

Monitoring Agricultural Vegetation Health Under Climate Stress Using NDVI and Land Surface Temperature (LST) Indices in the Sylhet Region

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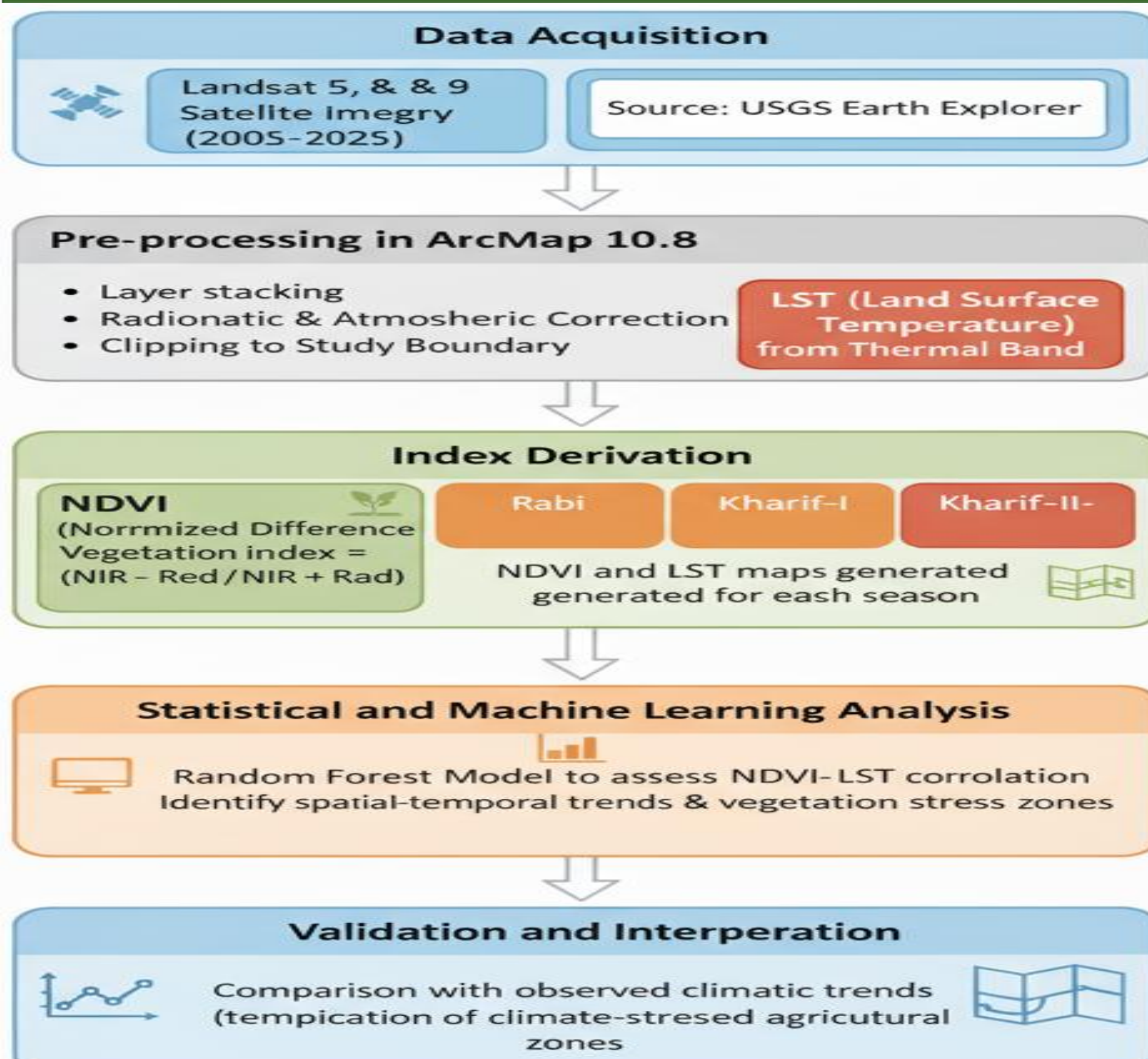
INTRODUCTION

Agriculture in the Sylhet region of Bangladesh is under growing stress from rising temperatures and changing rainfall. These shifts affect how healthy crops and vegetation remain throughout the year. Using satellite data from the past two decades, this study examines how vegetation health responds to climate stress. NDVI and LST values from Landsat images were analyzed for the main cropping seasons Rabi, Kharif-I, and Kharif-II to track changes in vegetation and surface temperature. A Random Forest model was used to explore their relationship between NDVI and LST

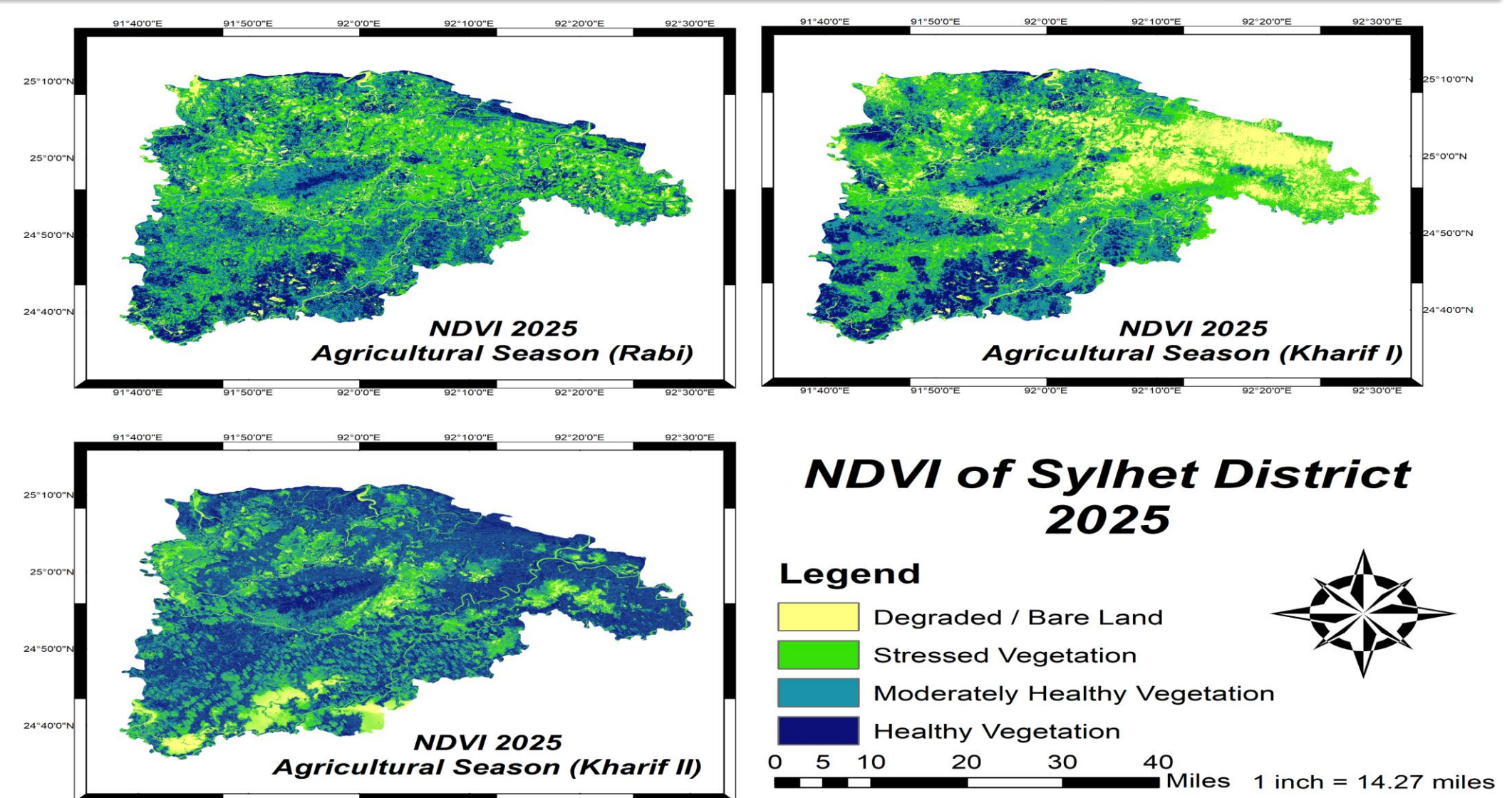
Area of Interest

The study focuses on Sylhet District, located in the northeastern part of Bangladesh. The area is characterized by a mix of hills, floodplains, and low-lying haor wetlands that support diverse agricultural activities. Sylhet has a humid subtropical climate with heavy monsoon rainfall and distinct seasonal changes influencing crop cycles. Rice, tea, and vegetables are the major crops grown here. However, the district frequently faces floods, rising temperatures, and periodic droughts, which threaten its agricultural stability. These environmental conditions make Sylhet District an important area for studying how vegetation health responds to climate stress.

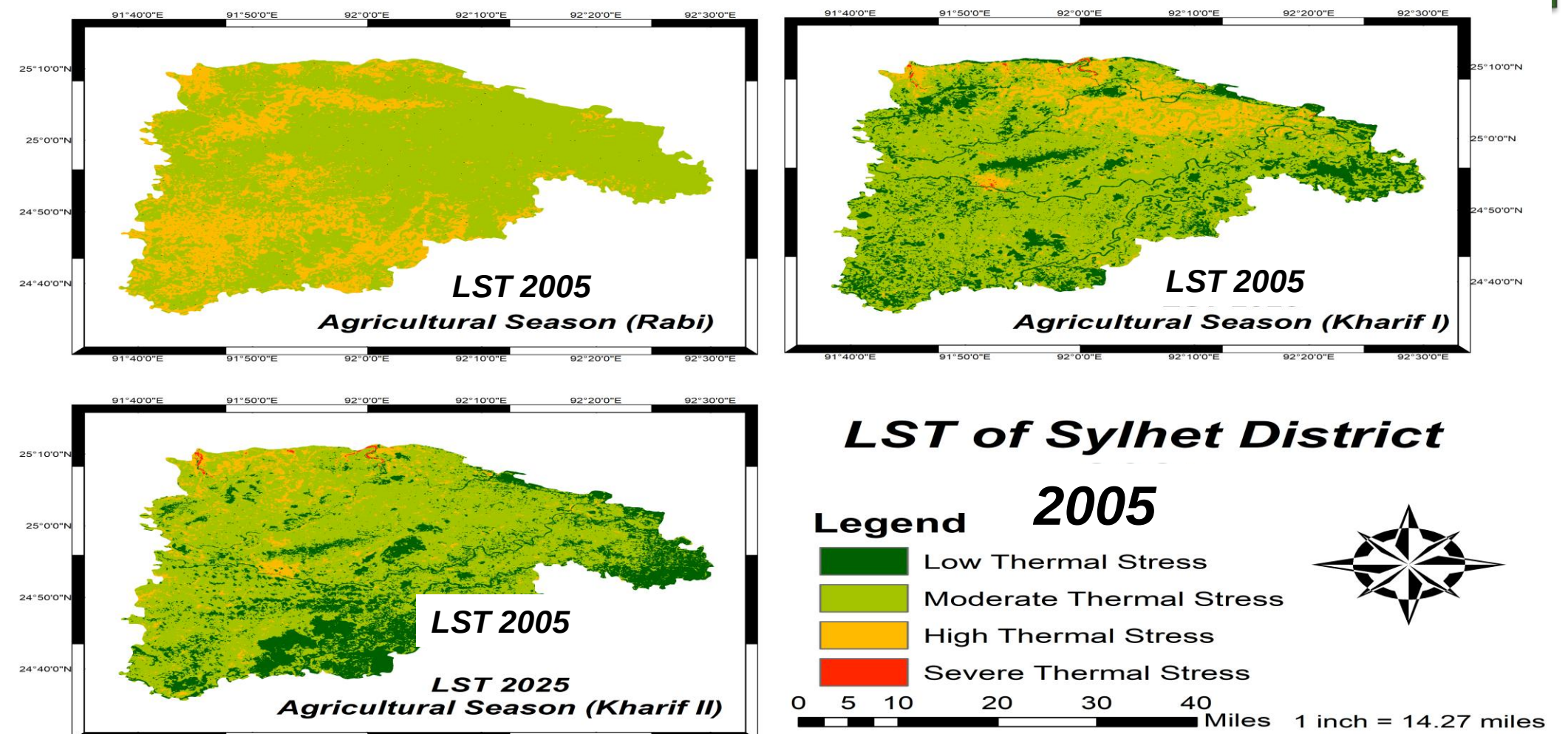
Methodological Framework of the Study



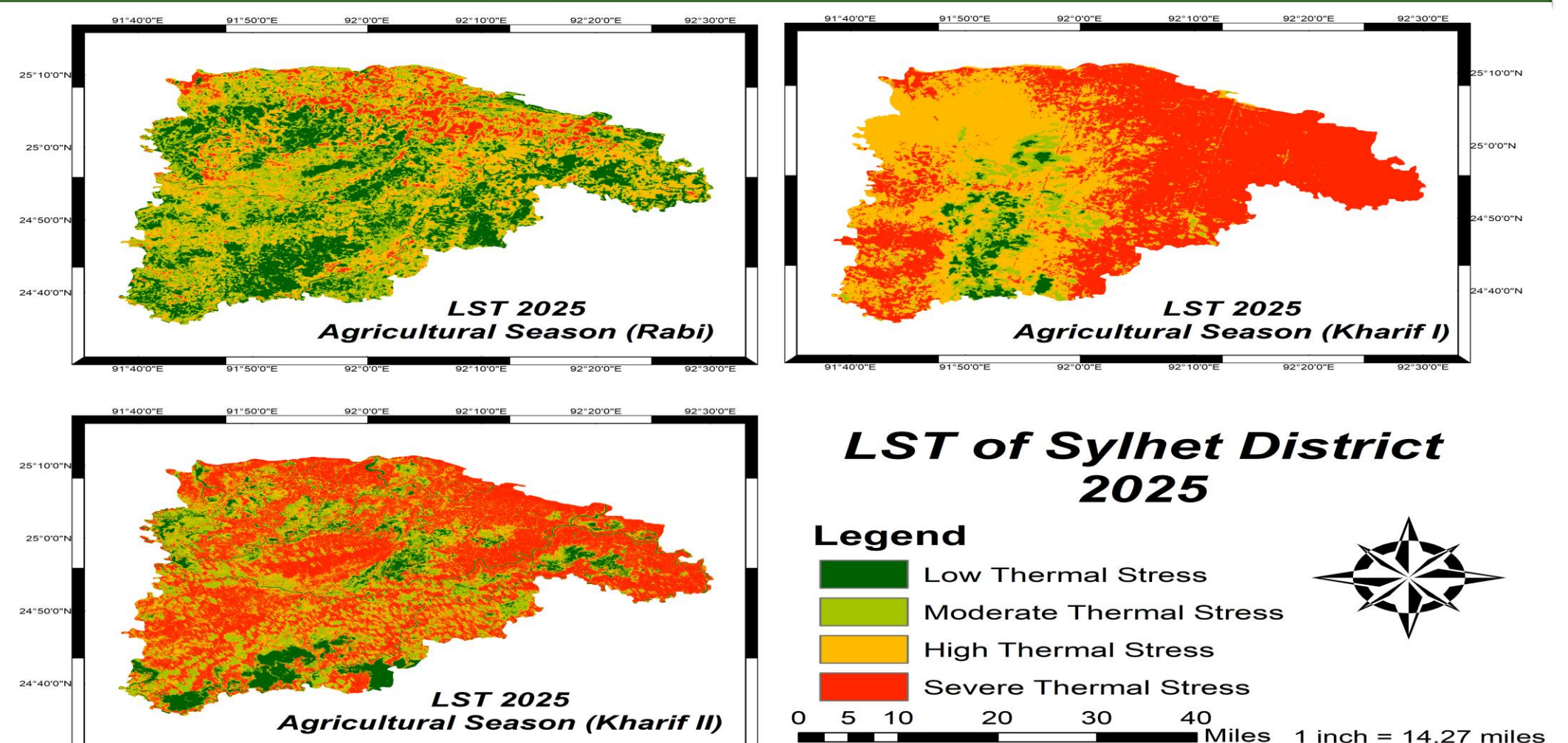
NDVI Patterns Across Agricultural Seasons



LST Patterns Across Agricultural Seasons(2005)



LST Patterns Across Agricultural Seasons



CONCLUSION

The analysis reveals significant thermal stress across the Sylhet District, particularly during the dry Rabi season. Rising Land Surface Temperature (LST) has been linked to a noticeable decline in vegetation health, as indicated by lower NDVI values. The Random Forest model shows a strong negative correlation between NDVI and LST, confirming that areas with higher surface temperatures generally exhibit weaker vegetation vigor..

REFERENCES

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- Rahimi, E.; Dong, P.; Jung, C. Global NDVI-LST Correlation: Temporal and Spatial Patterns from 2000 to 2024. *Environments* **2025**, *12*, 67, doi:10.3390/environments12020067.

