

Green Roofs in Las Vegas, Nevada: An Urban Heat Island Mitigation Strategy Proposal

Team #7: Jaelyn Law jslaw@uci.edu, Olivia Sirchio osirchio@uci.edu, Cecilia Kuang cskuang@uci.edu, Milena Raeber mraeber@uci.edu, Sarah Wu sarahsw1@uci.edu

Introduction

- Urban heat islands (UHIs): intensified climate impact
- UHIs: concentrated infrastructure, limited green spaces¹
- Las Vegas: severe UHI, public health risk², high energy consumption³
- Addressing UHI: crucial for sustainability, reduced environmental impact

Approach

- Strong negative correlation between heat & income⁴
- Focus → help alleviate UHI effect and bridge heat inequity
- Propose implementing green roofs in regions with higher temperatures and more vulnerable communities
- Green roofs cool down surrounding areas through evapotranspiration⁵
- Proposal focuses on minimization: green roofs require minimal land area + minimal irrigation

Proposal

- Low-profile green roofs for Janice Brooks Bay and Eva Garcia Mendoza Plaza buildings
 - Grassy, hardy, succulent-type plants
- High-profile green roof/community garden for the Harry C. Levy Garden building
 - Taller, food plants
- Drought-tolerant plants that use less water for Las Vegas climate
- Retrofitting cost considerations:
 - materials (soil, plants, insulation, etc.)
 - extra structural support for weight⁶
- We expect them to lower roof surface¹ temperatures and average city temperatures
- Green roofs also have a longer life span, increased energy efficiency⁷
- \$3.5 million total (about \$2m for materials)

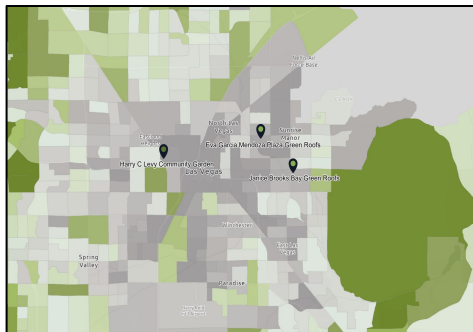
Cost-Benefit Analysis

- Short-term investment, long-term savings
- Prevention of business, tourism, citizen interest being lost due to extreme heat
- Elimination/prevention of costs associated with hospital stays, ambulances, etc.
- Less stress on power grid during heat waves¹
- Potential increase in housing values - aesthetic improvement¹

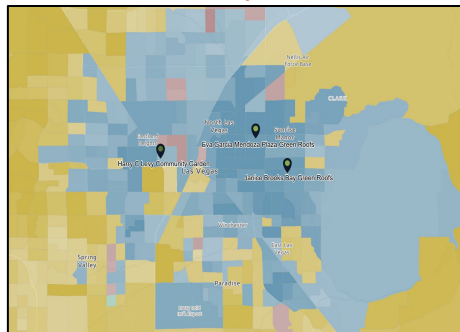
Measuring Success

- Three-phased approach to success: operational, strategic, and tactical
- Onboarding third-party government consultants to monitor progress, measure success, and meet with community partners

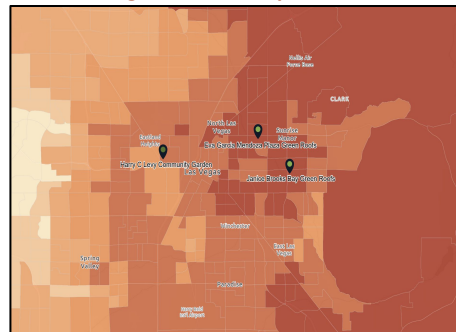
Median Household Income



Race and Ethnicity Concentration



High Surface Temperatures



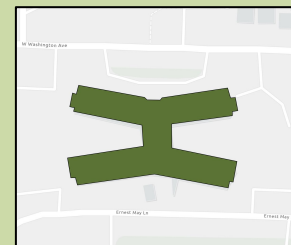
Janice Brooks Bay Green Roofs



Eva Garcia Mendoza Plaza Green Roofs



Harry C. Levy Community Garden



1. U.S. EPA. (2014, February 28). Heat Island Effect. US EPA. <https://www.epa.gov/heatislands>

2. U.S. EPA. (2010, July 1). Climate Change Indicators: Heat related deaths. Reports and Assessments. <https://www.epa.gov/climatechange/indicators/heat-related-deaths>

3. U.S. EPA. (2014, June 17). Heat Island Impacts (Overview and Factsheet). <https://www.epa.gov/heatislands/heat-island-impacts>

4. Anderson, M., & McKinn, S. (2010, September 8). As Rising Heat Bakes U.S. Cities, The Poor Often Feel It Most. NPR.org. NPR Choice Page. <https://www.npr.org/2010/09/08/1294423220/as-rising-heat-bakes-u-s-cities-the-poor-often-feel-it-most>

5. Kain, D. M., Bretz, S. E., Huang, B., & Akbari, H. (1984). The potential for reducing urban air temperatures and energy consumption through vegetative cooling (LBNL 35320). Lawrence Berkeley National Lab, (LBL), Berkeley, CA (United States). <https://www.osti.gov/etd-pub/lbnl-35320>

6. NPDES. (2021). Stormwater Best Management Practice Green Roofs Minimum Measure: Post Construction Stormwater Management in New Development and Redevelopment Subcategory: Innovative BMPs for Site Plans. epa.gov. <https://www.epa.gov/system/files/documents/2021/11/bmp-green-roofs.pdf>

7. Krawiec, L., & Riey, R. (2007). Comparative environmental life cycle assessment of green roofs. Building and Environment, 42(7), 2606-2613.