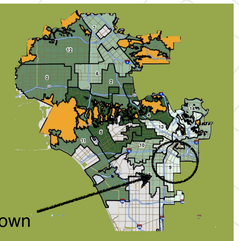
Evaluating the Impacts of Small-Scale Urban Greenspace: A Case Study of Harlem Place in Downtown Los Angeles

Underutilized spaces as opportunities to provision ecosystem services

What is the Problem?

There is a lack of information on the potential impacts of interstitial urban greenspace on ecosystem services and uncertainty in how different designs can be used to maximize benefits. Specific to LA, less than 30% of residents live in walking distance of a park and the Downtown has less than 10% tree canopy cover.



Map of LA, <10% canopy cover in Downtown

Why is this Important?

Urban areas rely on natural systems outside their boundaries to provide resources and mitigate pollution. Diminishing undeveloped land increases the need to creatively integrate greenspace and ecological services into existing infrastructure in order to enhance environmental and social health.

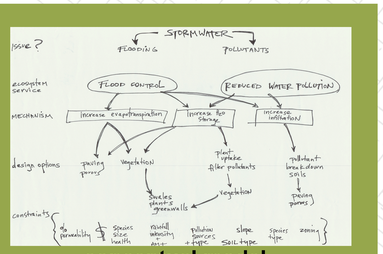
How Can the Harlem Place Alley Serve as a Case Study?

1. How can a conceptual framework guide design and evaluation of various types of greenspace projects?
2. What are the tangible and intangible impacts of small-scale greenspace on ecosystem services?
3. To what extent can ecological functioning be restored in existing urban environments, and what is its value?

Goals

1. Create conceptual models to provide a framework to determine how a project can address social or environmental issues and identify constraints and opportunities.

2. Estimate and compare quantifiable impacts of Low Impact Development design features on ecosystem services.

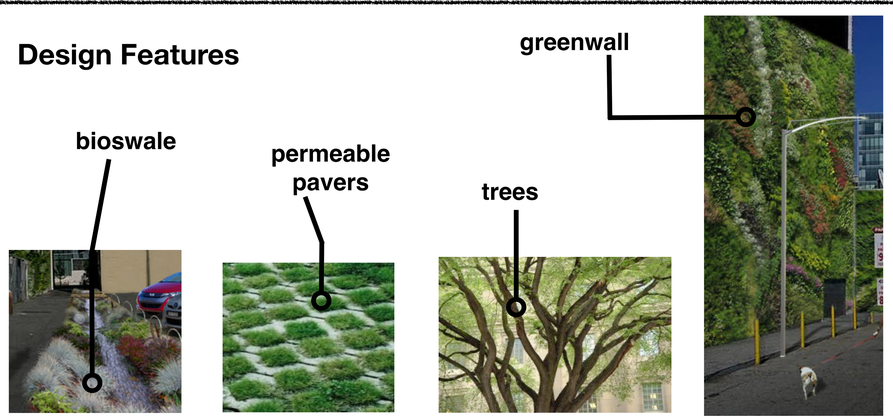


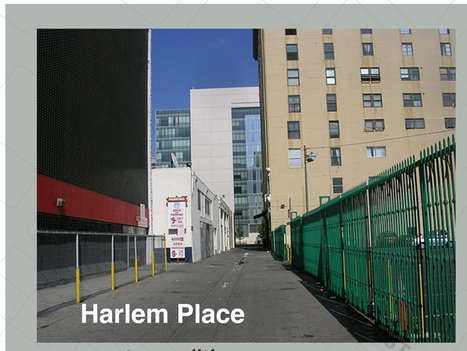
conceptual model

What We Did

- Conducted a physical site survey and used community surveys to determine site constraints and understand local priorities.
- Created prototypes of six greenspace design scenarios for redeveloping Harlem Place, a service alleyway in Downtown LA. Varied the extent and type of specific vegetation species and permeable pavers.
- Used modeling tools, including iTree and L-THIA, and literature reviews to estimate the effects of design features on ecosystem services.

Design Features





- current conditions

- decreases localized temperatures
- increases stormwater infiltration & air pollution capture

- improves microclimate
- captures all site stormwater & >50% of drainage from building rooftops

Client: Downtown Los Angeles Neighborhood Council Sustainability Committee
Advisor: Christina Tague

Group: **Theresa Morgan**
Katie Riley
Rebecca Tannebring
Leanne Veldhuis

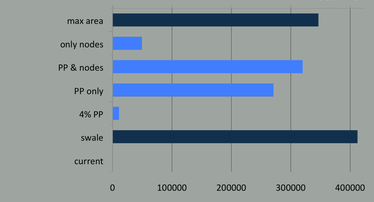
Maps: City of Los Angeles: Department of City Planning, Urban Forestry Division - USDA Forest Service
Visuals: Lauren Takeda & Jason Wickert

Ecosystem Services Analyzed:

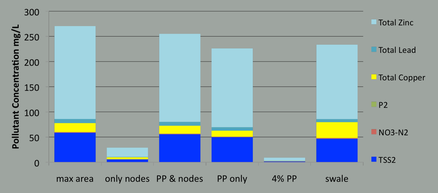
- **livability**
- **urban heat island mitigation**
- **air quality**
- **stormwater quality and runoff reduction**
- **CO_2 mitigation**

Results

Water Runoff Reduction (gal)



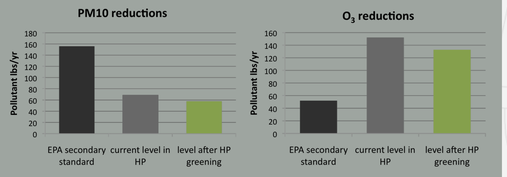
Water Pollutant Reduction



Runoff Reduction: Bioswale Design is capable of capturing all rainfall falling on site, in addition to 54% of runoff generated by surrounding building rooftops. If our Maximum Area Design Scenario was extrapolated to all 900 miles of LA alleys, it would reduce runoff from a 1-year storm event by a total of ~75,540,000 gallons.

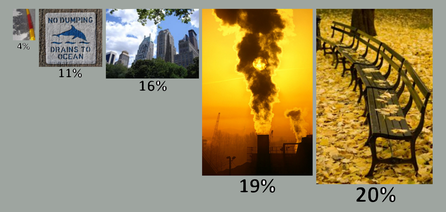
Stormwater Quality: permeable pavers and bioswales can capture water pollutants found in LA urban runoff including ~70-90% of TSS and Zinc and ~40-75% of Phosphorus and Lead.

Air Quality Maximum Area Design

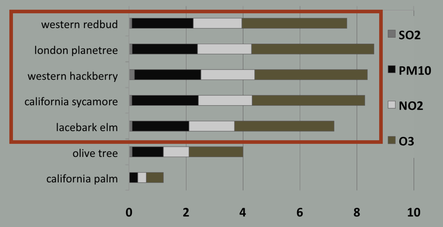


Air Quality: able to quantify particulate capture of specific tree species. Maximum Area Design's 45 trees unable to bring immediate site area into EPA compliance for ozone.

Survey of Community's Concerns



Air Pollutant Deposition (lbs/yr) for Selected Tree Species



Livability: greenspace can impact a range of social issues including health, education, sense of community, walkability, and safety. While impacts are difficult to quantify, conveying intangible impacts to stakeholders as well as quantifying the tangible benefits can build support for more greenspace projects.

Urban Heat Island: potential 4-20 degree C cooling directly under tree canopy.

CO_2 Mitigation: 445-3015 lbs/yr range of carbon sequestration; need to consider embedded carbon costs of construction, site maintenance and design features.

Summary

As urbanization continues, small-scale greenspace can play a pivotal role in providing healthy, livable urban environments. While many impacts are local, interstitial greenspace can provide substantial regional benefits if similar projects are replicated throughout a region. Impacts must be quantified on the appropriate scale: regional or local, social or biophysical. Articulation of the scale at which ecological impacts can be realized can build political support for the cumulative regional benefits, and community support for the local benefits.