Heat Impacts on Vulnerable Communities and Reduction Strategies

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Why is this important?

- During this century CA's communities will get hotter
- Heat is greater some neighborhoods than others
- Public health will be harmed and thousands will die
- Vulnerable communities will suffer most
- Public policy can reduce suffering & disparities

A typical CA neighborhood: little vegetation + lots of asphalt = hot temperatures

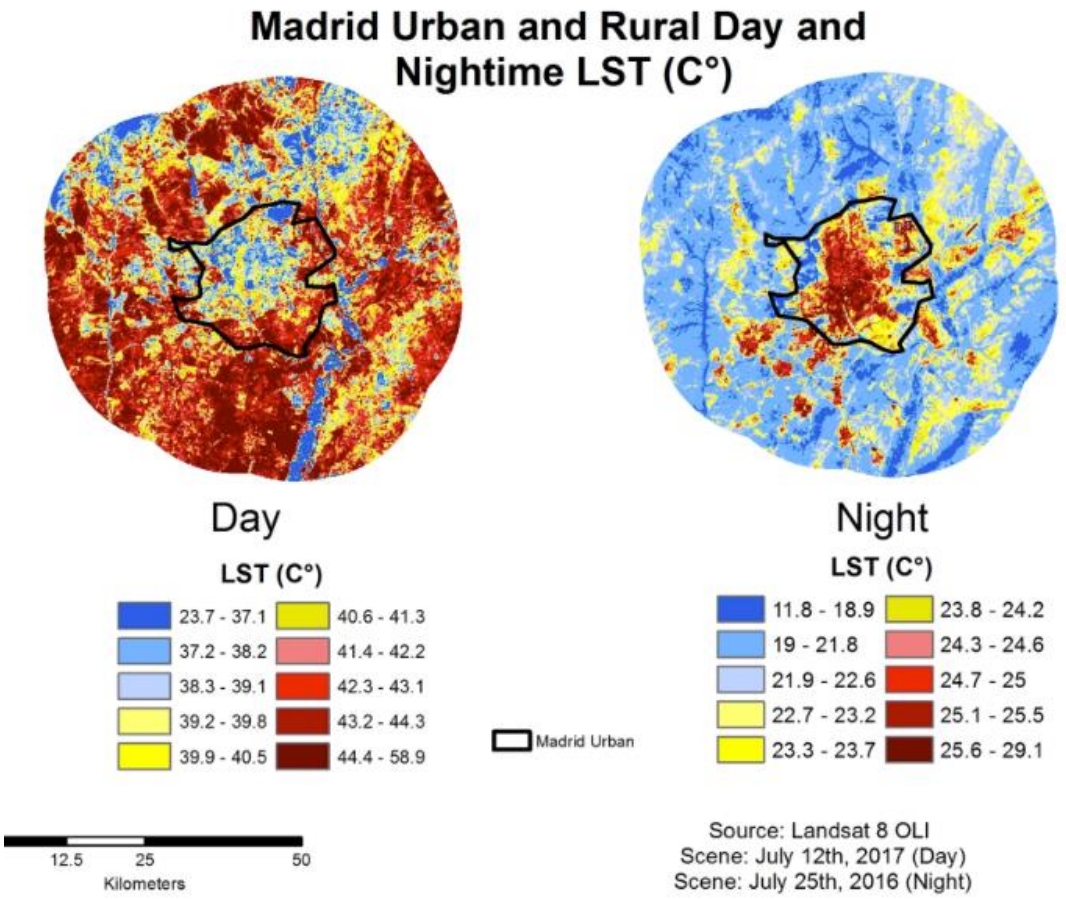
Credit: Local Government Commission

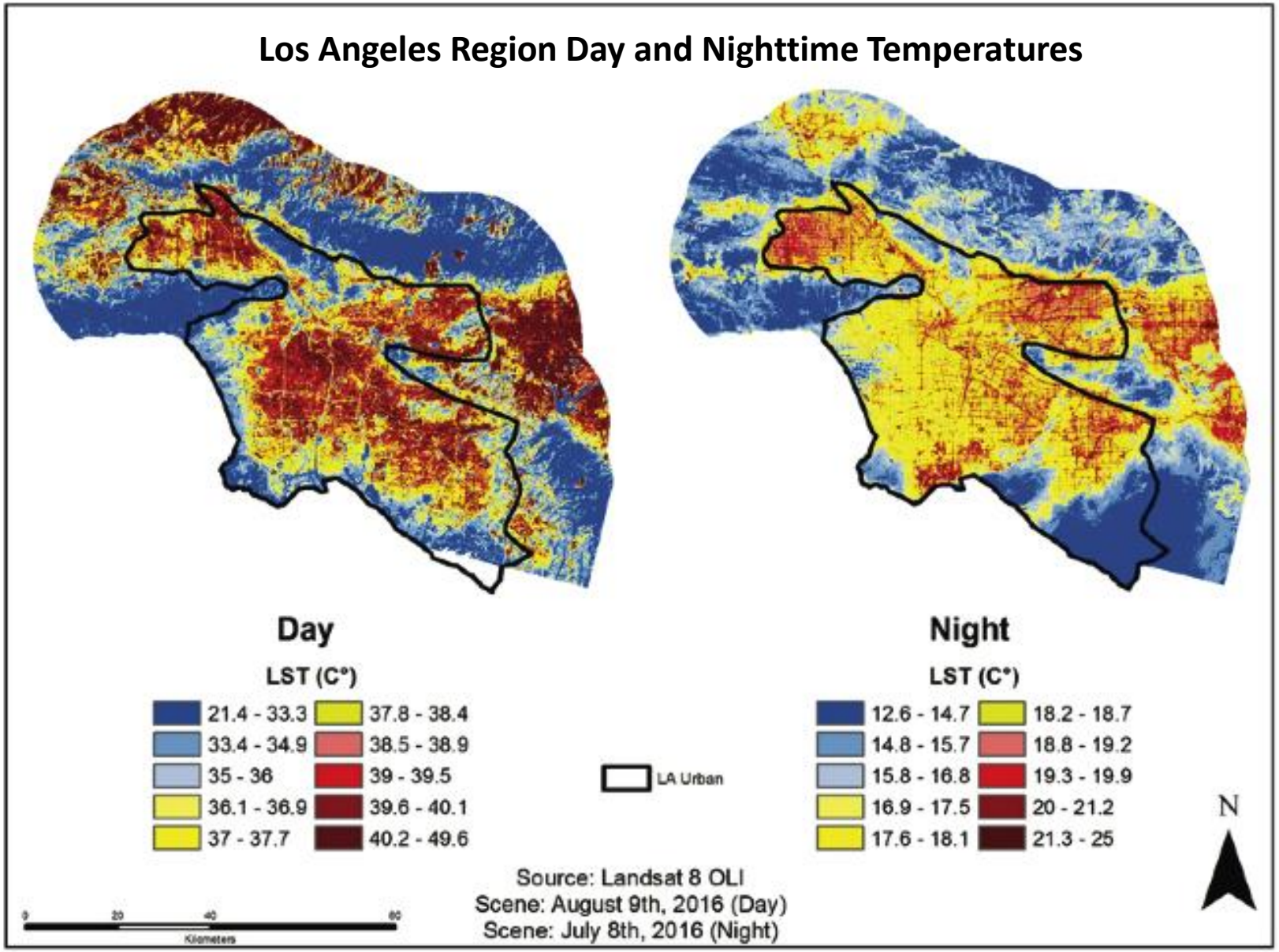
Urban Heat Islands

- Known since the 19th century, popularized recently
- Academic study since the 1960s
- Cities can be 5-10° F hotter than surrounding rural areas
- Some neighborhoods are much hotter than others, depending on vegetation and paved surfaces
- In Sacramento, the neighborhood on the right can be 9° F hotter than the one on the left (<1 mi apart)

But UHIs in dry climates are more complex

- Less studied until recently
- Deserts heat and cool rapidly
- Arid cities are often cooler than rural areas in daytime, hotter in nighttime
- What matters in terms of policy is heat, not heat islands per se
- Need to understand heating dynamics in both urban and rural communities
- Goal to tailor policies for the neighborhood & community



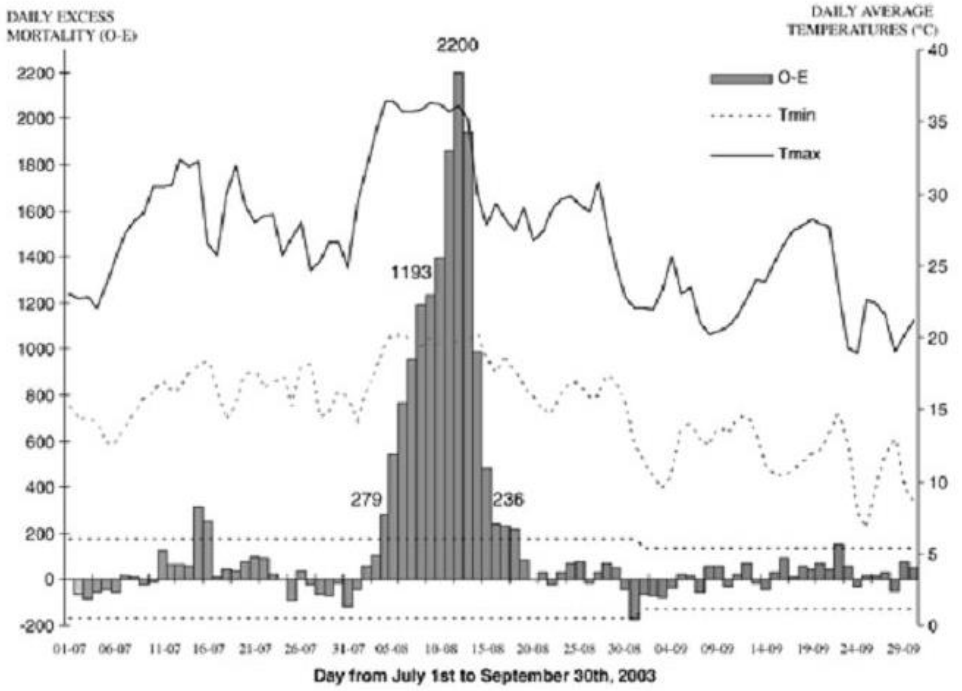


Neighborhoods most subject to heating can be mapped & mitigation strategies developed

Effects of excess heat on public health

- Many low-income neighborhoods have little tree cover, lots of asphalt, little shade from buildings
- Residents without good a/c or evaporative cooling are at risk
- The elderly, the young, and the sick are most at risk
- Lack of nighttime cooling a factor
- 2003 heat wave in France led to 15,000 deaths
- 1995 heat wave in Chicago led to 700 deaths

Figure 16: Excess deaths observed during the 2003 heat wave in France. O= observed; E= expected.



Fouillet et al., 2006

How do we keep neighborhoods cool?

- Greening (maximize shade from drought-tolerant trees)
- Cool materials (highly reflective roofs and paving surfaces)
- Shade-producing built form (multi-story buildings, narrow street widths, awnings/porticos/courtyards)

Marcus Jaaske/Shutterstock

Policies & programs to reduce excess heating

- Funding for tree-planting (e.g. CA's Urban Greening program)
- Codes requiring drought-tolerant shade trees within new development (some CA cities do this)
- Codes requiring reflective roof and paving materials (CA has these at the state level)
- Standards or guidelines for shade-producing built form (no systematic implementation yet)

+ give priority to low-income neighborhoods

Friends of the Urban Forest

Vision: The cool CA community of the future

- Shaded ground surfaces, esp. walkways, parking, and public spaces, maximize human health & comfort
- Relatively dense, taller built form creates shade (and uses land efficiently), with minimum open asphalt
- Continuous tree canopy or PV along streets creates shade
- Light-colored surface materials, green and/or shaded roofs, window shading, and energy-efficient construction
- Drought-tolerant plant communities throughout the city improve ecosystem function and add variety

Green roof (U.S. EPA)

Thanks!

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