

Using NASA Earth Science Datasets for National Climate Assessment Indicators: Urban Impacts of Heat Waves Associated with Climate Change

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Objective: *Engage urban stakeholders in a process to develop a set of vulnerability indicators that are focused on heat waves in urban areas. Elucidate for urban governments the degree to which heat waves are changing, the real-life impacts of heat waves on urban populations, and the effectiveness of adaptation actions to reduce urban temperatures. Integrate physical, ecological, and socioeconomic information into a set of five related indicators that address vulnerability.*

Proposed Indicators

- **Exposure indicators:**

- *Urban Heat Wave Indicator*: Heat index degree days in a single summer for “heat waves” defined by NWS Heat Advisories and Watches/Warnings
- *Urban Heat Island Indicator*: Difference between average urban and rural LSTs during heat waves
- *Air Quality Indicator*: Daily 8-hr maximum metropolitan O₃ values during heat waves

- **Sensitivity indicator:**

- *Urban Socioeconomic and Hotspot Indicator*: Classification of sensitivity of census block groups based on socioeconomic census and urban greenness data

- **Adaptive capacity indicator:**

- *Urban Adaptation Effectiveness Indicator*: Measured reductions in LST or increases in NDVI in neighborhoods related to UHI reduction measures

Process and Data

Identify and Engage Stakeholders

- *Urban health and planning departments*
- *City, county, state governments*



Refine Indicator Methodology



Calculate Indicators

- *Generate unique visualizations*
- *Vet results with stakeholders*



Assess National Scale-Up

• NASA Satellite Datasets

- Land Surface Temperature (LST)
- Land Cover/Urban Extent
- NDVI

• Supplemental Datasets

- National Weather Service Heat Products
 - Heat Advisories
 - Excessive Heat Warnings
 - Excessive Heat Watches
- Socioeconomic Data
 - Age, income, race, health status
- Ambient O₃ mixing ratios
- EPA Urban Heat Island Community Actions Database