

## Introduction

Urbanization disrupts local climates by replacing natural land cover with impervious surfaces. These surfaces such as concrete and asphalt retain more heat than vegetated cover, therefore, putting these areas at risk for the urban heat island effect. This is when urban areas become significantly hotter than outlying areas and exhibit high temperature anomalies, therefore, putting its residents at risk. Another contributing factor is anthropogenic emissions of greenhouse gases from industries and automobiles. The purpose of this research is to assess areas vulnerable to the urban heat island effect in Dallas County, Texas by looking at the heat severity index (The Trust for Public Lands) and land cover data (NLCD 2021). This study aims to provide insights for planning and policies that enhance resilience to urban heat island risks in Dallas County.

## Research Question

Where are significant areas with high temperature anomalies and impervious land cover in Dallas County, Texas?

## Study Area

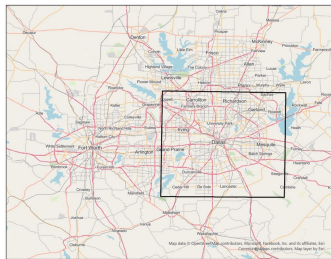


Figure 1. Dallas County, Texas

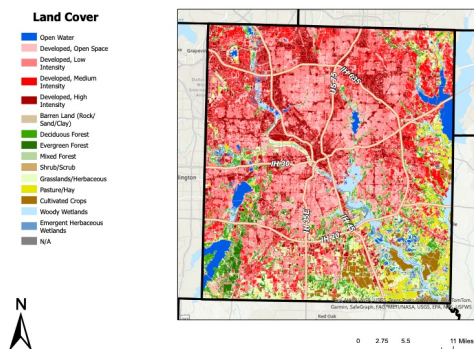


Figure 2. Land cover in Dallas County, Texas

## Results

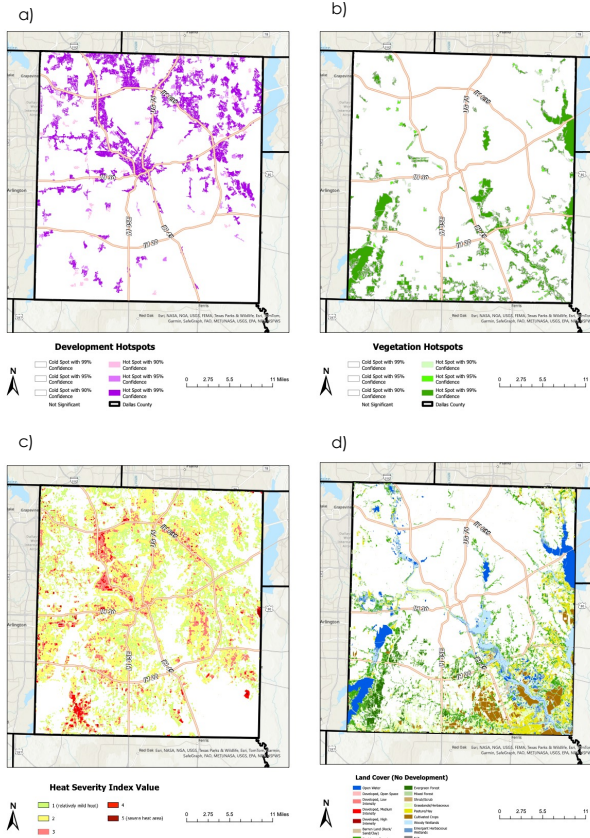
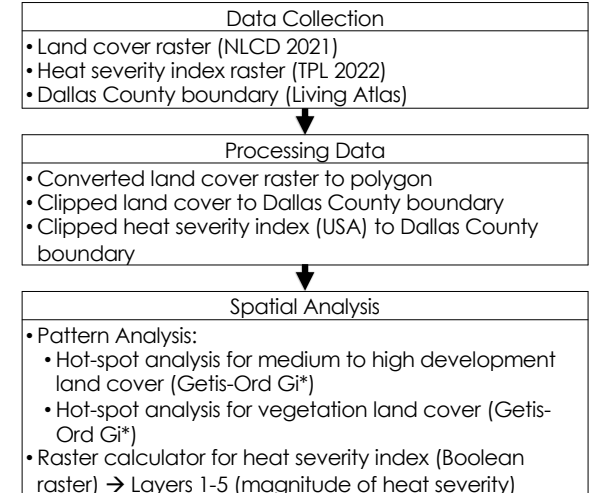


Figure 3. a) Medium-high development hotspots as determined by the hotspot analysis (Getis-Ord  $G_i^*$ ) spatial statistic tool, b) vegetation hotspots determined by the same tool c) a Boolean raster of the heat severity index sourced from Heat.gov, and d) land cover types in Dallas County, Texas other than development (grid codes 21-24).

Land cover	Percentage	Impervious surfaces
Developed, high intensity	15.06%	>80%
Developed, medium intensity	21.95%	50-80%
Developed, low intensity	19.28%	20-50%
<b>TOTAL</b>	<b>56.29%</b>	-

Table 1. A breakdown of developed land cover by type (high, medium, and low intensity) and the total developed land cover for Dallas County, Texas

## Methods



## Discussion

- Through pattern analysis, we discovered similar clusters for significant hotspots of development and areas with temperature anomalies (heat severity index)
- Similar to development, vegetation hotspots coincide with areas that are **not** developed land cover (e.g., forest, grasslands, pasture, etc.)
- Areas with low to high-intensity development are at greater risk for the urban heat island effect
- Urban heat islands directly affect human health and quality of life (Shahmohamadi et al., 2011):
  - Elevated body temperatures → dehydration, heat-related illness
  - Increased physical and mental stress
  - Increased disease vectors → higher incidence of vector-borne and food-borne diseases
  - Decreased air quality

## References

