National Aeronautics and Space Administration

Ajax Urban Development

Utilizing NASA Earth Observations to Assess Urban Forest as an Adaptation Strategy for Extreme Heat in Ajax, ON, Canada

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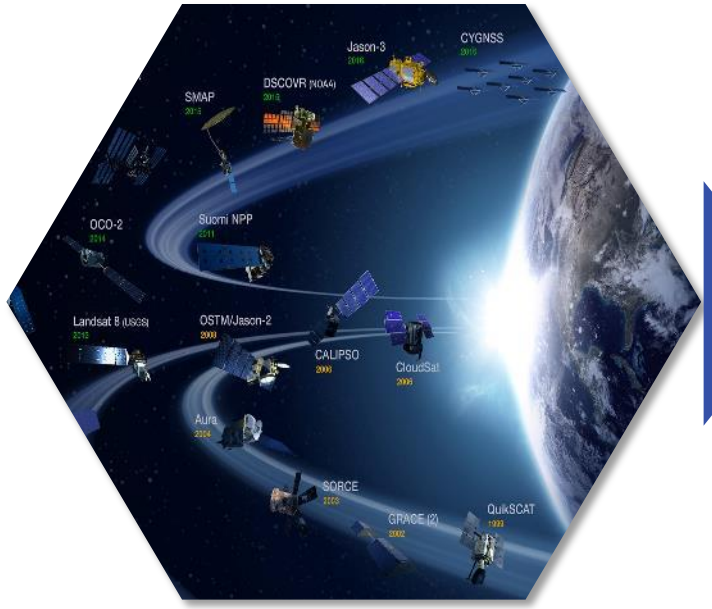
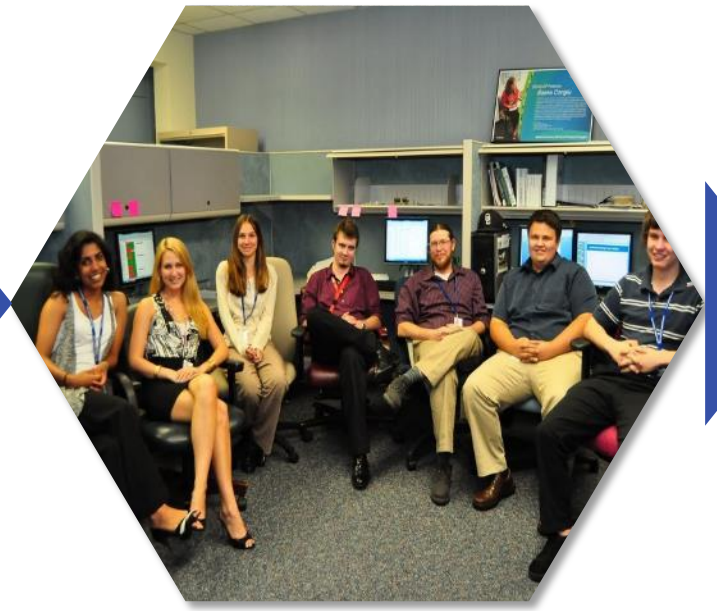
What is DEVELOP?

DEVELOP addresses environmental and public policy issues through **interdisciplinary feasibility studies** that apply the lens of **NASA Earth observations** to community concerns around the globe. Bridging the gap between NASA Earth Science and society, DEVELOP projects **build capacity** in both participants and partner organizations to better prepare them to address the challenges that face our society and future generations.



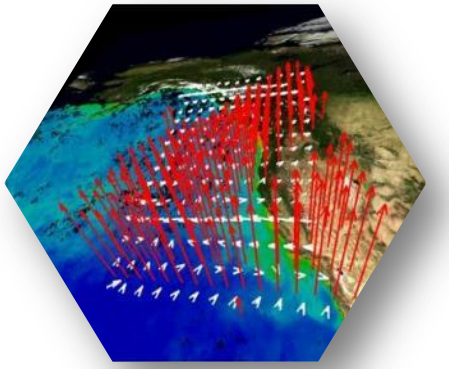
NASA Earth Science

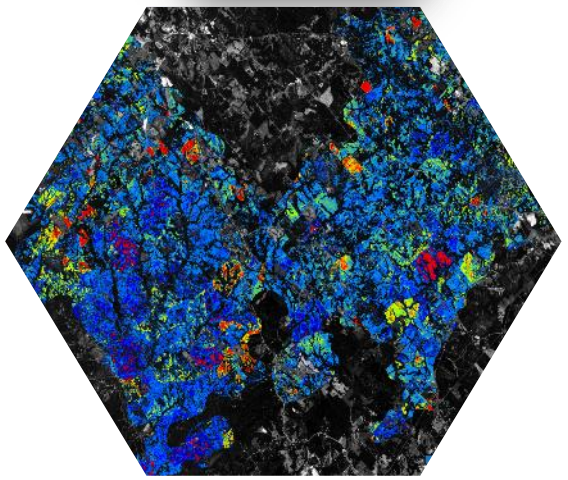


DEVELOP

Decision Makers

Project Characteristics





All DEVELOP projects share these core characteristics:

- Highlight the **applications** and capabilities of **NASA Earth observations**
- Address **actionable** real-world environmental issues
- Partner with **decision-making** organizations
- Conducted by **interdisciplinary** teams under guidance of DEVELOP Science Advisors
- Create a comprehensive set of **deliverables** (Project Summary, Poster, Presentation, Technical Report, Video, Imagery, Shapefiles)
- Take place in **just 10 weeks** during three terms a year (spring, summer, and fall)
- Align with one of the Applied Sciences Program's 8 **application areas**

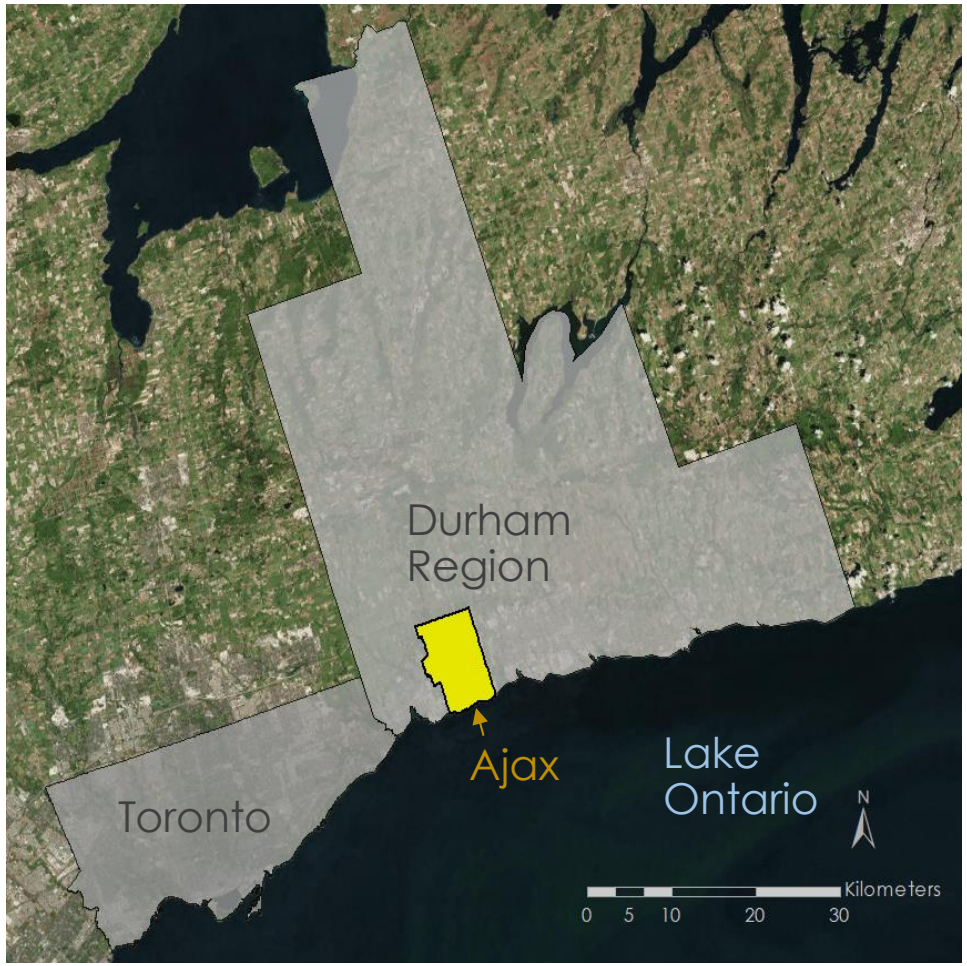
Disasters | Health & Air Quality | Energy | Agriculture & Food Security | Ecological Forecasting | Urban Development | Water Resources | Transportation & Infrastructure

Ajax Urban Development

- Ajax, Ontario, Canada
- Population: 120,000
- Study Period: January 2000 – December 2016

Partners

- Town of Ajax, Operations & Environmental Services
- Great Lakes and St. Lawrence Cities Initiative
- Arizona State University, Urban Climate Research Center



Community Concerns

- Recent **extreme weather** events have impacted the health of Ajax's urban forest and led to a reduction in overall tree coverage.
- Maintaining the health of Ajax's **urban forest** is essential.
- Changing conditions could challenge the ability of Ajax and surrounding municipalities to grow or maintain **tree coverage** needed to build **community resilience** to extreme heat.

Image Credit Town of Ajax: Operations & Environmental Service

Objectives

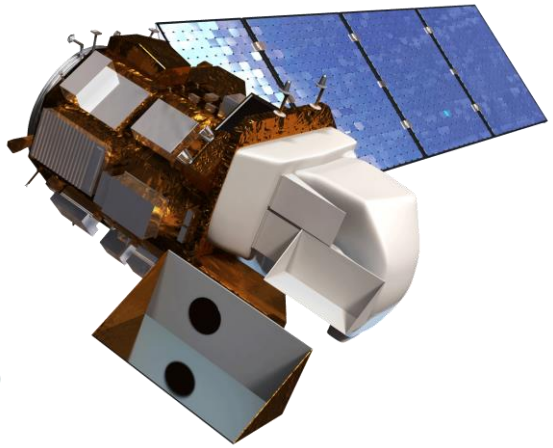
- **Analyze** tree arrangement at the block scale
- **Forecast** tree stress based on projected changes in weather patterns
- **Identify** locations where Ajax residents are most vulnerable to extreme heat
- **Assess** the extent and magnitude of extreme heat throughout Ajax
- **Estimate** tree canopy cover and throughout Ajax

Image Credit Town of Ajax: Operations & Environmental Service

Data

NASA Satellites:

Landsat 5



Landsat 8

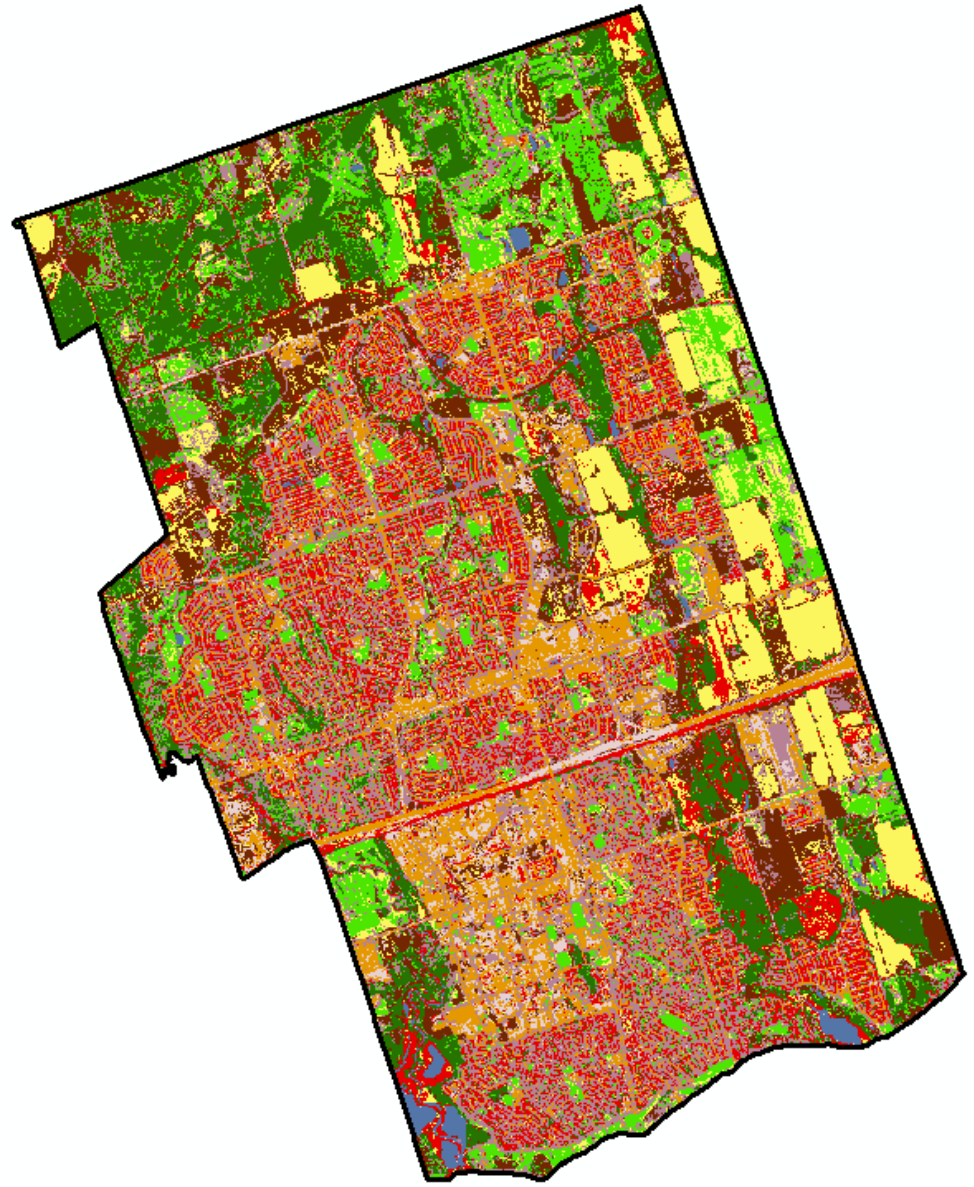
Other Datasets:

- PlanetScope high resolution imagery
- Orthoimagery provided by Town of Ajax, Operations & Environmental Services
- SENES Consultants Durham Region Future Climate prediction results
- Daymet V3
- Census of Canada

Image Credit: NASA

Land Cover Classification

2016 Land Cover Classification

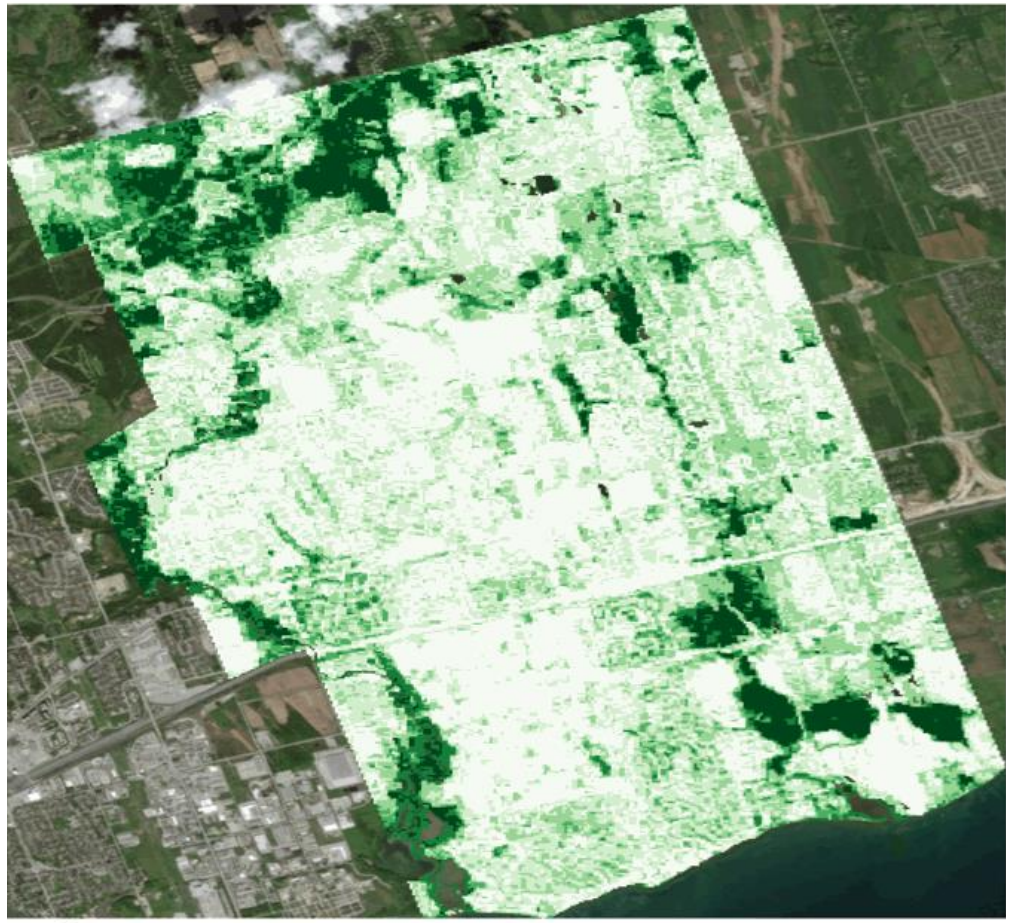


- Land cover analysis can differentiate small scale urban features
- Produce a more accurate tree canopy assessment
- Can be a useful input in local climate models

Urban Heat: Surface Temperature

- Surface temperatures varied greatly from year to year
- Urban core was consistently hotter than surrounding area

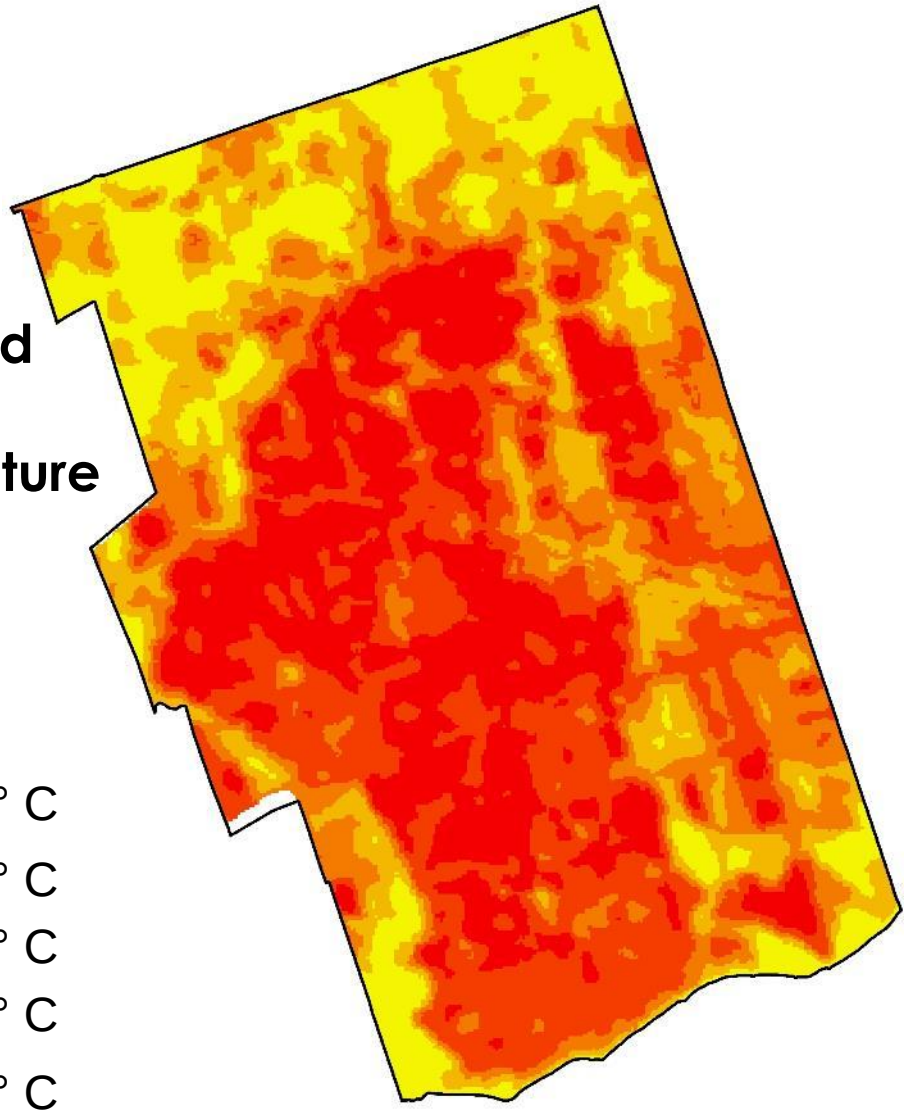
Tree Canopy Estimates



- Forested regions surrounding the urban core experienced greatest variation
- Tree canopy cover throughout urban core was consistently low (< 10% tree canopy cover)

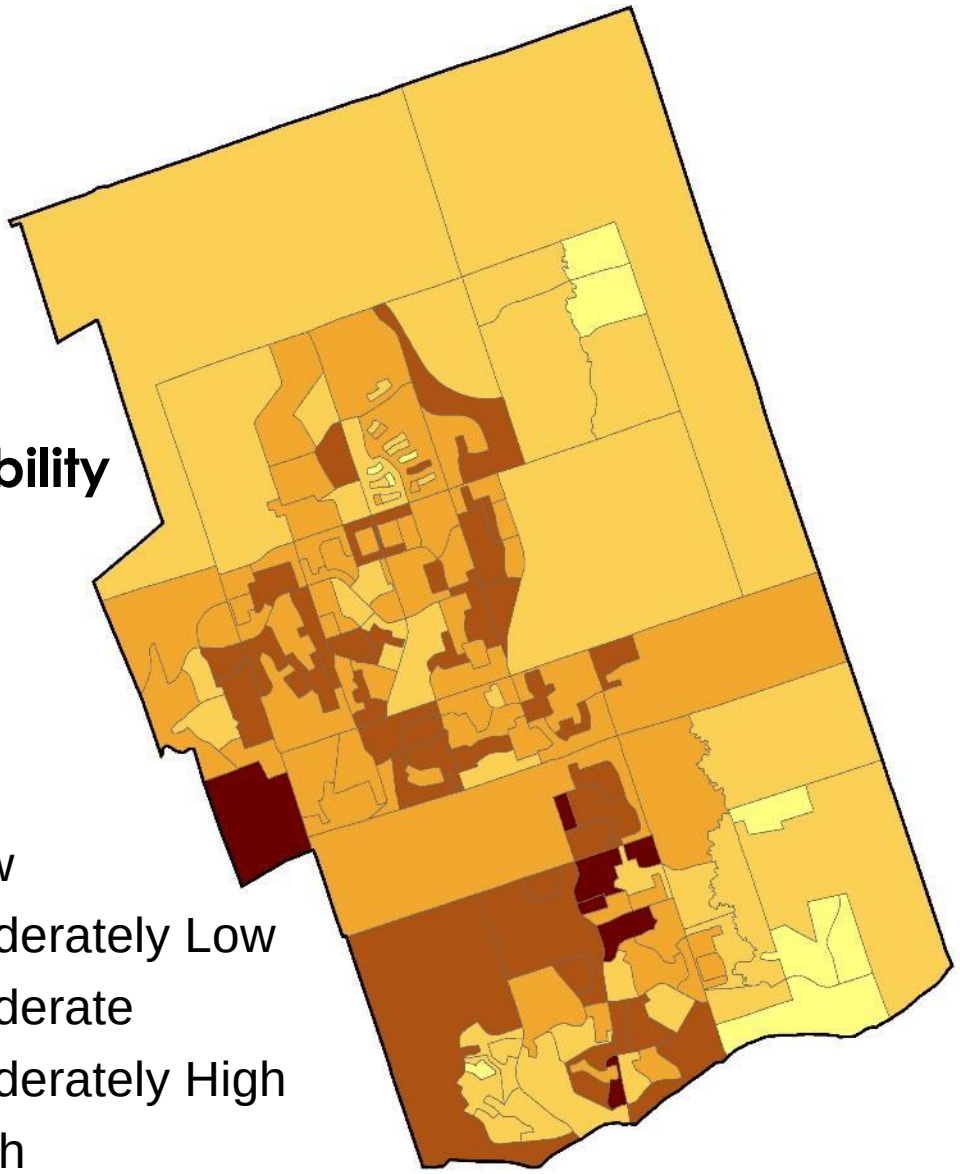
Areas of Concern

2016 Land Surface Temperature



- < 20 ° C
- < 23 ° C
- < 25 ° C
- < 27 ° C
- < 33 ° C

Social Vulnerability Index



- Low
- Moderately Low
- Moderate
- Moderately High
- High

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