Climate Adaptation through Design: Heat Mitigation and Mortality

2014 Urban Climate Institute
Urban Warming and Public Health

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July 9, 2014
Climate, Urban Land-use, and Excess mortality

Atlanta     Philadelphia     Phoenix
Avoided Heat-Related Mortality through Climate Adaptation Strategies in Three US Cities

urbanization
  buildings
  transportation
  land cover

climate
  temperature
  precipitation
  storms

health
  heat-illness
  famine
  vector-borne
  ozone
  allergies
urbanization

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Business as Usual

Scenarios
Scenarios

VEGETATION
- PRG  Private Greening
- PUG  Public Greening
- GREEN Combined Greening

Homes and Commercial Buildings
Streets and Public Lands
Greening on Public and Private Lands

REFLECTIVITY
- BAE  Building Albedo
- RAE  Road Albedo
- ALBEDO Combined Albedo

Homes and Commercial Buildings
Streets and Parking Lots
Combination of Buildings and Streets

COMBINED
- ALL Combined Greening & Albedo

Combined Greening followed by Combined Albedo
Potential Land Cover Change

urbanization
- buildings
- transportation
- land cover

climate
- temperature
- precipitation
- storms

health
- heat-illness
- famine
- vector-borne
- ozone
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Urbanization
buildings
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Climate
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Health
- heat illness
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## Health Impacts

<table>
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<th>Relative risk</th>
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<td>Zanobetti and Schwartz, 2008</td>
<td>mean daily apparent temperature (May-Sept)</td>
<td>$1.018 \ (1.0109, \ 1.025) \ \text{per } 0.55^\circ \text{C \ (O}<em>3 \ \text{and PM}</em>{2.5} \ \text{adjusted})$</td>
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<td>all ages in 9 US cities (1999–2002)</td>
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<td>Medina-Ramon and Schwartz, 2007</td>
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Extreme Heat and Excess Mortality

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<td>Anderson and Bell, 2011</td>
<td>heat wave periods classified as 2 or more days with mean daily T above 95th percentile of 1987–2005 average for May-Sept</td>
<td>1.0367 (1.0295, 1.0439) per heat wave day</td>
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Health Impacts

Scenario

Private Green
Public Green
Combined Green
Building Albedo
Road Albedo
Combined Albedo
ALL
2010-2050 change

Medina-Ramon

Atlanta

Philadelphia

Phoenix

Difference in Deaths from 2050 Business As Usual

- NonHW
- HW
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