



Pimpri Chinchwad Education Trust (PCET)

Pimpri Chinchwad College of Engineering

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Department of Civil Engineering

Urban Heat Island Monitoring in Pune Using RS & GIS

**Subject: Remote Sensing & GIS
Formative Assessment 2 2024-2025**

Presented By

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Guided By

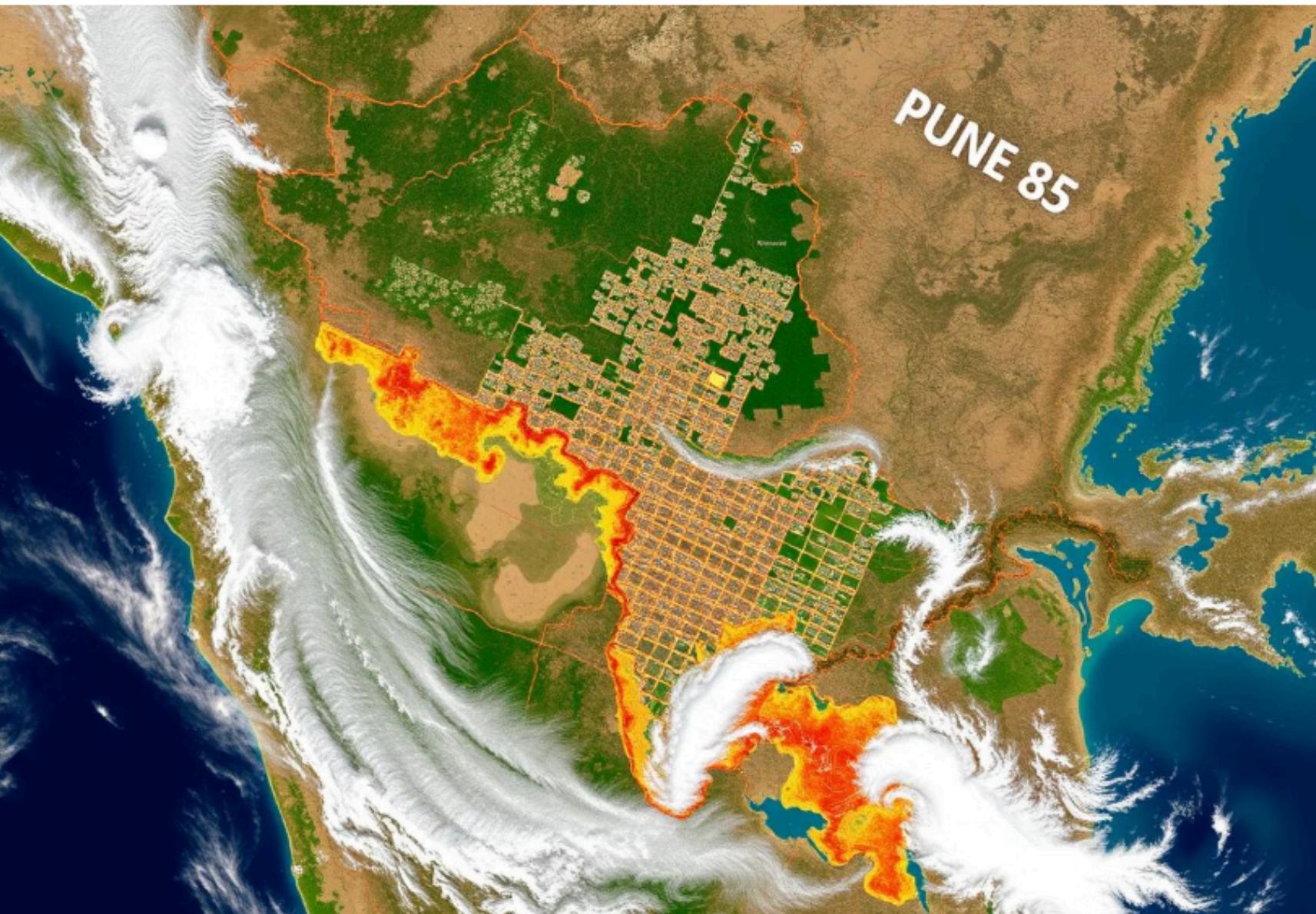
Dr. S. T. Mali

Urban Heat Island Monitoring in Pune

Urban Heat Islands (UHI) emerge in cities where structures like buildings and roads absorb heat, resulting in higher temperatures.

Pune's urbanization has increased UHI effects with land use changes.

Remote Sensing and GIS offer objective observations, using satellite thermal mapping to monitor UHI and land changes.





Problem Statement

1 Decreased Green Cover

Unplanned urban growth reduces vegetation.

2 High-Density Heat Zones

Shivajinagar & Hadapsar show high LST.

3 Monitoring Delay

Lack of real-time tools hinders mitigation.

4 Data-Driven Planning

Need to identify UHI zones using geospatial technology.

Objectives: Mapping and Mitigation Strategies

Assess LST Distribution

Across Pune.

Derive NDVI

For vegetation mapping.

Establish Correlation

Between LST and NDVI.

Generate UHI Risk Map

Mitigation planning.

Methodology: Data Acquisition and Processing



Data Download

Satellite data from USGS.

Preprocess Imagery

Clipping, projection, correction.

Calculate NDVI and LST

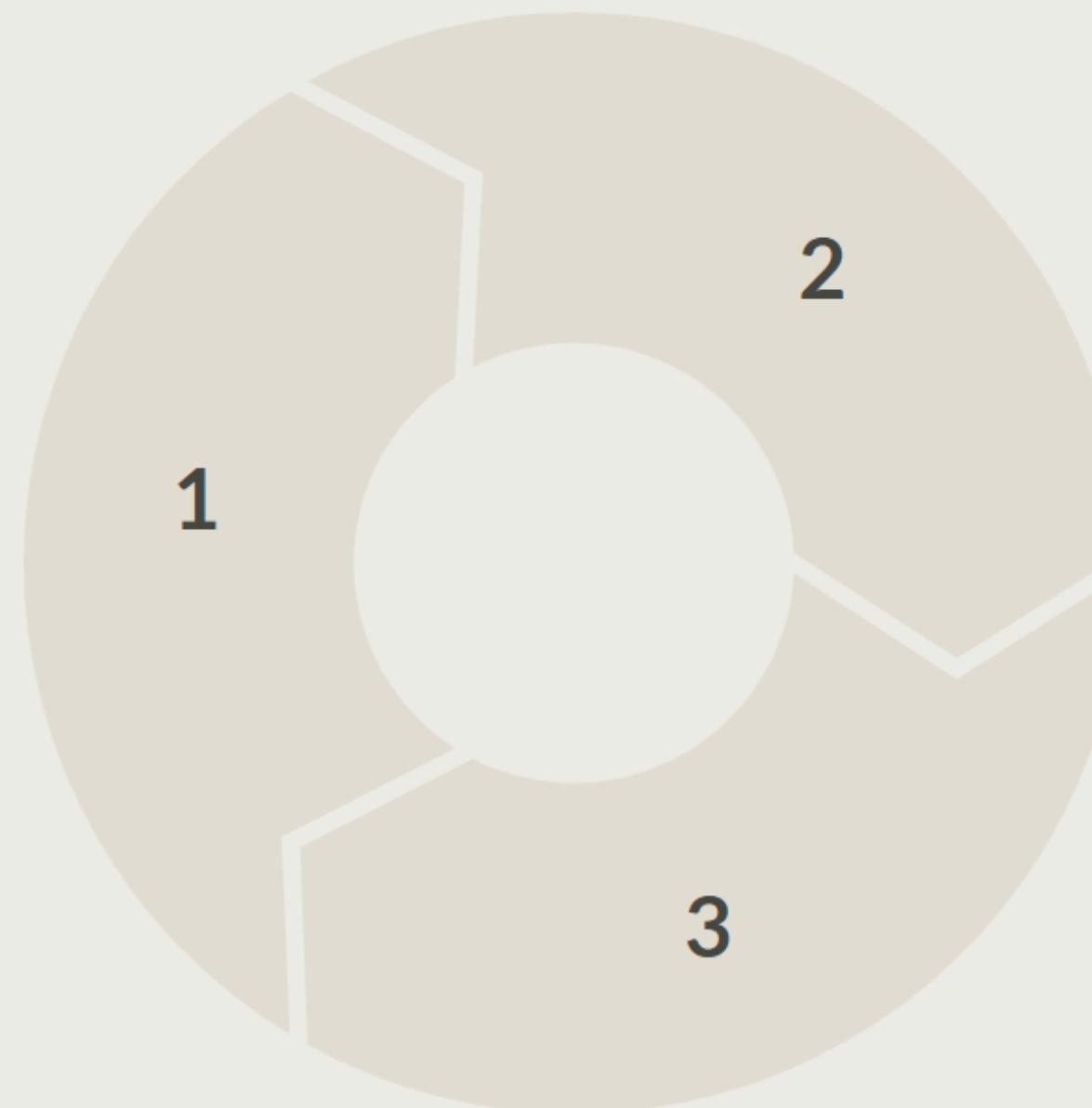
Using Landsat 8 bands.

Overlay Layers

Identify UHI zones.

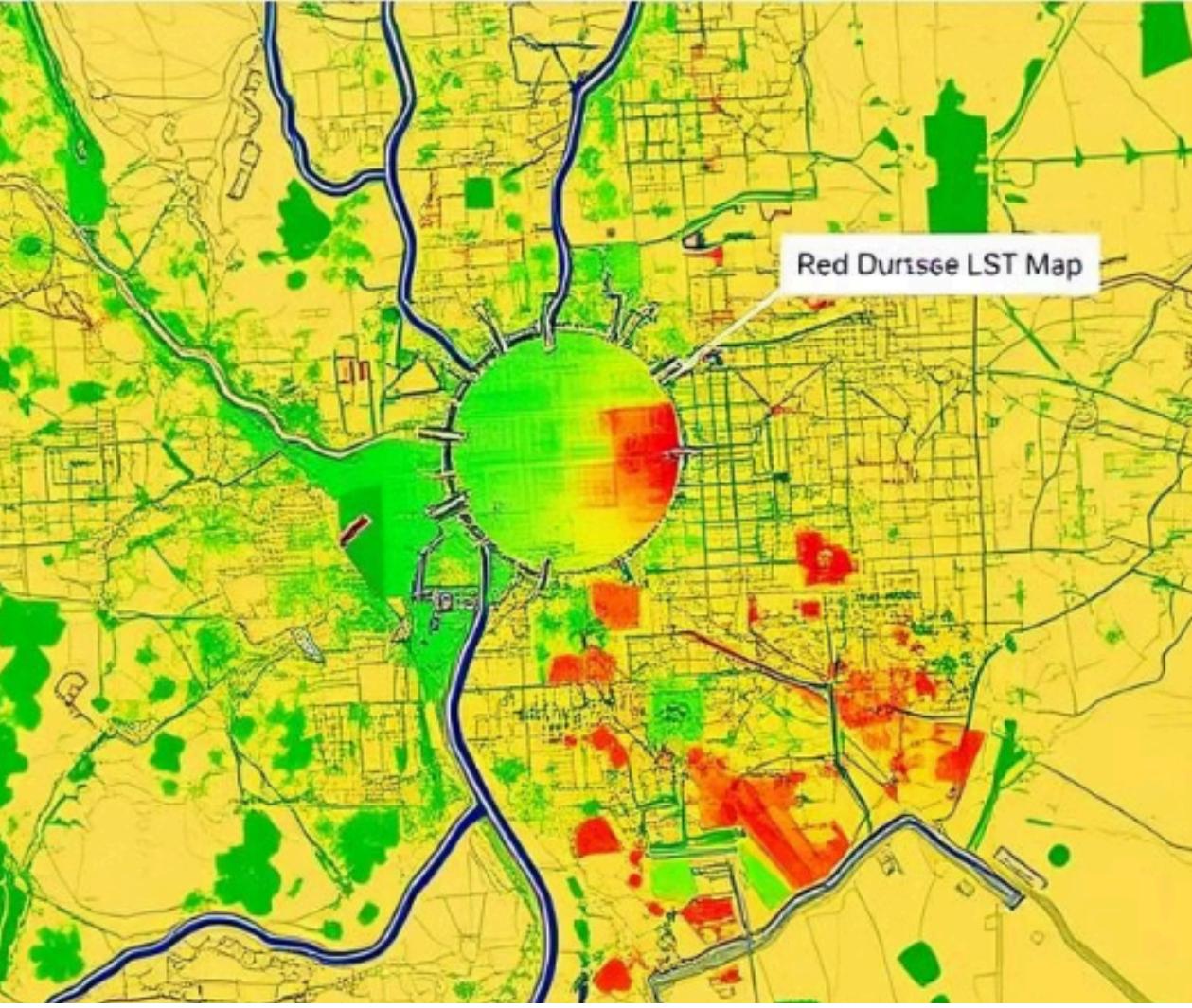
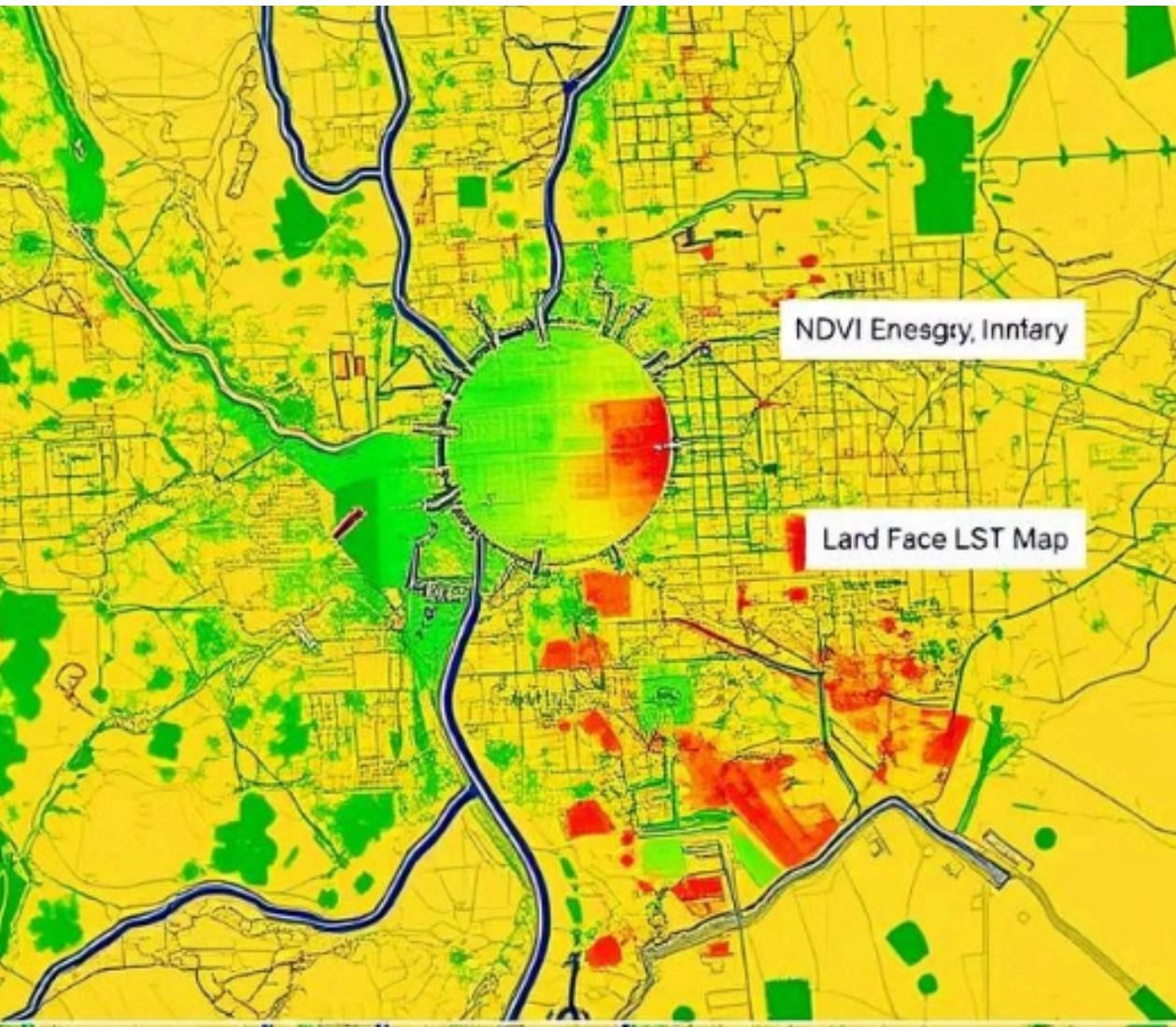
Input / Processing / Output: Data Workflow Overview

Input
Landsat 8 image, Pune city shapefile.



Processing
NDVI and LST calculations.

Output
NDVI map, LST map, UHI vulnerability map.

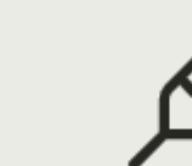


Results and Discussion



NDVI Results

Vegetation (Pashan, Baner): NDVI > 0.4.



LST Results

High (Hadapsar, Shivajinagar): ~39°C.



Correlation

Inverse NDVI and LST.

Limitations: Factors Affecting Accuracy



Band Resolution

Limits micro-area analysis.



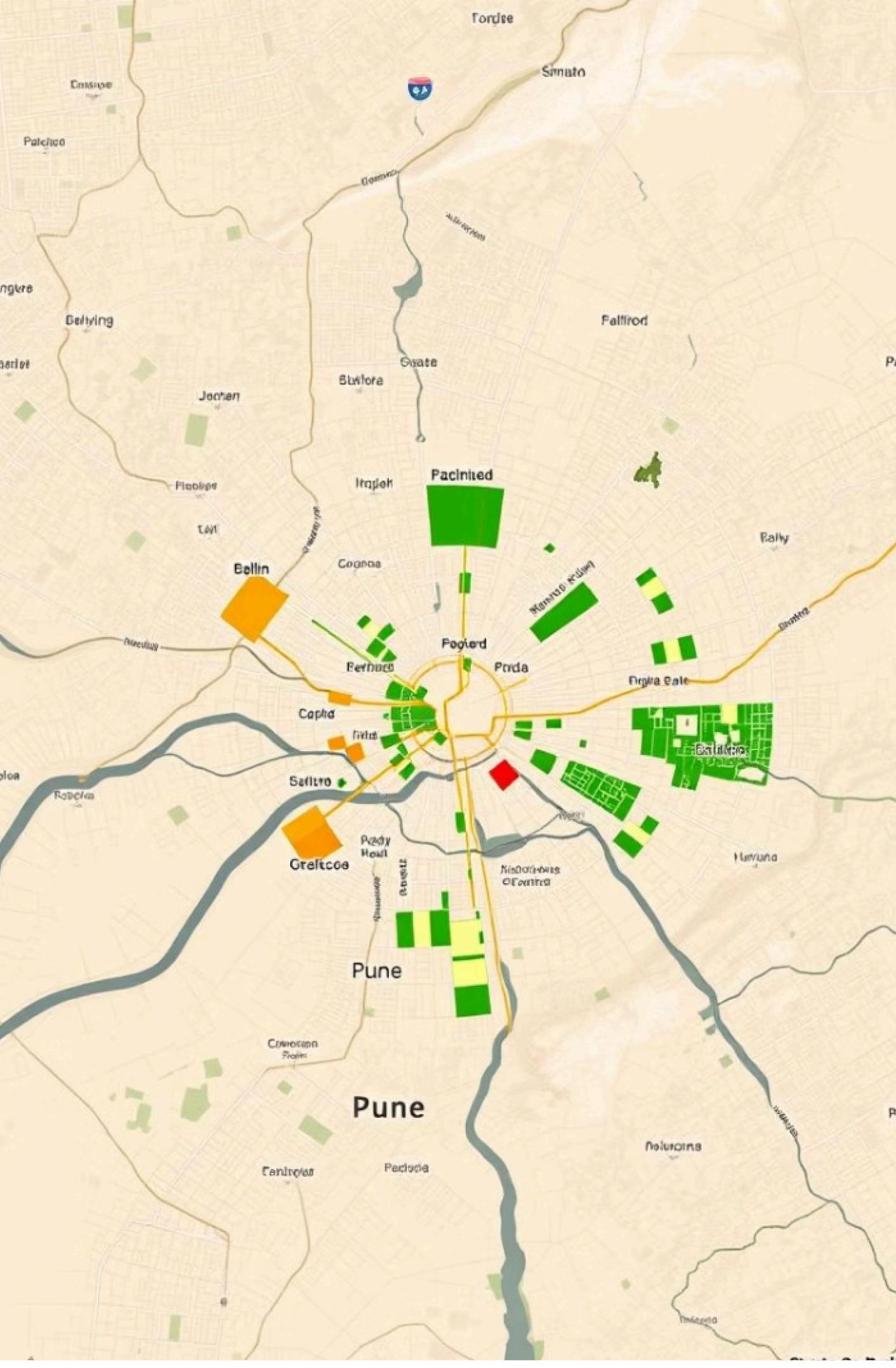
Atmospheric Effects

Skew LST values.



Single-Date Analysis

No seasonal variation.

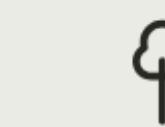


Conclusion: Remote Sensing for Sustainable Urban Planning



Cost-Effective Monitoring

Scalable method.



UHI Zones Identified

Guide green infrastructure planning.



Inform Policies

Sustainable development and zoning.

Applications

Green Belts

Prioritize UHI hotspots.

Smart Dashboards

Real-time monitoring.



Cool Roofs

Integrate reflective surfaces.

Heat Action Plans

Data-backed strategies.

Observation

Free satellite images and tools like QGIS solve real problems. Students and governments can collaborate for healthier cities. Working together, they can create a more climate-friendly city for everyone.



Key Takeaways

Remote Sensing Works

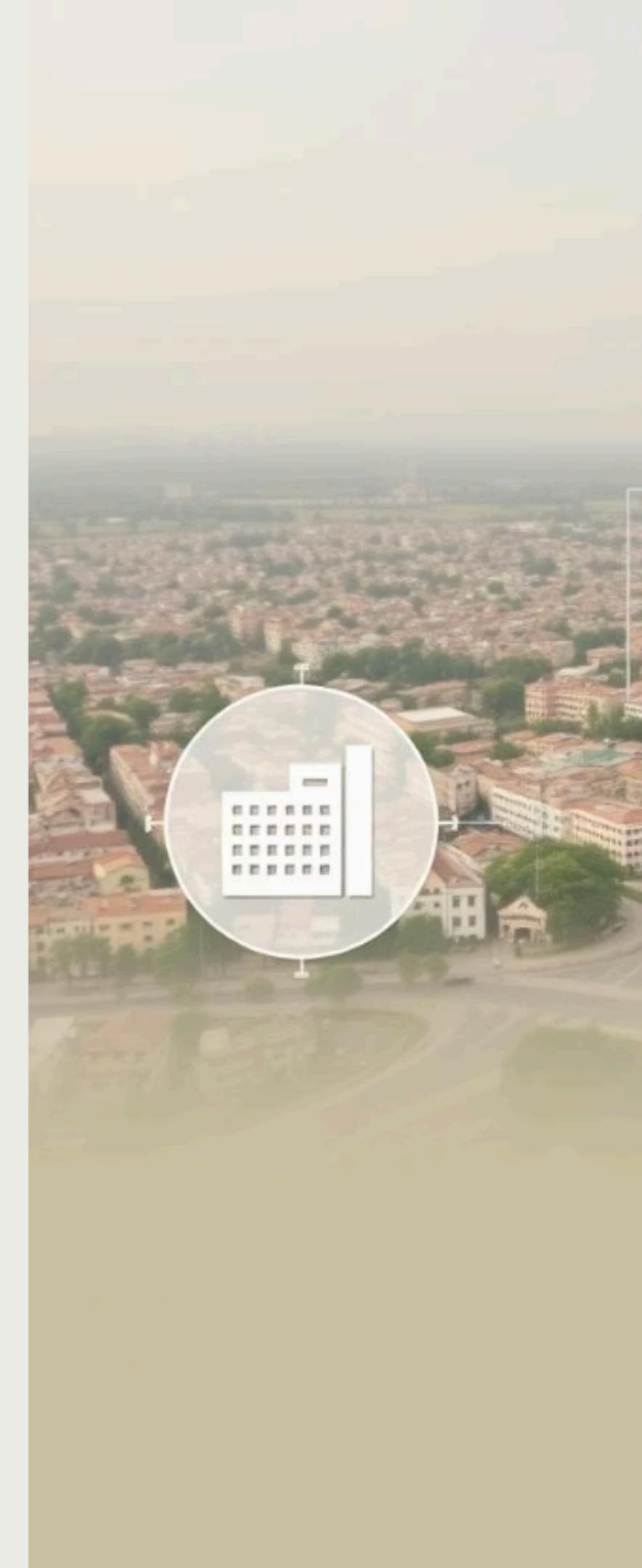
Effective UHI monitoring method.

Greeneries Matter

Essential for cooling cities.

Actionable Data

Informs planning and design.



References

Key resources and data sources used in this study.

- USGS Earth Explorer (2025). Landsat 8 Thermal Imagery.
- QGIS Dev. Team (2024). QGIS Geographic Information System [Software].
- Voogt & Oke (2003). *Int. J. Remote Sensing*, 24(4), 1167-1192.
- Pune Municipal Corp. (2024). Urban Climate Monitoring Report.
- NRSC, ISRO (2024). Urban Heat Island Analysis Techniques.