Urban Resilience to Extremes Sustainability Research Network
Research Experiences for Undergraduates (REU)
SUMMER 2017

Opportunity 6: Portland, OR

Understanding the Capacity of Green Infrastructure to Mediate Extreme Heat Events in the Pacific Northwest

Under the direction of Dr. Vivek Shandas at Portland State University, the REU student will help to generate a ground-based validation of urban heat islands in select cities in the Northwest of the U.S. Heat waves kill more people in the U.S. annually than all other natural disasters combined. Many of these deaths are preventable through understanding the relationships among landscape features that amplify or reduce ambient temperatures and those populations most at risk. We ask two questions in this study: (1) to what extent can green infrastructure help to ameliorate urban heat stress among vulnerable populations? And (2) how does the physical design of the green infrastructure affect localized temperatures? For the purposes of this study, we define green infrastructure as living trees, shrubs, and grass. While extensive research has identified the aggregate use of green infrastructure (e.g. parks, open space, and larger ball fields) on reducing ambient temperatures, we still have yet to understand how highly precise placement of trees, shrubs, and grass can reduce temperatures. In addition, we currently do not know whether the placement of a large group of trees in an neighborhood provide greater reductions in ambient temperatures or can we get the same result through distributing those trees across the same landscape. With increases in the resolution of landscape data (e.g. LiDaR, ground-based measurements, etc), and the advances in spatial analysis (e.g. GIS, remote sensing, etc.), we have an opportunity to address questions about the role of physical designs in reducing heat related mortality and morbidity. Such questions of design of green infrastructure have far-reaching consequences on the practice of urban planning and public health, especially in areas that are undergoing rapid change (e.g. Portland, Seattle, Tacoma, etc.). By understanding the how the placement of green infrastructure in a rapidly changing neighborhood impacts ambient temperatures during a heat wave, planners and other decision makers will be able to identify how best to ameliorate the effects of heat waves on the most vulnerable populations in cities.

REU Activities:

- Work with the PI and members of the Sustaining Urban Places Research (SUPR) Lab to obtain and begin working with the existing GI inventory.
- Conduct field visits, as needed, to newer bioswale sites to estimate structural (e.g., size, shape, slope, soil, vegetation, input/output conditions) characteristics and add them to the inventory.
- Work with ArcGIS software and street coverages to estimate the contributing areas (i.e. the upslope areas that would constitute the “watershed” sources of water that drain to the bioswale) for each bioswale.
- Compile the above information to get an updated inventory of total bioswale area, including contributing areas. In addition to an updated spreadsheet of this information, the REU student would produce summary graphs and a brief report of overall findings.

REU Desired Qualifications, Interests and Skills:

- Enthusiastic and well organized
- Sustainability
- Climate change