAGE OUTPUTS

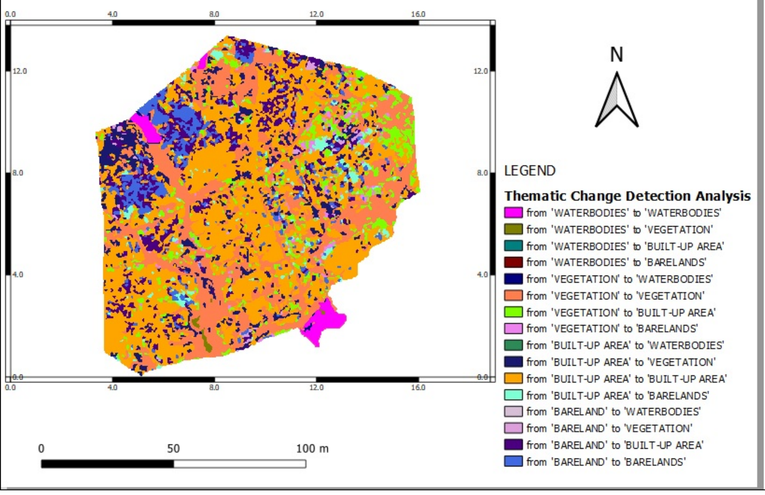
2011 MAP OF TEMA ACQUISITION AREA SHOWING LAND USE PATTERNS (SUPPERVISED CLASSIFICATION)



2021 MAP OF TEMA ACQUISITION AREA SHOWING LAND USE PATTERNS (SUPPERVISED CLASSIFICATION)



A MAP OF THE TEMA ACQUISITION AREA SHOWING THEMATIC CHANGE DETECTION ANALYSIS FROM 2011 to 2021



INTRODUCTION

Urban sprawl is the rapid city expansion marked by low density housing, single use zoning and a heavy reliance on private automobile for transportation. It poses environmental, social, and economic challenges driven by factors like population growth, increase car usage and land use policies, causing habitat loss, higher carbon emissions and, reduced open spaces. This expansion contributes to issues like traffic congestion , longer commutes ands social isolation due to limited community connectivity.

STUDY AREA

Tema is the city on the Bigt of Benin and the Atlantic coast of Ghana. It lies 25km to the East of Accra. It is the capital of the Tema Metropolitan District with a population of 177,924 as of 2021 census (Ghana Statistical Survey, 2021). With a 0.48% annual change from 2010 to 2021. The Greenwhich Meridian passes through it and it is known as the "Harbor City" dues to being Ghana's largest seaport. Tema comprises of 26 communities, each with basic access to amenities.

AIMS AND OBJECTIVES

OBJECTIVES OF THE STUDY

The objective of the study is to conduct a change detection analysis to identify and assess alterations in the land use cover within the city of Tema as a result of popultion influx.

AIMS OF THE STUDY

The aim is to quantify and characterize changes in land use patterns and its implications for urban planning and sustainable development.

METHODOLOGY

Data collected from USGS Earth Explorer was processed using ENVI software. Pre-processing included gap filling, radiometric calliberation, and atmospheric correction. Land use was classified based on vegetation, built-up areas, water bodies and bare lands through a supervised classification with selected training data.
Change detection involved pixel-by-pixel comparison of land cover maps from the year 2011 to 2021 to identify changes over time

CONCLUSION

Tema's urban sprawl research reveales divereseimplications, emphasizing positive and negative effect on environmental, social, and economic aspects. Recommendations stress sustainable development, including zoning, green infrastructure, and mitigation strategies like neighbourhood revitalization for balanced urban future.

The table below shows the statistics gotten from the change detection analysis performed and represented in pixel count.

Change Detection Statistics (Initial State: UNSU.dat, Final State: UNSU 2021.dat)

File Options Help

Pixel Count | Percentage | Area (Square Km) | Reference

Final State \ Initial State	WATERBODIES	VEGETATION	BUILT-UP AREA	BARELAND	Row Total	Class Total
Unclassified	0	0	0	0	0	0
WATERBODIES	74635	410	57	31	75133	75133
VEGETATION	464	41544	15859	1711	59578	59578
BUILT-UP AREA	112	14335	69945	16240	100632	100632
BARELANDS	27	2117	5365	10504	18013	18013
Class Total	75238	58406	91226	28486		
Class Changes	603	16862	21281	17982		
Image Difference	-105	1172	9406	-10473		

FINDINGS OF THE STUDY

1. Tema faces challenges from fragmented land use caused by urban sprawl , resulting in disorderly development patterns.
2. Urban sprawl poses a threat to green spaces, prioritizing construction over preservation
3. Increased traffic congestion is a consequence of dispersed development, longer commuting distances, and higher reliance on private vehicles.
4. Limited land availability and high prices of land in the TAA result in congested settlement, squatter communities, and unauthorised development.
5. The study revealed a concerning trend of sprouting development into critical connservation areas, remote sites, IDA's and open spaces. The trend sugests ptential gaps in land use planning and zoning regulations and enforcements

SIGNIFICANCE OF THE STUDY

1. Examining urban sprawl in Tema, provides crucial insights into land use dynamics.
2. Aids in decision-making for sustainable development, infrastructure planning, environmental conservation, and land management.
3. The study helps to identify concerns, evaluate impacts on ecosystems, and devise mitigation strategies for issues like green space loss and pollution.
4. The study contributes to the broader discourse on urbanization challenges, guiding future research and policy interventions.
5. Help attain resilient and livable cities by addressing complexities associated with urban sprawl and its consequences.

RECOMMENDATIONS OF THE STUDY

1. Conduct periodic review of land use plans of the TAA to include emerging trends to ensure sustainable land use planning.
2. The government should establish pull-factor amenities - like jobs, hospitals and market places - in other regions to help depopulate Greater Accra
3. Establish urban growth boundaries to avoid encroachment into wet and protected lands.
4. Evaluate urban development plans to ensure a balance of ecosystem and infrastructure.
5. Promote a shift in paradigm from single use to high use development within the TAA.
6. Revitalize old communities or neighbourhoods. Places like Comm 1,2,3,4,25, Ashaiman and Tema new town.