

Geospatial Analysis of Urban Growth Dynamics and Land Surface Temperature in Lagos, Nigeria

Introduction

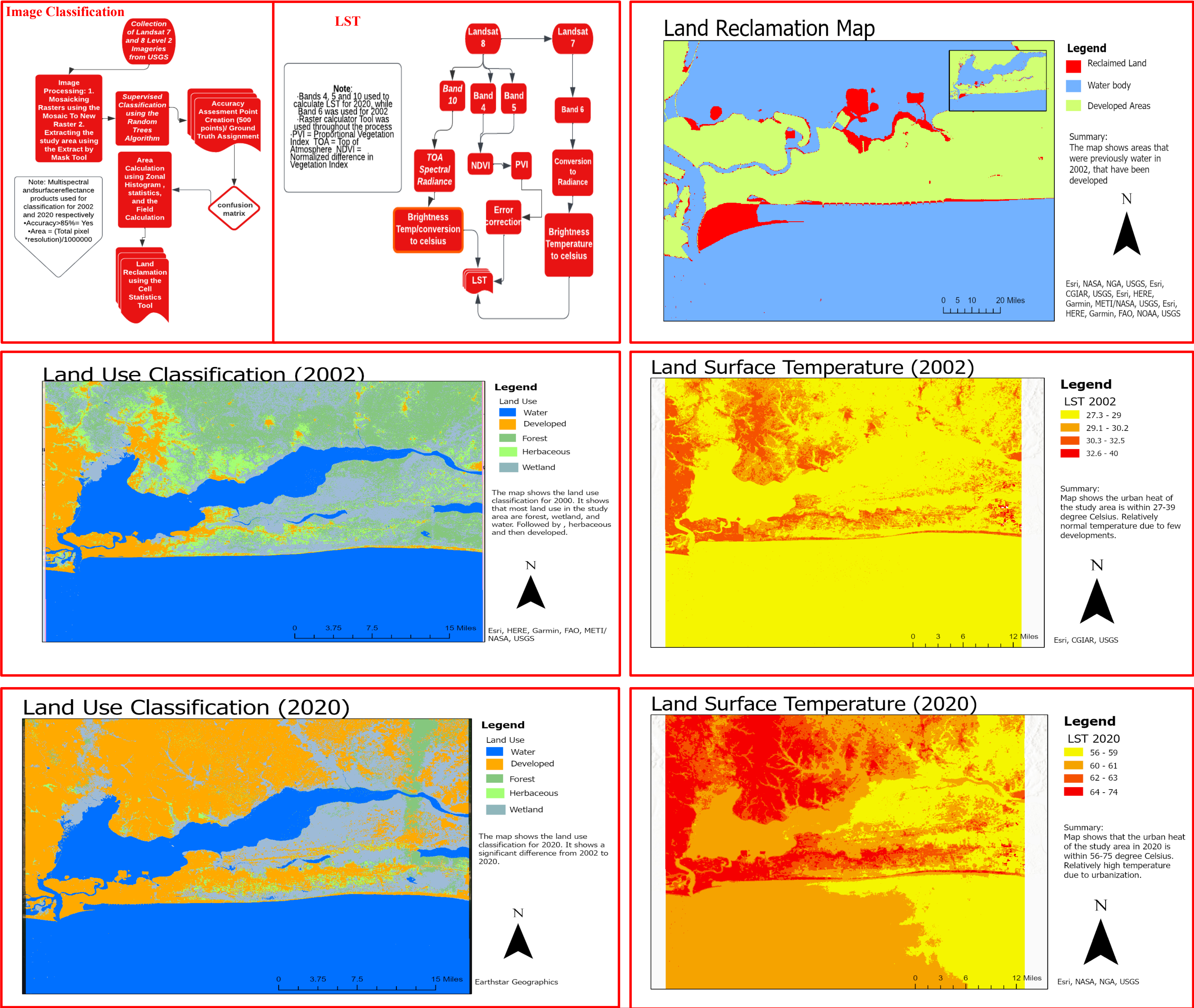
Rapid urbanization is currently one of the drivers of climate change. As human activities increases and the earth's surface is replaced with buildings, pavements, and tarmac roads, higher solar radiation is retained through greater thermal conductivity while the ability to release the heat at night stored during the day becomes low. The overall effect is a warmer urban environment. Rapid urbanization also results in Land reclamation practices in coastal cities to acquire land. Therefore, this study explores the effects of urbanization on land surface temperature (LST) in selected areas of Lagos State, Nigeria, and the extent of encroachment into water bodies. This study focuses on Lagos State, Nigeria, because it is one of the world's fastest-growing coastal cities and the country's commercial and economic capital.

Aim and Objectives

- This analysis provides information for policy response towards urban development, expansion, and management.
- ❖ To identify and quantify land uses in the selected areas of Lagos in 2002 and 2020.
 - ❖ To calculate the LST of 2002 and 2020 in the study area.
 - ❖ To spatially understand the extent of encroachment into the water body between 2002 and 2020.

Techniques

- ❑ Data set: Level 2 Landsat imageries
- ❑ Tools and Techniques: ArcGIS PRO ModelBuilder:
 - Extraction Toolset
 - Raster Mosaic
 - Classification & Pattern Recognition Toolset
 - Random Trees Classification
 - Accuracy Assessment
 - Zonal toolset
 - Local Toolset
 - Normalized Difference Indices
 - Raster Math



Results

The accuracy assessment was above 85%. In 2002, the predominant land uses were forest, wetland, and water (see Table 1 below). There were also a few developments on the west side of the map. This same year, the average surface temperature was 33^o C. In 2020, the land use revealed the study area to be highly developed (see Table 1 below), The average surface temperature was 64^o C. This reveals a positive correlation between urbanization and land surface temperature. Changes across the classes are shown in the Table below. The land reclamation map reveals that about 34 km² of water was reclaimed between 2002 and 2020.

Table 1: Summary of Findings

LAND USE (kmsq)	2002		LST		2020		LST		CHANGE		% LST	
	AREA	%	(°C)		AREA	%	(°C)		AREA	%	CHANGE	%
WATER	3051	61			3017	60			-34	-1		
DEVELOPED	314	6			1208	24			894	74		
FOREST	673	13	33		114	2	64		-559	-491	31	48
HERBACEOUS	298	6			65	1			-233	-358		
WETLAND	674	13			606	12			-68	-11		
TOTAL	5010	100			5010	100			0	0		

Conclusion

The study area is highly urbanizing, and reclamation is part of the process of increasing the amount of land available. There is evidence of changes in temperature which could lead to dramatic negative changes such as sea level rises, warmer ocean temperatures, increase in extreme weather events, and some diseases and pests. It is thus recommended that policies are put in place to control developments, and reclamation practices.

References

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