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Introduction

Introduction

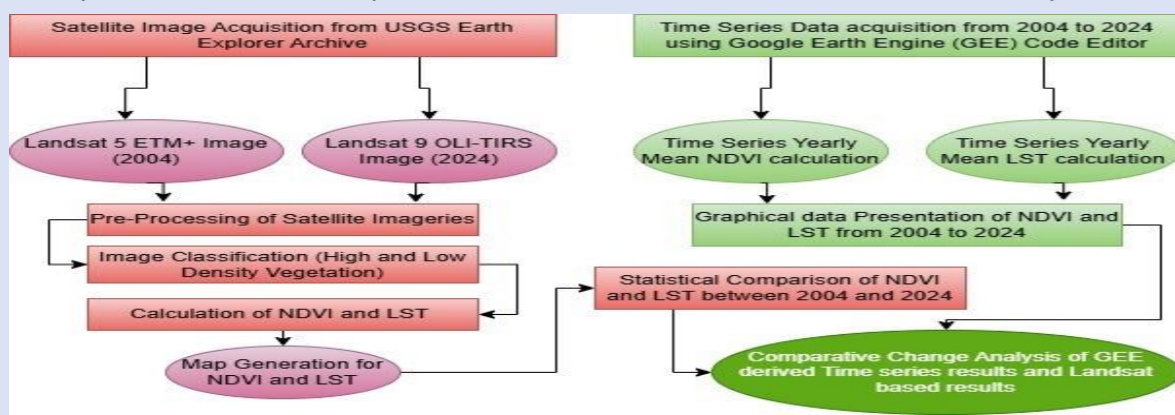
Urban green spaces (UGS) play a crucial role in reducing urban heat island (UHI) effects by lowering land surface temperatures (LST). Rapid urbanization in Dhaka has led to decreased UGS, impacting LST.

Objective: To analyze spatial and temporal changes in UGS and LST in Dhaka Metropolitan and understand the correlation between vegetation cover (NDVI) and LST.

Methodology

Methodology

Study Area: Dhaka Metropolitan Area, divided into various zones for analysis.



$$LST = \frac{BT}{1 + (\delta \times \frac{BT}{p}) \times \ln LSE}$$

Figure 1: Methodological Flowchart

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

Correlation Analysis: The relationship between LST and NDVI was measured to assess the cooling effects of green spaces.

Discussion

Discussion

Study Area: Dhaka Metropolitan Area, divided into various zones for analysis. This study reveals a strong link between the reduction of green spaces in Dhaka and rising land surface temperatures (LST), highlighting the urban heat island effect due to rapid urbanization. As green areas have diminished from 2004 to 2024, LST has increased, especially in densely populated zones, demonstrating the cooling role of vegetation. The negative correlation between NDVI and LST emphasizes the need for green spaces to regulate urban temperatures.

To address this, sustainable planning that integrates green infrastructure—such as parks, green roofs, and preserved green belts—is essential. These measures can mitigate heat, improve air quality, and enhance urban resilience, supporting a healthier environment for Dhaka's future. This study underscores the urgency of adopting nature-based solutions in urban policy.

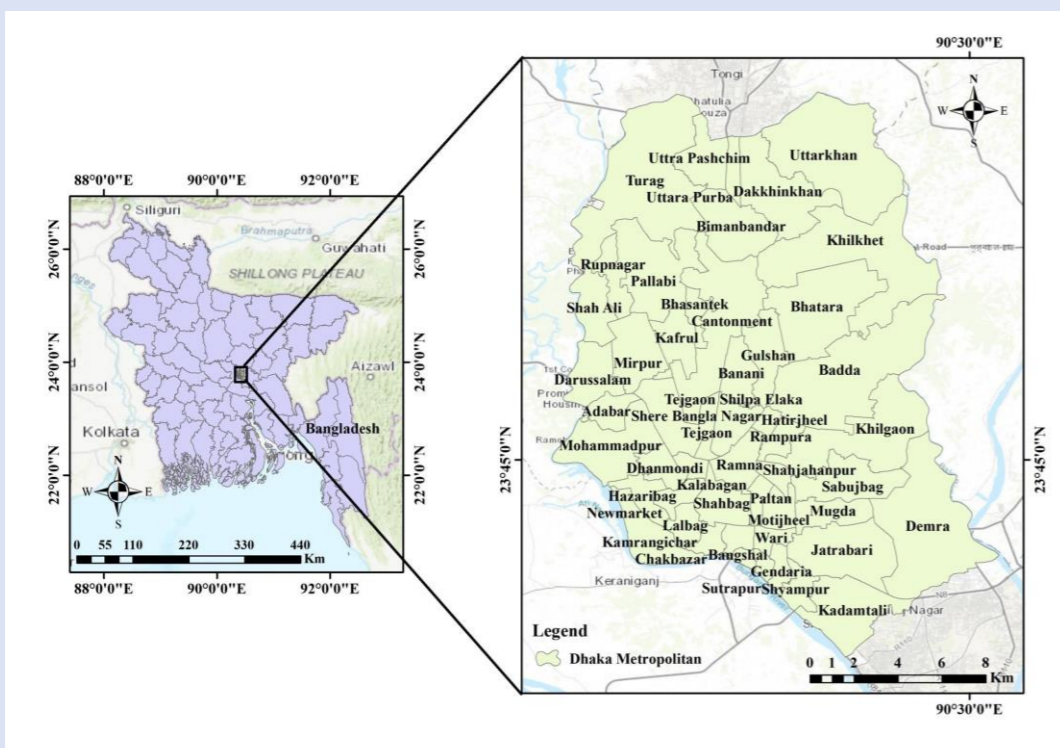


Figure 2: Location Map of the Study Area

Discussion

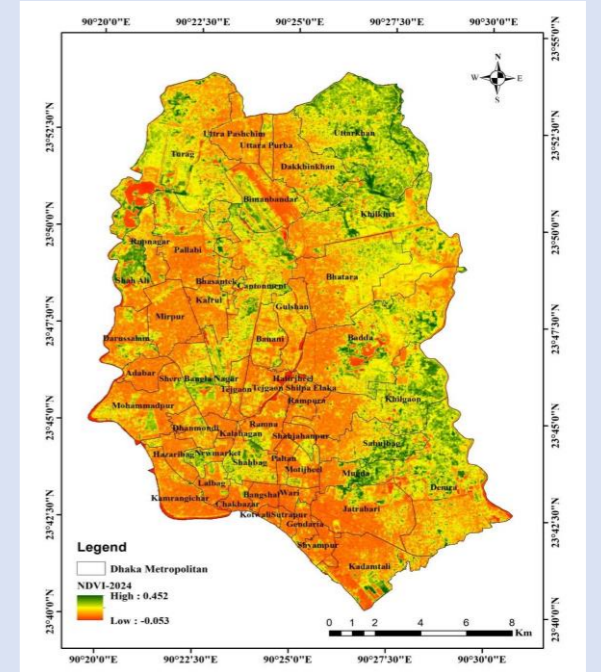
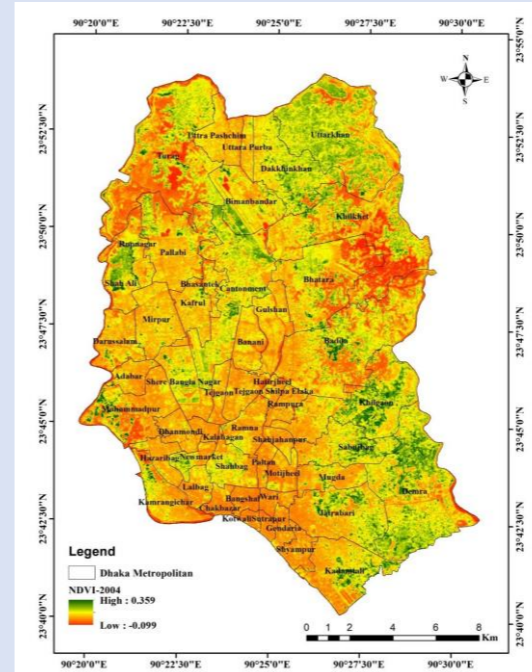


Figure 3: NDVI Map of the Study Area 2004 & 2024

The study reveals that declining green spaces in Dhaka, reflected by lower NDVI (Normalized Difference Vegetation Index) values, are linked to rising land surface temperatures (LST). NDVI serves as a valuable indicator of vegetation health, with higher NDVI values correlating to cooler temperatures. This highlights the importance of green spaces in regulating urban climate. To mitigate further LST increases, urban planning should prioritize preserving and enhancing green spaces, utilizing NDVI data to guide sustainable development and improve Dhaka's resilience against heat.

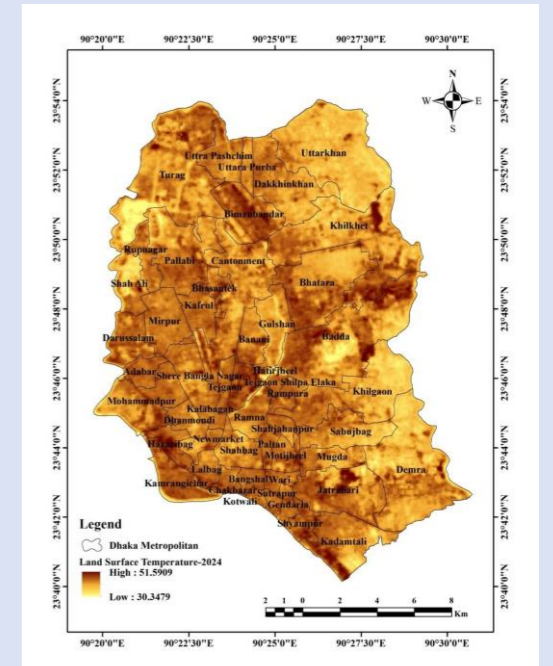
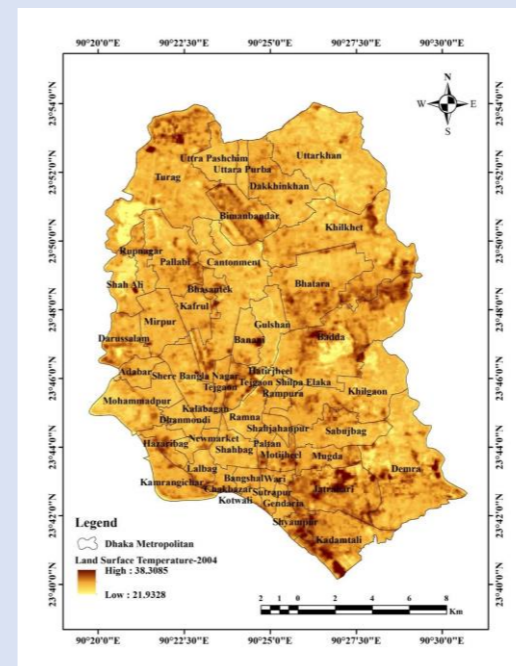


Figure 4: LST Map of the Study Area 2004 & 2024

This study highlights how the reduction of green spaces in Dhaka has led to increased land surface temperature (LST), intensifying the urban heat island effect. A strong negative correlation between vegetation (NDVI) and LST shows that green spaces are essential for natural cooling. To counter rising LST, sustainable urban planning should focus on preserving green spaces and incorporating green infrastructure, such as parks and rooftop gardens, to support a cooler, more resilient urban environment.

Result

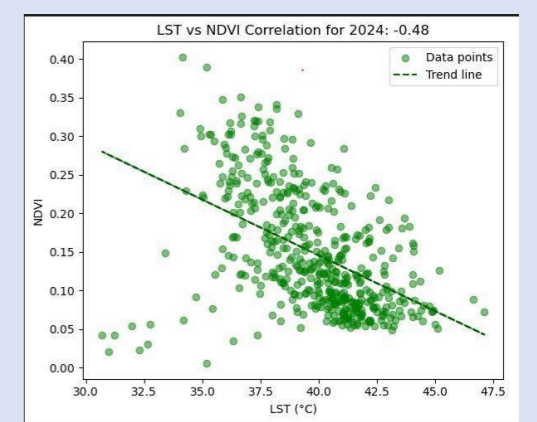
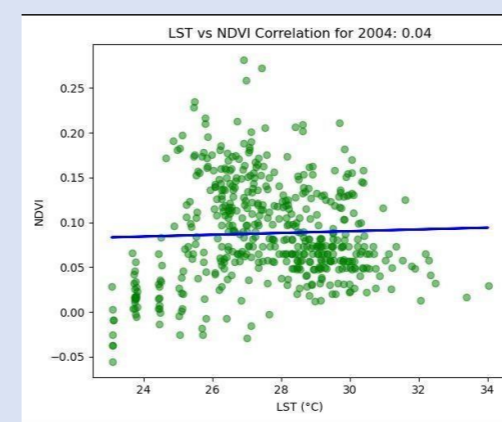


Figure 5: The Correlation Between Land Surface Temperature (LST) and Normalized Difference Vegetation Index (NDVI)

The research indicates that the reduction of green spaces in Dhaka, evidenced by diminished NDVI (Normalized Difference Vegetation Index) values, correlates with increasing land surface temperatures (LST). NDVI functions as a significant metric for assessing vegetative health, with elevated NDVI values associated with lower temperatures. This underscores the significance of green spaces in moderating urban temperature. To avert further expands in land surface temperature, the planning process must put emphasis on preserving and improving the quality of green spaces, employing NDVI data to inform sustainable development and strengthen Dhaka's resilience to heat.

References

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