Climate Adaption Effectiveness across a Coastal to Desert Climate Gradient in the Los Angeles, CA Megacity

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Problem Statement

➢ Urbanization
  ✓ Climate -> 2.5°C higher
  ✓ Human health
  ✓ Economic -> $100 million per year
  ✓ Water
  ✓ Air pollution

➢ Managing climate change

➢ Urban heat
  ✓ Climate, vegetation, altitude, adjacency to water bodies, and socio-economic conditions
Urban Surface Warming

![Graph showing the relationship between mean neighborhood daytime LST (C) and the percentage of households reporting heat illness. The graph includes a linear trend line indicating a positive correlation.]

Jenerette et al. *In Press*. Landscape Ecology
Questions

➤ How does the effectiveness of vegetation as LST cooling mechanism vary?

➤ How does the socioeconomic influence on vegetation availability vary?

➤ What influences the variation in neighborhood income on LST?
Hypothesis

- Vegetation has a greater LST cooling effect in hotter and drier conditions
  - Through increased evaporative potentials

- The neighborhood income is more strongly related to vegetation in drier environments
  - As management (i.e. irrigation) can have increasingly larger effects

- Cooling effect associated with neighborhood income should be higher in more inland than coastal climate gradient
Data Sources

- May 22, 2013

- HyspIRI data
  - MASTER -> LST
  - AVIRIS -> Land cover and NDVI

- Census -> Median income

- SRTM -> Elevation
Study Area
Spatial Scales and Climate Zones
LST Challenges

<table>
<thead>
<tr>
<th>Line</th>
<th>Start</th>
<th>End</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 2</td>
<td>10:13am</td>
<td>10:47am</td>
<td>Desert</td>
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<tr>
<td>Line 6</td>
<td>12:08pm</td>
<td>12:41pm</td>
<td>Inland</td>
</tr>
<tr>
<td>Line 9</td>
<td>13:57pm</td>
<td>14:28pm</td>
<td>Coastal</td>
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Standardized LST
Structural Equation Modeling: For Large Scale Analyses
Regional Variation: Vegetation and LST
Regional Variation: Income and Vegetation

![Graph showing the relationship between NDVI Income (Direct effect) and Zones (Distance to Coast in Km). The graph indicates a peak at around 30 km with an R² value of 0.97.](image)
Regional Variation: Income-LST

![Graph showing the relationship between LST Income and Zones (Distance to Coast in Km). The R² value is 0.95.](image)

- LST Income (Direct effect)
- Zones (Distance to Coast in Km)
Conclusion

- Vegetation cooling effectiveness varies by a factor of 6 in greater Los Angeles
  - Consistent with ecophysiological mechanisms of plant microclimate control that becomes stronger in warmer and drier environments

- Neighborhood income influence on vegetation and LST are peaked at intermediate distances from the coast

- Added complexities for urban studies of megacities
Ongoing Works

- Improving LST standardization
  - Better time correction
  - Use warming rate as heat indicator

- Seasonal and diurnal variation
  - Spring – Fall
  - Day - Night

- Landscape composition
  - Using AVIRIS to develop land cover classifications
Thank you!
Scatter Plot

- Net_Income
- LST
- NDVI
- DEM