Los Angeles' Urban Soil Future

Building Climate Resilience Through Improved Soil and Ecosystem Management

Final Report
May 2025

Photograph taken by Igor Bronz of a hummingbird he and Mary Hillemeier rescued from being trapped in a tent during a site visit for the Residential Landscape Diversity Study

TreePeople
ARLA
Rockefeller Philanthropy Advisors

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Executive Summary

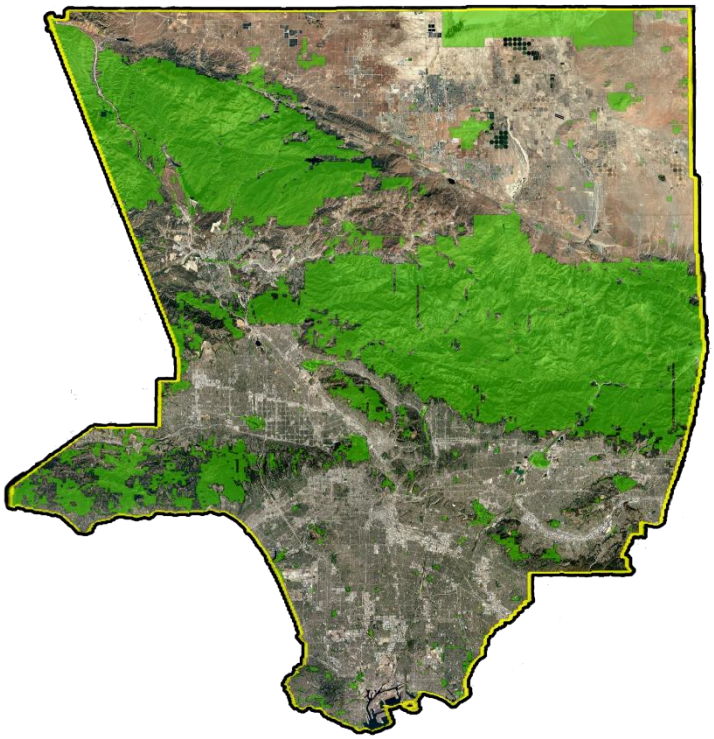
Advancing Soil and Ecosystem Management Through Climate Gardening

One of the key products that emerged from the work on **Los Angeles' Urban Soil Future** is the concept of ***Climate Gardening***. Climate Gardening is advanced as a multi-disciplinary approach for personal and societal decision-making around landscapes, harnessing both a climate- and human- focus. It is intended as an evolution upon existing frameworks and an antidote for their shortcomings – developed for a new era increasingly defined by climate change and our subsequent responses.

Approximately 70% of the immense 4,750 mi^2 land area in LA County is privately owned. 78% of residential land in Los Angeles is zoned for single-family housing. With this in mind, a great deal of Los Angeles' landscape conditions come down to personal choices made by the property owner. For example, with water conservation being an important objective for Southern California, it was a major unintended consequence that the desire for recreational space and perceived high maintenance concerns pushed many property owners to adopt ecology-negative xeriscaping and artificial turf approaches, rather than pursuing the more desirable outcome of constructing native ecosystems in place of monoculture lawns.

Considerations such as these provoke a critical examination of which individual choices, in aggregate, lead to ecological issues, and how these individual choices can be channeled in service of greater environmental goals while still preserving the wants and needs of the property owner. Under a Climate Gardening framework, a turf replacement program may permit the use of native lawn grasses that use less water and promote biodiversity, preserving the desire for recreational space without resorting to practices that harm the critical soil ecosystems underpinning Los Angeles' environmental function.

The development of the Climate Gardening framework is the result of experience performing some of the first studies on soil physical, chemical and hydrologic characteristics of residential properties in Los Angeles County through the Residential Landscape Diversity Study and Urban Dynamic Soil Properties Study, as well as broader urban soils-centered work through helping develop the urban soil components of the LA County Urban Forest Management Plan, advancing soil support systems with partners at the newly formed Social Impact Collaborative, and multiple impactful publications.



Green Denotes Public Land in Los Angeles County
California State Geoportal

In part due to projects through **Los Angeles' Urban Soil Future**, TreePeople emerged as a leader within the Los Angeles urban soils space with nearly $2 million awarded by the Safe Clean Water Program for soils-based projects: GroundTruth, and Next Gen Bioretention.

Climate Gardening, TreePeople's 4th Urban Soils symposium, held on March 7th, 2025, showcased much of the work that Los Angeles' Urban Soil Future led to. The purpose of the symposium was two-fold: to share this important work with LA's broader community of environmental practitioners, and to build partnerships for larger-scale projects centered around urban soils and how they are managed. The impact of this symposium resulted in LA's first Free Soil Testing event, among other important projects in development.

In many ways, the knowledge obtained and partnerships built through **Los Angeles' Urban Soil Future** serve as a powerful catalyst for upcoming projects that include increasing access to ecological resources, facilitating post-fire restoration of urban soils, and developing strategies and pilots to scale nature-based solutions for LA communities.

Project Overview & Partners

Project Name: Los Angeles' Urban Soil Future
Grantee: TreePeople
Grant Period: 6/1/2023 – 3/31/2025
Project Lead: Dr. Dustin L. Herrmann
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TreePeople Project Team

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External Project Team & Urban Soils Collaborative Participants

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Dr. Kirsten Schwarz (UCLA)
Drs. Daniel Hirmas & **Lindsey Slaughter** (Texas Tech University)
Dr. Adam Berland (Ball State University)
Rachel Malarich & **Michelle Barton** (City of Los Angeles)

External Project Team & Urban Soils Collaborative Participants (cont'd)

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Drs. Francisco Escobedo & Dexter Locke (USFS)
Hailey Veirs (Fellow with US Forest Service)
Dr. Eric Wood (CSU Los Angeles)
CSU Long Beach Masters in GIS Capstone Service Project (*Dr. Steven Steinberg, LA County GIS, and students Donald Reinartz & Talisa Andrade, CSULB)*
LA County UFMP Project Leads (*Ryan Allen with Dudek, Rebecca Ferdman with LA County Chief Sustainability Office*)
Dr. Michele Romolini (LMU)
NSF Macrosystems Proposal Soils-Driven Urban Homogenization Cascade Project Team (*led by Dr. Peter Groffman, City University of New York; co-PIs: Dr. Morgan Tingely, UCLA; Dr. Dexter Locke, USFS; Dr. Susannah Lerman, University of Massachusetts; Dr. Sarah Hobbie, University of Minnesota; Dr. Becky Ball, Arizona State University; Dr. Desiree Narango, The Vermont Center for EcoStudies, Dr. Christopher Neill, Woodwell Climate Research Cente; Dr. Jeannine Cavender-Bares, Harvard University, Dr. Meghan Avolio, The Johns Hopkins University, and Dr. Tara Trammell, University of Delaware*)
Urban Soils in Climate Resilience Planning Working Group (Dr. Kirsten Schwarz & PhD Candidates Morgan Rogers, Monika Shankar and Melody Ng, UCLA; Dr. Elizabeth Cook, Barnard College)
Regional Climate Collaborative Proposal Los Angeles Food Climate Collaborative Team (*Alba Velasquez, Los Angeles Food Policy Council; Veronica Montenegro, Rising Communities; Lizette Arzola, LA Central City Neighborhood Partners*)
Ecological Society of America Annual Meeting Symposium on Los Angeles as Model Urban Ecosystem Participants (*Speakers: Dr. Darrel Jenerette, UC Riverside; Dr. Edith de Guzman, UCLA/UC Cooperative Extension; Talia Dodson, TreePeople; Kat Superfisky, City of LA; co-conveners: Drs. Lara Roman & Natalie van Doorn, USFS; Dr. Kirsten Schwarz & PhD Cand. Morgan Rogers, UCLA*)
Dr. Peter Ibsen (US Geological Survey)
Dr. Dilia Kool (Ben Gurion University)
Dr. Danielle Stevenson (CAER)

Project Scope

Seven Core Components of the Los Angeles' Urban Soil Future Grant

1

Giving soil-related input to plans and policy

TreePeople and partners will be at the table to provide input on effective soil management principles and priorities into the currently being developed high level policy and planning documents in Los Angeles. The known policy and plans where TreePeople will be involved are for the City and County of Los Angeles Urban Forest Management Plans, LA City Biodiversity Guidelines, LA City Bureau of Engineering's Biodiversity Checklist, and LA County's Nature-based Solutions Task Force.

2

Designing soil resource support systems

Small scale urban land managers such as home landscapers and urban agriculture entrepreneurs identified the need to be supported by soil management resource support systems. TreePeople and partners will evaluate two important resources, mulch, and clean soil, and design systems that would work to abundantly meet these two foundational needs of poorly resourced urban land managers within the specific political, institutional, economic, biophysical, and infrastructural constraints and opportunities of Los Angeles.

3

Healthy soil management education and skills training

TreePeople will direct its established environmental education and desired workforce development training capacity to create youth curriculum, general audience education, and a workforce development training module that are built around Climate Gardening practices.

4

Community-driven workforce development planning

In collaboration with community members including those initially identified through past activities in Watts and the new Compton office of the USDA-NRCS, TreePeople will support the planning of a project based workforce development program. This component was identified as a next step based on semi-structured interviews with Watts-connected folks involved in urban land management endeavors.

5

Integrating with complementary ARLA activities

TreePeople's Principal Scientist and supporting soil experts will consult the project teams in the ARLA universe of activities where soil-related knowledge is needed.

6

Putting Los Angeles on solid footing for the future by building the locally relevant knowledge foundations for climate resilience through urban soil management

This component will be the largest in scope because it leverages $1M+ in other funding or in kind contributions from SCWP, NRCS, USFS, and others. Its scope can be broken down into five subcomponents: a guiding urban soil geography and then into the four dimensions of climate resilience. The objective is to understand how we unlock the multi-dimensional climate resilience potential of the three competing future ecosystems of Los Angeles across the range of soil conditions in the Los Angeles landscape.

7

Accelerate the scaling of the work

TreePeople with partners will continue to build the momentum around the potential of urban soils and the implementation of best management practices for leveraging their contributions to climate resilience. We will do this through continuing to bring the same sustained and intentional focus on collaboration and network building reflected in the partnerships in this proposal. Further, we will create opportunities for being visible leaders in urban soil as a "people and nature" approach to climate resilience through such activities like continuing the annual Los Angeles Urban Soil Symposium. Finally, we will leverage partnerships and our recognition as leaders in pursuing major grant opportunities.

Residential Landscape Diversity Study Soil

A Patch-based Survey of Ground Cover Impact on Surface Soil Properties

Background & Purpose

78% of residential land in Los Angeles is zoned for single-family housing, representing the single largest land use category. The aim of the study is to understand the effect of ground cover on soil physical, chemical and hydrological characteristics within single-family residential properties, and to understand homeowners motivations behind choosing one form of ground cover over another. This is the starting point towards developing better socio-ecological approaches for improving soil development. As ground cover is often the choice of the homeowner, this is an actionable opportunity area to improve soil properties across Los Angeles County, leading to improved stormwater capture, increased resilience, reduced extreme heat, and other benefits.

TreePeople and US Forest Service Staff sampling a lawn patch during the RLD Study
Photo by April Laird

Methods & Data Collection

Sampling was performed on patches, defined as discrete sections of soil separated from other parts of the property by either impermeable surfaces or other clear delineations. For example, a front yard may be considered one patch, or subdivided into multiple patches. At each site, patches were chosen to best reflect the overall composition of different available ground covers in order to best compare differences in soil characteristics within the same site. Each patch was also separated into an edge component (first 0.5 meters from the border) and center component. Patches narrower than 1 meter did not contain a center component.

The purpose of this method is to determine if 'edge effects' (such as increased foot or vehicle traffic) play a significant role in affecting soil physical, chemical and hydrologic properties.

Three primary ground cover types were investigated:

Traditional/Lawn
A typical grass lawn with at least 30% of surface covered by grass. Trees may be present within patches.

Modernist/Non-Biological
A non-living cover such as gravel, bare soil, or artificial turf. Presence of succulents & other low-metabolism plants permitted in this category

Ecological
Densely vegetated patches with native or non-native vegetation and interstitial space between plants covered by mulch or leaf litter.

25 representative sites were sampled across LA county. In-situ measurements were performed, and **232 bagged samples** were analyzed at the USFS Pacific Southwest Research Station and at the Texas Tech University Bayer Plant Sciences Laboratory. All testing was performed on the **top 5"** of the mineral soil within the patch.

In-situ Measurements
- Unsaturated Hydraulic Conductivity
- Surface Bearing Strength
- Sunlight Exposure
- Electro-conductivity
- Soil Temperature
- Bulk Density

Laboratory Measurements
- pH
- Texture
- Organic Matter
- Microbial Respiration
- Soil Moisture Content

Residential Landscape Diversity Study Social

A Patch-based Survey of Ground Cover Impact on Surface Soil Properties

A chicken standing on an ecological-designated patch in a study participant's yard
Photo by Mary Hillemeier

The Social Context

Interviews were conducted for each participant to better understand their motivations & decision-making process with regard to their landscape choices. 26 interviews were conducted in total. Participants are believed to be more sustainability-motivated than the average LA resident due to their connection to TreePeople and willingness to participate in this study.

Key Findings

- The interviews found that residential landscape managers in our study are not only motivated by the aesthetic and recreational aspects of gardening, but also engage in gardening as a means of contributing to broader environmental goals.
- Awareness of soil's potential as a climate mitigation tool remains relatively low among not only study participants, but presumably the general public.
- Residential landscape modifications seem to occur in clusters, with local gardening "steward-influencers" igniting change most successfully proximally in their community, suggesting a strategic entry point for cultivating soil knowledge.

Soil Management Considerations

Parking Considerations: **25%**
Cost Considerations: **43%**
Water Conservation Capacity: **62%**
Time Available for Gardening: **56%**

Has Social Interaction Aspects: **69%**
- Reduces Interaction: **31%**
- Increases Interaction: **25%**
- Privacy/Barrier Function: **19%**

Preference for low-cost, low-maintenance landscapes that do not use much water. Some participants who park outdoors were concerned about plants impeding their ability to park or keep the vehicle clean.

Most participants found that their landscaping choices had an impact on social interactions, with results equally split between increased and decreased interaction. Most likely, the decreased interaction came from the use privacy barriers such as tall plants, walls, fences or hedges.

Conclusion

Despite study participants being more concerned about broader sustainability and climate goals than the average, the very real considerations of maintenance, cost and impact on individual social interaction ("steward-influencer" vs. desiring more privacy) seem to play a major role in landscaping decisions. The elevation of water conservation goals (independent of costs) can be considered a form of marketing success by entities employing this messaging. There is a clear opportunity for improving adoption of dense vegetation as opposed to xeriscaping by marketing ease-of-maintenance, low-cost, and water conservation aspects of certain native plants. Recreation as a consideration for ground cover is likely under-represented in this study due to participants skewing older without young children.

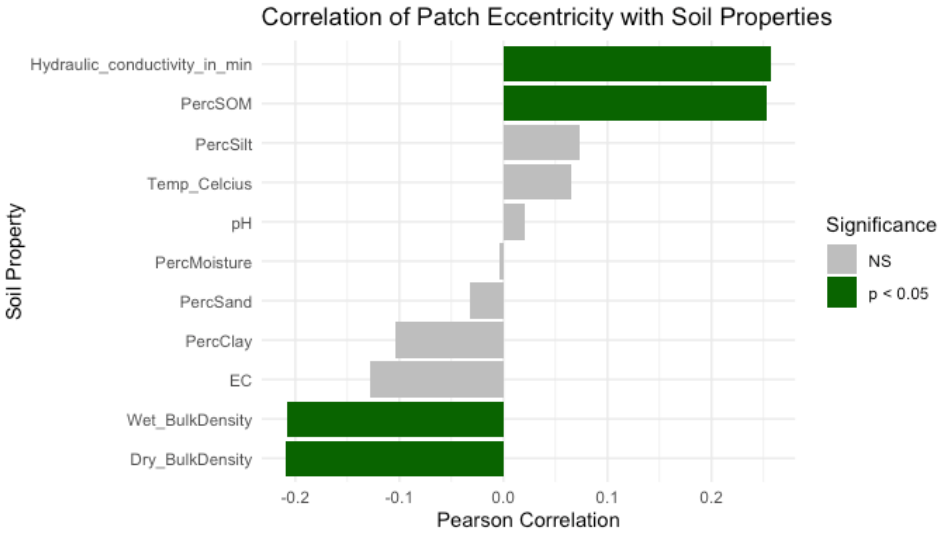
Residential Landscape Diversity Study Synthesis

A Patch-based Survey of Ground Cover Impact on Surface Soil Properties

Soil Analysis Results

Results indicated that landscape type has a strong influence on several key soil characteristics.

- **Wet Bulk Density and Dry Bulk Density were significantly higher in Modernist landscapes**, suggesting greater soil compaction.
- **Soil pH differed by landscape type**. Traditional landscapes exhibited slightly more acidic soils than Modernist landscapes.
- **Percent Moisture was significantly higher in Ecological and Traditional landscapes**, indicating better water retention in more ecologically managed areas.
- **Soil Organic Matter (SOM) showed the strongest differences**: Ecological landscapes had the highest SOM, followed by Traditional and Modernist landscapes
- Other properties, including soil temperature, electrical conductivity (EC), and soil texture components (sand, silt, and clay percentages), **did not significantly differ between landscape types.**
- **Edge versus center sampling points showed no strong differences for most soil parameters.** Dry Bulk Density ($p = 0.065$) and Soil Organic Matter ($p = 0.087$) exhibited marginal trends, suggesting that edges may have slightly denser and lower-organic matter soils compared to centers, but these differences were not statistically robust.
- **Spatial configuration of a patch matters**: Less spatially "eccentric" patches (bigger area relative to their edge) may foster conditions for soil formation, organic matter accumulation, and better structure.



TreePeople staff and interns and US Forest Service staff gathered at the final field site for the RLD Study. *Photo by Mary Hillemeier*

Synthesis

One of the most important questions we sought to answer is: to what extent does ground cover – which is the choice of the property owner – affect soil health?

We found that overall, soil quality metrics were significantly influenced by landscape type, ground cover type, patch size and perimeter as well as patch eccentricity. Ecological landscapes and natural ground covers such as mulch, leaf litter, and pine needles were associated with higher soil organic matter, greater moisture retention, better infiltration rates, and lower electrical conductivity. Our findings highlight that larger, less eccentric, vegetated patches with natural ground covers (e.g., mulch, litter) and within ecological landscape types have the most positive impact on soil health indicators.

Further, due to low awareness of soil's potential as a climate mitigation tool, there is an opportunity to promote better soil management by emphasizing existing low maintenance and water conservation aspects of native, ecological landscapes when discussing these landscapes as an option for homeowners.

Dynamic Urban Soil Properties Study

A Pit-based Characterization of Urban Soil on LA Residential Properties

Background & Purpose

A complement to the patch-based approach of the Residential Landscape Diversity Study for characterizing the impact of ground cover on soil development within the first five inches, the Dynamic Urban Soil Properties Study takes on a pit-based approach to this process. The goal is to provide additional context by understanding the soil depth at which ground cover impacts "trail off" and native soil qualities "take over". Given that soil development processes are gradual, this important knowledge allows us to interpret the impact of ground cover changes over time, which requires knowing the depth and extend of the modified zone.

This collaborative study was an opportunity for the special projects team at USDA-NRCS to improve their soil survey and particularly for the Hueneme series, more commonly found in the southern portion of Los Angeles County.

TreePeople and USDA-NRCS Staff performing sampling with homeowner observing (left)
Photo by Igor Bronz

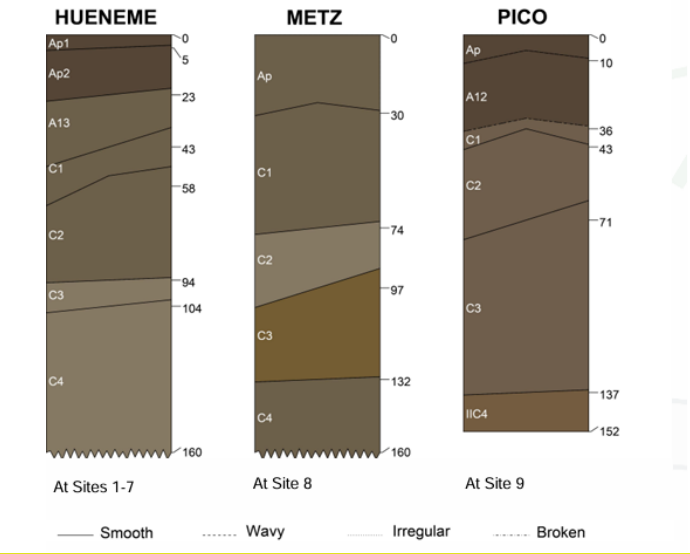
A Soil Pit Excavated In a Lawn
Photo by Igor Bronz

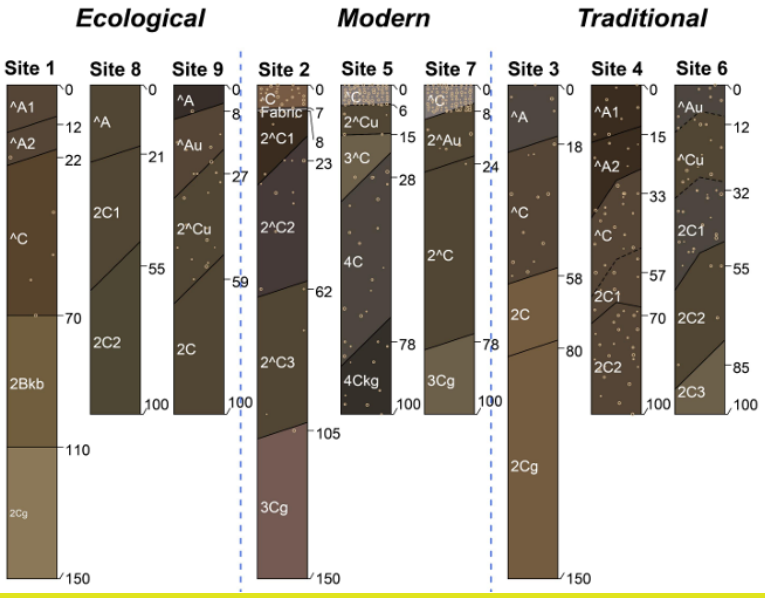
Methods & Data Collection

This study was performed on 9 residential sites initially contacted during the Residential Soils Diversity Study. There were 3 sites chosen for each ground cover type: lawn, non-biological, and ecological. A representative patch was selected and a soil pit was excavated to a depth range of 100-150 cm. USDA-NRCS staff performed a soil pit characterization based on their protocols, and TreePeople gathered bagged samples from each soil horizon to send for laboratory measurements described on Page 4.

Preliminary Findings

While much of the data analysis for this study is still ongoing, the below correlations compare mapped soil profiles (left) to the described soil profiles during this study (right), demonstrating marked differences in soil structure between ground cover types largely attributed to management. There are also significant differences between described and mapped soils, demonstrating the heterogeneity of urban soils in general.





Socio-Economic Benefits of LA Trees Study

Describing the Value of Trees and other Plants on LA Residential Properties

US Forest Service & TreePeople staff performing the Socio-Economic Benefits of LA Trees Study & Residential Landscape Diversity Study at a residential property
Photo by April Laird

Background & Purpose

Managed by the USDA, this environmental justice-focused study seeks to understand if trees and biodiversity are improving the well-being of residents in the Los Angeles area. The information from this research may assist partners in foregrounding equity and environmental justice when identifying, locating, and implementing future tree planting projects.

We understand trees to be an integral part of any healthy urban ecosystem, however many Angelenos view trees as a nuisance for various reasons. This study serves two main two main goals within the Climate Gardening context: To better understand the relationship that residents have with their trees, and to develop better outreach around trees.

Methods & Data Collection

Work on this study was performed on 25 residential properties alongside the Residential Landscape Diversity Study. TreePeople also assisted the US Forest Service in securing 40 additional properties to survey. The USFS catalogued the species, size and condition of every tree and shrub larger than 0.5 meters found on each property, **obtaining over 100,000 individual data points across 65+ sites**. This and other data will be fed into USFS social valuation models to determine property-specific impacts and be able to extrapolate these values across broader geographies based on property typology. The study is currently ongoing at the time of this report and will be published at a later date.

US Forest Service staff measuring shrubs at a residential property
Photo by Mary Hillemeier

Preliminary Findings

It would appear at this stage in the analysis that number of trees & tree diversity at a property correlate positively with property value.
While this was not an unexpected finding, there also seems to be a **strong variability in tree density and diversity among properties of similar values and lot sizes, suggesting that there is also a clear sociological angle to decision-making regarding trees**. This may be an opportunity area to explore why certain individuals maintain trees on their property while others do not and whether common objections to trees can be defeated.

Climate Gardening Symposium Conference

The 4th Los Angeles Urban Soil Symposium

Meeting Our Moment

Climate Gardening was the theme of TreePeople's 4th Los Angeles Urban Soil Symposium, held at the NewStart Housing Corporation on March 7, 2025.

With over **130 environmental practitioners** attending on a weekday representing important public and private institutions as well as project collaborators, our research and discussions made it clear that there is a need for a new guiding ecological framework for cities – one that directs human needs in service of environmental goals through innovative practices and adjusted social conventions. The purpose of the symposium was two-fold: to share this important work with LA's broader community of environmental practitioners, and to build partnerships for larger-scale projects centered around urban soils and how they are managed.

Andy Lipkis presenting at the Climate Gardening Symposium
Photo by Igor Bronz

Presenters

Andy Lipkis	What if it had been 'SoilPeople'?
Melani Smith	Gateway Cities Regional Climate Collaborative
John D. Bunzel	Address by the TreePeople Board Chair
Mary Hillemeier	Meeting Our Moment with Climate Gardening
Dustin Herrmann	Climate Gardening: Preparing for the Mid-Century
Francisco Escobedo	Wildfire Resilience
Kirsten Schwarz	Soil Health in the Aftermath of the LA Fire
Igor Bronz	A Case for Circular Soil Systems
Danielle Stevenson	Toward an Ecological Approach to Soil Remediation
Eric Wood	Wildlife at Your Doorstep: The Ecology of Native Plants, Birds, and Pollinators
Kate Forester	Green Infrastructure Ecology: Considerations for Designing and Maintaining Healthy, Functional, and Climate Resilient Systems
Lindsey Slaughter	Ecosystem Linkages Between Soils and Human Health: Importance and Drivers of Soil Microbial Diversity
Kim Karlsrud & Daniel Phillips	The Mesquite Mile
Michele Romolini	Art-Based Engagement to Promote Human-Centered Landscapes
Daniel Hirmas	Ground Truth: Guiding a Soils-Based Strategy for Impactful Nature-Based Solutions
Hoori Ajami	Improving Water Resource Management Using Hydrologic Models
Monika Shankar	Digging Deeper: Cultivating a Resilient LA by Centering Community Knowledge & Priorities
Valeria Velasquez	LA Food Policy Council
Matt Teutemiz	Where Do We Go From Here?
Melanie Winter	Reflections on the Day

Climate Gardening Symposium Impact

The 4th Los Angeles Urban Soil Symposium

The Mosaic Machine: A) Front, B) Back showing gumball machine mechanisms, C) Close-up of the watershed populated with rubber balls representing landscapes

Photos by Daniel Phillips

Bridging Art & Science

Achieving Climate Gardening goals at scale requires communicating sophisticated ecological concepts, necessitating exploring ecological art as an avenue for communication.

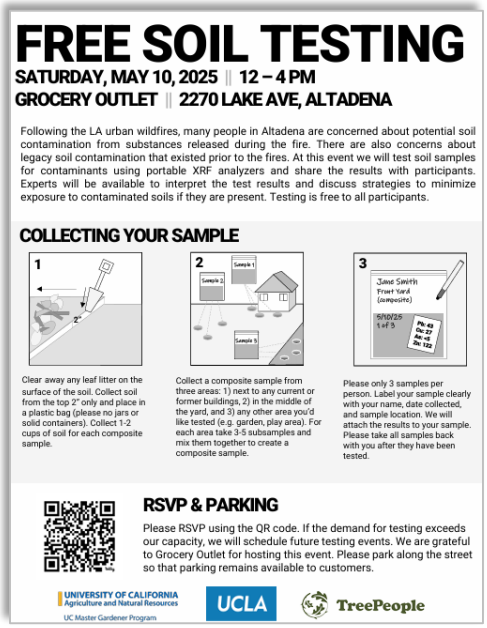
The Mosaic Machine is an interactive art installation by Kim Karlsrud & Daniel Phillips of COMMONStudio that gives participants a choice of one of four landscapes (traditionalist, modernist, ecological and foodscape) to add to a scale representation of the Rio Hondo watershed. This is done through a gumball machine mechanism which sends balls of four different colors, each representing a landscape type, into a cutout of the Rio Hondo watershed at the front of the machine. Eventually, the actions of a few hundred people will populate the watershed and represent how individual landscaping choices lead to a collective outcome.

Research Gathering

On March 8th, 2025, 15 symposium contributors gathered to discuss future opportunities for urban soils research in Los Angeles. This productive all-day meeting resulted in new collaborations being made between participants and development of plans for larger-scale implementation projects, such as a grant for a Circular Soils & Carbon Network to divert clean sediment from land development and native vegetation from utilities clearing operations in order to turn this material into clean soil for use in restoration and remediation projects across LA.

LA's First Community Soil Testing Event

Through connections made at the Climate Gardening Symposium, TreePeople partnered with UCLA and Altadena community organizer Kristy Brauch (UC Master Gardener; UCANR California Naturalist) to bring a Free Soil Testing event to fire-affected communities in Altadena, set for May 10, 2025. At this event, local residents will bring bagged soil samples from their properties to get tested for heavy metals contamination. Uniquely, each attendee will receive a consultation about their results from soil contamination experts in our collaborator group. This event is funded externally but the need was identified during the Climate Gardening symposium, demonstrating lasting impact.



FREE SOIL TESTING

SATURDAY, MAY 10, 2025 || 12 – 4 PM

GROCERY OUTLET || 2270 LAKE AVE, ALTADENA

Following the LA urban wildfires, many people in Altadena are concerned about potential soil contamination from substances released during the fire. There are also concerns about legacy soil contamination that existed prior to the fires. At this event we will test soil samples for contaminants using portable XRF analyzers and share the results with participants. Experts will be available to interpret the test results and discuss strategies to minimize exposure to contaminated soils if they are present. Testing is free to all participants.

COLLECTING YOUR SAMPLE

1 Clear away any leaf litter on the surface of the soil. Collect soil from the top 2" only and place in a plastic bag (please no jars or solid containers). Collect 1-2 cups of soil for each composite sample.

2 Collect a composite sample from three areas: 1) next to any current or former buildings, 2) in the middle of the yard, and 3) any other area you'd like tested (e.g. garden, play area). For each area take 3-5 subsamples and mix them together to create a composite sample.

3 Please only 3 samples per person. Label your sample clearly with your name, date collected, and sample location. We will attach the results to your sample. Please take all samples back with you after they have been tested.

RSVP & PARKING

Please RSVP using the QR code. If the demand for testing exceeds our capacity, we will schedule future testing events. We are grateful to Grocery Outlet for hosting this event. Please park along the street so that parking remains available to customers.

UNIVERSITY OF CALIFORNIA Agriculture and Natural Resources UC Master Gardener Program | UCLA | TreePeople

Free Soil Testing Event

Bringing Soil Testing Services & Consultation to Fire-Affected Altadena

LA's First Soil Testing Event

A team composed of TreePeople, UCLA and Mount Saint Mary's University staff conducted LA's first Free Soil Testing Event on Saturday, May 10th from 12 noon to 4 pm at the Grocery Outlet within the Eaton Fire-affected area of Altadena.

Despite the intense 95 degree heat, Dustin Herrmann (TreePeople), Igor Bronz (TreePeople), Kirsten Schwarz (UCLA), Jenny Jay (UCLA), Sanjay Mohanty (UCLA), Adriane Jones (MSMU), and their students **screened over 250 samples for over 90 participants** for heavy metals such as lead, arsenic, cobalt, copper, nickel, mercury and chromium, providing vital individualized consulting that brought peace of mind to Altadena residents who were concerned about potential soil contamination from ash deposition from the wildfire on their soil.

Participants also received a custom-made 1-page educational document providing details about soil contamination.

This event was organized through a connection made with Kristy Brauch, a Pasadena resident, at the Climate Gardening symposium, demonstrating the impact of symposia on driving important work.

Participants waiting to get their soil screened for heavy metals, Altadena, May 10th
Photo by Igor Bronz

SOIL TESTING INFO SHEET

UCLA · TreePeople · Mount Saint Mary's University

SOURCES OF SOIL CONTAMINATION

Any substance in the soil that exceeds naturally-occurring levels *and* poses human and/or environmental health risks is a soil contaminant.

Soil can become contaminated from legacy sources (past land use, industrial activity, lead-based paints, leaded fuels) as well as contemporary sources (wildfires, smelting, dumping). Many of the pollutants of concern (lead, arsenic, copper, zinc) are the same for legacy and contemporary sources.

WHY IS SOIL CONTAMINATION A CONCERN?

Contaminated soil can harm those who work with or around soil. People can be exposed when they accidentally eat or breathe in soil particles. Young children, who are especially vulnerable to most types of soil contaminants, can be exposed when they play in contaminated soil, transferring soil from their hands to their mouths, or to food.

The only way to know if soil is contaminated is to test it.

CONTAMINANT LEVELS

We will provide concentrations for Lead, Arsenic, Cobalt and Copper by default; however, we screen your sample for all of the below elements and will also include their concentrations if they exceed EPA Residential Action Levels.

INORGANIC CONTAMINANT[1]	RESIDENTIAL ACTION LEVEL (PPM or mg/kg)[2]
Lead	80* / 200
Arsenic	35
Cobalt	23
Copper	3100
Nickel	670
Mercury	7
Chromium	70

POTENTIAL SOURCES[3] (L)egacy or (C)ontemporary

Leaded Paint (L)	Leaded Fuel (L)
Wildfires (C)	Industrial Activity (L/C)
Building Materials (L/C)	Waste Incineration (L)
Treated Lumber (C)	Commercial Land Use (L/C)
Car Batteries (L/C)	Landfills & Dump Sites (L/C)
Pesticides & Herbicides (L)	

1. This is a list of potential contaminants that can be found in soil and that the pXRF analyzer is capable of reliably measuring.
2. Action levels are based on EPA's Regional Screening Level (RSL) Resident Soil Table (November 2024) under the Noncancer Child Hazard Index. These are guidance levels for soil found on residential properties (commercial and industrial have different standards) based on exposure risk associated with ingestion, inhalation and dermal contact of contaminated soil. Actual risk depends on individual factors.
3. Potential sources refer to anthropogenic activities that have contributed to elevated inorganic contaminant concentrations in soil. Legacy refers to past sources, and contemporary refers to current sources. Some fall under both categories.

* California standard, which differs from EPA standard. Best management practices for decreasing soil exposure recommended for values between 80 and 200, such as frequent handwashing and dust management.

INORGANIC CONTAMINANTS

Sometimes referred to as simply 'heavy metals', inorganic contaminants can persist in the environment for centuries. They are not very reactive or mobile under normal conditions. They rarely affect plant growth, however long-term human exposure can cause chronic health effects. Risks depend on age, contaminant concentration, and existing medical conditions.

ORGANIC CONTAMINANTS

There are many types of organic contaminants. They are typically characterized by high mobility & volatility (risks to groundwater and air quality), and are more likely to cause acute health problems (requiring immediate medical attention) upon exposure. Organic contamination is much less widespread than inorganic contamination, but more serious. When discovered, organic contamination often requires prompt assistance from the appropriate authorities to properly manage.

STAYING SAFE

Keep children away from soil contaminated with heavy metals
Children are more at risk from soil contamination than adults. Children tend to ingest greater quantities of soil due to behavior, their bodies absorb contaminants more readily, and certain soil contaminants can cause developmental harm.

Do not eat contaminated soil, or root vegetables and leafy greens grown in contaminated soil
Soil particles stick to the surface of produce and in the case of root vegetables or leafy greens, can be very difficult to remove. Heavy metals do not typically enter plants.

Reduce soil dust as much as possible
Dry soil can become airborne under windy conditions. Be sure to keep soil moist, covered by vegetation or mulch, and avoid dusty conditions.

FREQUENTLY ASKED QUESTIONS

How do I manage soil contaminated with heavy metals?
Strategies include, but are not limited to: adding compost and mulch, adjusting pH to decrease contaminant mobility, ensuring that soil is well-planted, and covering contaminated soil with layers of clean soil, compost and mulch.

How far can heavy metals spread?
Under most soil conditions, heavy metals rarely enter plants or groundwater, and mostly stick to the surfaces of plants or remain in the soil. Plants with smooth surfaces can be washed and peeled to eliminate risk of exposure.

Can I use results from a soil testing event for insurance claims?
No. Insurance claims typically require a more comprehensive individualized site assessment that would be performed by a licensed environmental consulting firm.

May 2025

Top: *Staff and Volunteers using XRF analyzers to screen soil samples for heavy metals in Altadena, May 10th*
Photo by Igor Bronz
Bottom: *Soil Testing 1-pager given to event participants*

Climate Gardening Short Course

Building a Baseline Understanding of Climate Gardening

The Need for Education

One of the critical components underpinning the Climate Gardening framework is the need for Los Angeles residents to have a fairly nuanced understanding of ecosystem function in order for them to make informed decisions regarding the landscapes they manage

The Short Course

The cohort in this month-long inaugural short course was selected from a pool of applicants who has prior relationships with TreePeople and are committed to climate and environmental goals. The short course was designed to introduce the practice of climate gardening – a socio-ecological approach to landscape management -that seeks to optimize ecosystem development within the context of human needs.

Instructor Danielle Stevenson, PhD, delivering a lecture to Climate Gardening Short Course Students
Photo by Mary Hillemeier

Course Goals:

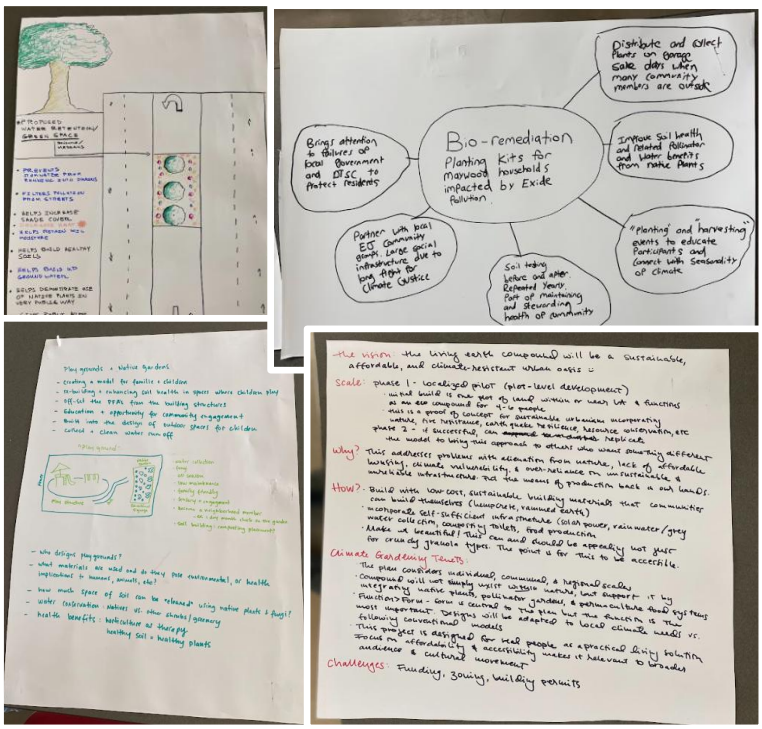
Read urban landscapes through an ecosystems and climate-adaptation lens.

Assess water, soil, and plant traits in a landscape and its impact on the local ecology.

Assess the impact of different landscape types on the wider urban ecology.

Articulate one's relationship with nature and the local ecosystem

Develop the skills to build collective capacity for climate adaptation



Course Outcomes

Engagement was led by practitioners from TreePeople's Research, Policy and Green Infrastructure teams, and external experts from the Center for Applied Ecological Remediation and Texas Tech University.

The course culminated in a project proposal asking participants to apply their Climate Gardening tenants to landscape transformation. The **18 inaugural participants** created proposals that that reflected a keen understanding of the potential for urban landscapes to enhance the local ecosystem while adapting to climate change and the importance of relational values among one's community and landscape.

A survey was administered to students, which received **overwhelmingly positive responses**, with students praising the applicability of the knowledge.

Ecological Society of America Special Sessions 1 & 2

Three Special Sessions Spanning Topics on Los Angeles Ecology

ESA opening event at the Long Beach Convention Center
Photo from ESA website

Description

The ESA is an international conference with thousands of ecologists attending. Kirsten Schwarz (UCLA), Natalie van Doorn (USFS), Dustin Herrmann (TreePeople) and Monika Shankar (UCLA) organized a special symposium session titled **Exploring the Past, Present and Future of Urban Ecology in Los Angeles** for the 2024 Ecological Society of America conference at the Long Beach Convention Center. This session was held from 3:30 – 5 pm on Wednesday, August 7th, 2024.

This Inspire session aimed to provide an overview of the past, present, and future of LA urban ecology, shared through the work of practitioners, community organizers and activists, and academic researchers. Topics covered will include the historical ecology of LA, green infrastructure and LA's changing urban tree canopy, urban food systems, biodiversity, extreme heat, sustainability planning, and community-based participatory research as a mechanism to build more resilient futures.

Contributors

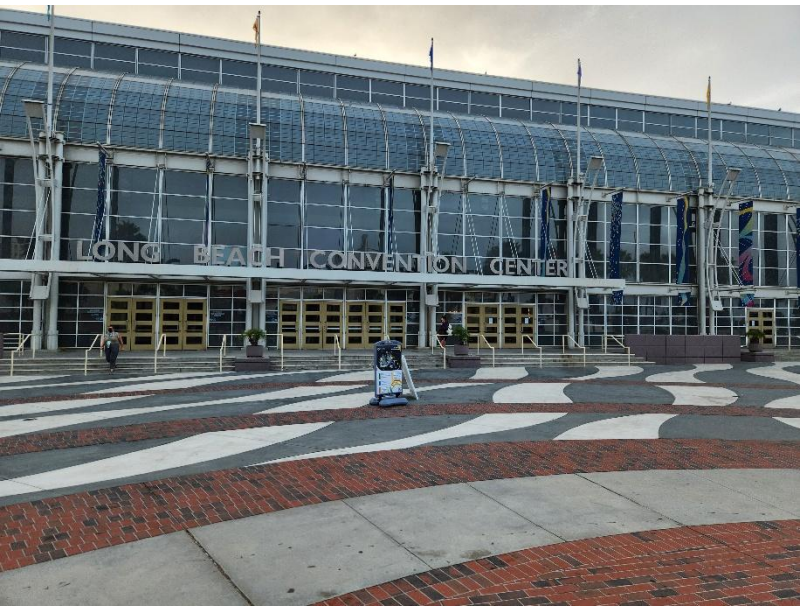
Eric Wood	California State University - Los Angeles	Quantifying the temporal effects of urbanization on avifauna throughout Greater Los Angeles
Natasha Khanna-Dang	California State University - Los Angeles	Challenges and opportunities for protecting California walnut woodland habitat
Natalie van Doorn	U.S. Forest Service	Greener City, Displaced Lives? Untangling the Links Between Trees and Gentrification in Los Angeles, CA
Jamiah Hargins	Crop Swap LA	Community-based urban farming: Food as a unifier and organizing keystone
Lara Roman	U.S. Forest Service	Are trees always good? Disservices and barriers to participation
Morgan Rogers	University of California – Los Angeles	LA from Above: The Power of 3D Remote Sensing in Urban Ecological Studies
Jonathan Ocón	Clark University	From the urban forest to random forest: Leveraging aerial remote sensing imagery for tree species identification in Los Angeles County
Alejandro Fabian	TreePeople	Cultivating Regional Resilience through Community-Supportive Ecology
Rebecca Ferdman	LA County Chief Sustainability Office	Room To Grow: An equitable community forest for LA County
Jason Douglas	University of California - Irvine	Empowerment praxis: Community research and organizing for environmental health and justice

Presentations

Dustin Herrmann presented at a session titled **Think Globally and Act Locally: How Ecologists Can Make a Difference in their Communities Throughout Their Careers** where he spoke about his personal journey as an ecologist and described several ecological success stories, both from his native Illinois and Southern California.

Ecological Society of America Special Session 3

Three Special Sessions Spanning Topics on Los Angeles Ecology



Long Beach Convention Center on the day of the event
Photos by Igor Bronz

Description

Dustin Herrmann (TreePeople), Lara Roman (USFS), Natalie van Doorn (USFS), Morgan Rogers (UCLA) and Kirsten Schwarz (UCLA) organized a special symposium session titled **Urban Ecology in a Biological and Cultural Diversity Hotspot: From Testing Theories to Improving Wellbeing in Greater Los Angeles** for the 2024 Ecological Society of America conference at the Long Beach Convention Center. This session was held from 1:30 – 3 pm on Thursday, August 8th, 2024.

This special session features a series of distinguished speakers advancing our understanding of social-ecological systems within the urban environment of Los Angeles. Speakers were selected for both for their individual contributions as practitioners and for the sector they represent (academia, government, non-profit/community, and a boundary spanner) to convey the unique perspectives of coalitions directing applied ecology in the Los Angeles area.

Contributors

Lessons from the Los Angeles Urban Ecosystem: Diversity, Functioning, and People
Darrel Jenerette
Professor of Landscape Ecology
University of California, Riverside

The Urban Landscape: Community as the Final Frontier of Ecological Processes
Talia Dotson
Community Organizing Senior Manager
TreePeople

A Thousand Forests in One Acorn: Distilling the Power of Multiple Diversities
Edith de Guzman
Water and Adaptation Policy Cooperative Extension Specialist
UCLA Luskin Center for Innovation

Balancing Biodiversity with Human Development in Los Angeles, California
Kat Superfisky
Urban Ecologist
City of Los Angeles

Impact

Los Angeles is known for its cultural diversity and its Mediterranean climate that across valley-to-mountain and coast-to-inland transitions generates arguably unmatched social-ecological gradients for a single metropolitan area. This is the test-bed for the Climate Gardening framework. Over **200 local, national, and international ecologists and other researchers** attended sessions that TreePeople staff co-organized or spoke at, providing credibility for these next-generation concepts through their feedback and inquiry.

Soil access is an equity issue for urban climate resilience

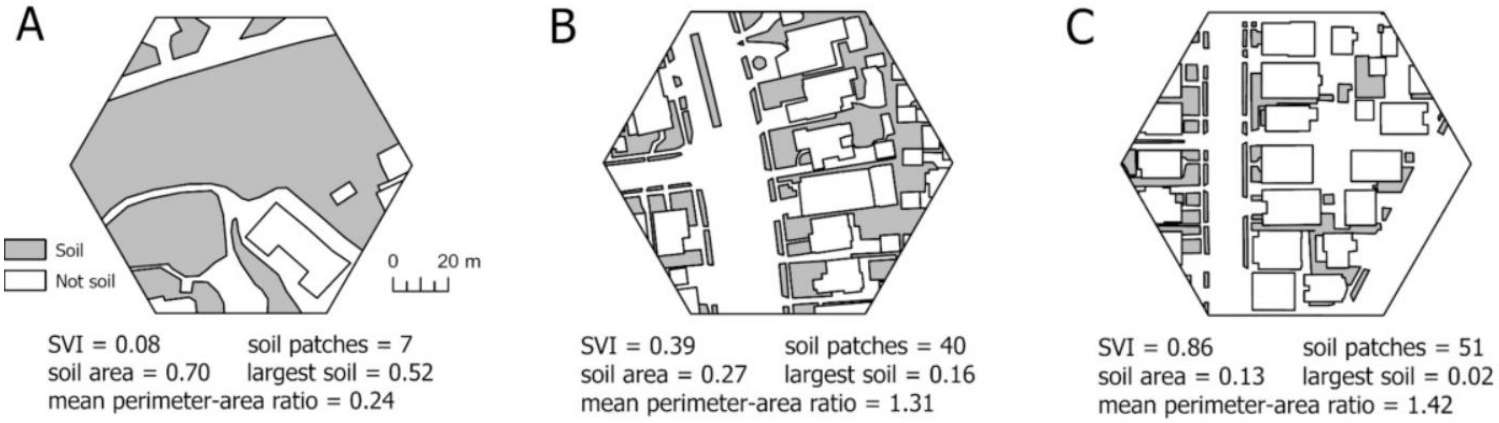
Landscape & Urban Planning, Volume 260, August 2025, 105395

Description

This study investigates how soil is distributed at fine spatial scales across Los Angeles County to examine the potential to for nature-based solutions to be realized equitably. Written by Adam Berland (Ball State University), Dustin Herrmann (TreePeople), Dexter Locke (USFS), and Kirsten Schwarz (UCLA) the significant findings of this study were accepted into the Journal of Landscape & Urban Planning (vol. 260).

Methods

- Randomly selected 1-hectare hexagons across south LA County with predominantly residential land
- Analysts used GIS and high-resolution air photos to draw polygons representing relevant factors
- The following four metrics were calculated to quantify overall availability, fragmentation, abundance and configuration of soil: 1) number of soil patches, 2) total area of 1-ha hexagon classified as soil, 3) largest soil polygon via the largest soil patch, 4) Mean soil perimeter ratio
- Soil metrics were compared to the US CDC/ATSDR Social Vulnerability Index to explore dimensions of equity related to soil availability. The index ranges from 0 (lowest vulnerability to 1 (highest vulnerability)

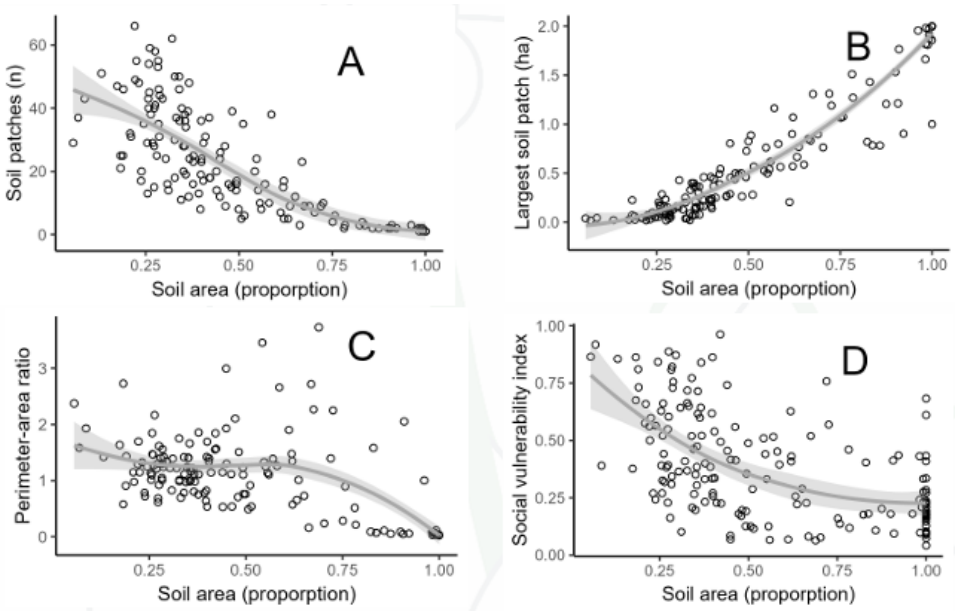


Geospatial approach using 1-hectare hexagons and soil metrics.
Illustrations from Soil access is an equity issue for urban climate resilience, Berland, et. Al. 2025

Conclusion & Impact

Significant correlations were observed among four metrics describing soil abundance and configuration in residential areas. These soil metrics were also significantly associated with social vulnerability, where high-vulnerability areas had soil surfaces that were less abundant, more irregularly shaped, and more fragmented.

This demonstrates the need for changes to urban planning & policy to transform areas with limited soil access as an obstacle for the implementation of the Climate Gardening framework. It is designed to be universally applicable, but actual impact varies by soil access.



Graphs showing relationships between tracked metrics and total soil area portion of the hexagon's area

In Pursuit of Clean Soil Support Systems

Improving Access to Ecological Resources through Soil Banking

An illustration of the Clean Soil Network system
Image by Igor Bronz

Background

The premise of a Clean Soil Network is straightforward: divert clean sediment excavated from deep underground during construction activity, mix it with locally produced compost and other organics, and turn it into a high-value ecological resource made available to communities for environmental restoration projects. New York City has a similar program with the Clean Soil Bank and it works well. The potential for this to succeed in Los Angeles is even greater due to LA's unique geography and needs.

Optimizing existing systems under a Climate Gardening framework heavily incorporates circular and adaptive reuse processes. The easiest systems to optimize are those that are already inefficient, such as the materials handling supply chain, which includes high trucking mileage, tipping fees to dispose, and additional fees to collect material. We can make this more efficient and in service of the environment.

Cool Soils LA

TreePeople, in collaboration with LA Sanitation, applied for an Extreme Heat and Community Resilience Program grant from the Governor's Office of Land Use and Climate Innovation. This grant was titled Cool Soils LA and would have funded the planning portion of this plan. The proposal was ultimately unsuccessful, however there was a **high degree of interest from partners within LA Sanitation and other potential collaborators**, We determined that this idea needed further internal development.

Transformative Grant - SIP

The **Social Impact Collaborative**, a group of 6 organizations (including TreePeople) and led by Dr. Kirsten Schwarz, **applied for a $250,000 grant in April 2025** to conduct soil research and action to support in post-fire recovery and rebuilding. This grant proposes to scale and implement a set of strategies to address our co-produced soil priorities: (1) a community soil testing program and synergistic soil curriculum, (2) a novel remediation program that includes residential soil banking with co-located composting hubs, and community-engaged bioremediation on high-priority sites, and (3) policy analysis to advance urban soil systems in LA and serve as a nationwide model. This would include considerable planning and siting work for a Clean Soil Network approach.

Circular Soils & Carbon Network

One of the major connections made during the Climate Gardening symposium was with Matthew Teutimez, Founder of Laboratory for Indigenous Knowledge Systems, and Danielle Stevenson, Founder of the Center for Applied Ecological Remediation. In early collaboration, we created an outline for a scaled soil mixing site that would demonstrate the two-fold program that focuses on creating healthy soils from diverted construction sediment, and sequesters carbon from routine vegetation removal by utilities. This creates a home for two important waste-stream products, and provides a host of ecological co-benefits. We plan to **apply for a tribal grant of at least $750,000** in order to pilot a soil mixing site for several months, and use generate enough material to restore a contaminated section of land in West Covina.

Climate Resilience in the Schoolyard

Engaging students in a hands-on exploration of soils and climate resilience

TreePeople environmental educators lead LAUSD students in **an observation** lesson to document and describe the trees and tree wells in their schoolyard
Photo by Mary Hillemeier

LAUSD students engage in **exploration**, measuring and comparing surface temperatures and water infiltration in the schoolyard
Photo by Olivia Bailey

Project Description

TreePeople environmental educators worked with Los Angeles County students to explore the role of soils, trees, and learning gardens in contributing to climate resilience in their own schoolyards. TreePeople's education team developed an original curriculum to contextualize and engage students in the nature-based transformations on their campuses through our school greening program. Students engage in a three lesson arc, tailored to their grade level (Pre K - K, Grades 1-2, Grades 3-5, Middle School) that guides them through the process of scientific inquiry.

In the first lesson, students practice **observation**. They document and describe the trees, soil, and other natural elements on their campus. Next, they build on their observations with **exploration**. In this lesson, students measure surface temperatures on the various materials they find on their campus in different conditions and test water infiltration on different natural materials vs. asphalt. Finally, the **solutions** lesson gives students a chance to step back and integrate what they have learned by designing their own nature-based solutions to heat, flooding & other challenges they experience in their schoolyard.

LAUSD students document and compare surface temperatures across their schoolyard, testing their hypotheses as to which surfaces absorb the most heat.
Photo by Sai Singh

LAUSD students design and discuss nature-based **solutions** to address environmental challenges in their schoolyard.
Photo by Mary Hillemeier

GroundTruth

Guiding a soils-based strategy for impactful nature-based solutions - SCWP

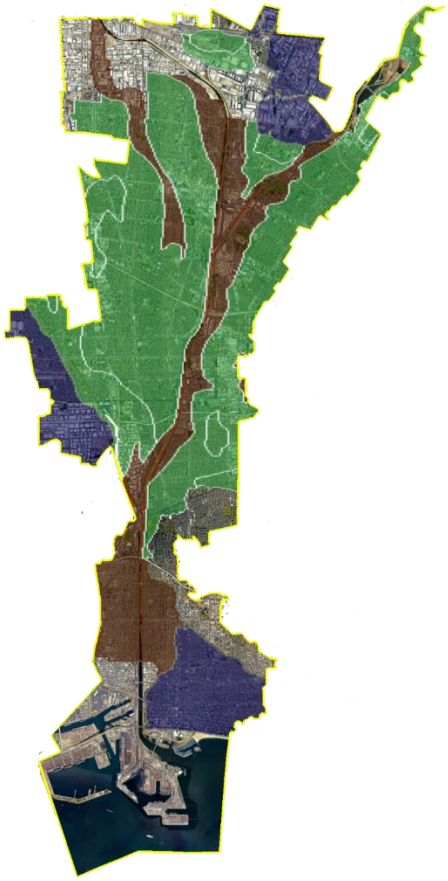
Project Goals

This **$460k SCWP-funded research study** will provide field-validated design guidance for mitigating and restoring hydraulic properties of urban soil systems. Our goal is to optimize pre-disturbance ecosystem function by designing a robust and quantifiable nature-based solution strategy for building climate resilience in the Lower Los Angeles River Watershed (LLARW).

Specific objectives of this project are to: (1) Identify soil properties and model soil modifications that maximize plant-available water and minimize urban stormwater runoff; (2) Simulate the regional effects of the watershed-level mitigation strategies developed in objective 1; and (3) Develop field-validated, model-derived, feasible, and fully specified landscape designs that can be adopted into practice by emphasizing native species and supportive ecosystems that mimic and sustain pre-disturbance soil hydrologic functioning.

Progress

The project team is exploring soil physical and hydrologic properties at 12 parkway strip sites assumed to be most anthropogenically-modified) and 12 urban park sites (assumed to be least anthropogenically-modified) across three soil classifications commonly found within the LLAR watershed. We are also installing long-term monitoring stations at 6 sites (3 park, 3 parkway) to understand water and pore behavior at various soil horizons. **At the time of this report, 12 parkway sites have been investigated in Bell Gardens.** Each site involved two days of field work. The first day included he excavation and sampling of a soil pit, and the second day included taking measurements of saturated and unsaturated hydraulic conductivity. The remainder of the fieldwork will be completed in Summer and Fall of 2025.



The Lower LA River Watershed with the three soil classifications marked in red, green and blue
Image by Igor Bronz

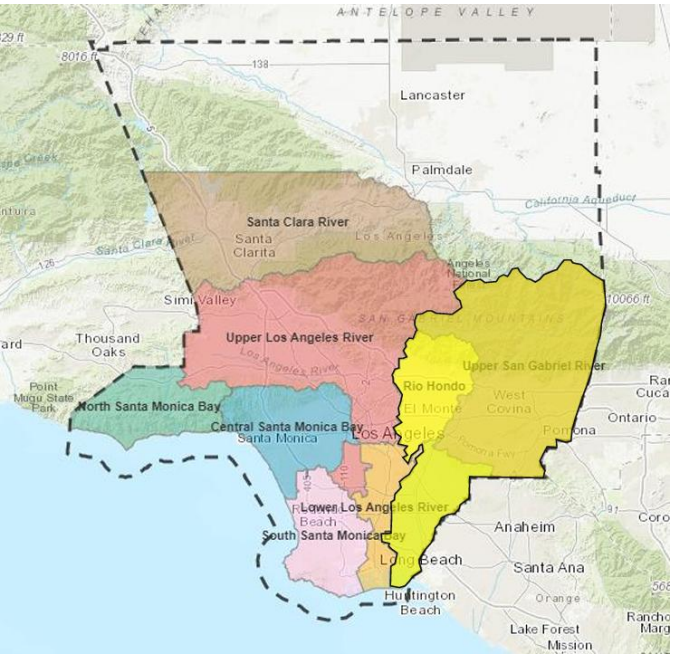
Intended Impact

We know surprisingly little about the hydrologic behavior of urban soils, especially right at the start of a rain event. Given LA's highly seasonal rainfall, and considerable year-by-year fluctuations in total precipitation, understanding these factors is critical in order to design strategies to effectively capture stormwater across a wide area. Traditional hydrologic models for watersheds potentially assume that urban soil is more permeable than it really is. If an issue is identified, we want to be able to deploy scalable strategies to improve the stormwater capture potential of urban soil. The Climate Gardening framework requires an accurate understanding of urban hydrology in order to make informed decisions.

Left-to-Right: 1) Researchers excavating soil pit in parkway; 2) Taylor McDowell photographing soil profile; 3) Preparation of soil monolith; 4) Prepared soil monolith in tray; 5) Unsaturated hydraulic conductivity test; 6) Saturated conductivity test. Photos by Igor Bronz

Next Gen Bioretention

Towards Living & Adaptive Stormwater Systems for a Resilient LA County - SCWP



Upper and Lower San Gabriel River and Rio Hondo Watersheds as the study area for Next Gen Bioretention

Image by Igor Bronz

Background

The Next Gen Bioretention study was funded by the Safe, Clean Water program for a **total award of $1.38m to assess the effectiveness of existing bioretention systems and create new design specifications for the Upper and Lower San Gabriel watersheds, and the Rio Hondo watershed**. There is currently very little existing performance data for bioretention systems. We suspect that many bioretention systems have failed for a number of potential reasons. Furthermore, there is a great deal of variability within bioretention system design between County-built systems and privately-designed systems. We want to understand which ones work better, and why. Then we want to design new, customized specifications that would improve future systems design.

We consider bioretention systems to be a key player within the Climate Gardening framework. They provide intermediate-scale, well-distributed stormwater capture and ecological productivity. Therefore, it is incumbent upon us to evaluate their performance so that we could optimize this important nature-based technology.

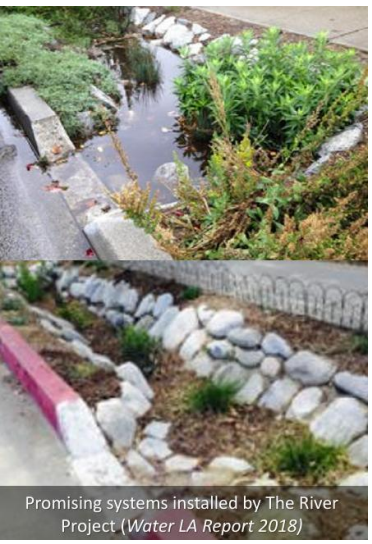
Study Objectives

Evaluate 15 systems per watershed across 3 tiers of comprehensive testing to produce catalog of bioretention system performance in Upper and Lower San Gabriel and Rio Hondo Watershed

Create site-level hydrological models that incorporate developmental ecological processes to understand system function over time. This will aid in designing new parameters for adaptive climate conditions.

Use findings from study to develop a design framework that outlines specification requirements for regional designs and retrofits that exceed current performance benchmarks.

Develop stewardship plans aimed at reducing operation and maintenance costs by better incorporating bioretention systems to be utilized as public space within communities



Promising systems installed by The River Project (*Water LA Report 2018*)

Long-term Vision

What is unique about this study is that we are looking at bioretention systems as living infrastructure. What differentiates living infrastructure in a practical sense is that it is meant to adapt to its ecological setting and actually improve over time.

From this standpoint, we seek to design bioretention systems that perform better over time as the soil microbiome becomes suited to the types of stormwater inputs it receives, and the structure of the system is sufficiently reliable to not get damaged by heavy rain events. This is quite different from the traditional understanding of engineered systems that have set lifespans and degrade over time, but we believe that this is a necessary departure as only living systems can be considered adaptive. This is the core of Climate Gardening and such an approach would result in more resilient systems that need less maintenance and function more reliably.

Unearthing the role of soils in urban climate resilience planning

A commentary published in *Nature Sustainability*, Issue 7, 1374-1376 (2024)

Introduction

A commentary authored by Monika Shankar, Melody Ng, Morgan Rogers, Elizabeth M. Cook, Dustin L. Herrmann & Kirsten Schwarz, *Unearthing the role of soils in urban climate resilience planning* argues that *ur*ban soils are essential infrastructure providing hydrology, pollutant attenuation, vegetation support, and other critical ecological services, **yet are often framed and managed as a hazard in resilience planning, excluding the potential of soils as an amenity.** A key goal is to broaden the framing of urban soils in resilience discourse to realize their full potential as essential infrastructure.

Results

A preliminary review of the resilience plans for 50 of the most populous US cities was conducted to assess how urban soils are framed. It was found that:

- There was widespread negative framing of urban soils and heavy focus on contamination/remediation across policy documents & literature
- A general lack of emphasis on urban soils management principles or value, with some exceptions - despite easily accessible contradictory evidence
- Benefits of soil are unrealized and underutilized due to negative framing

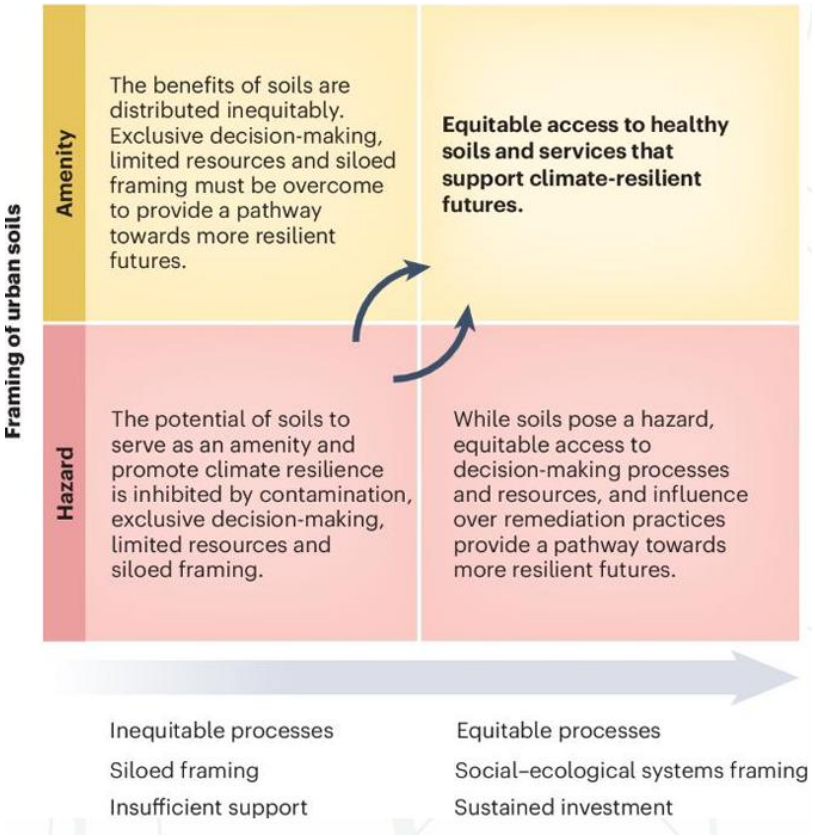


Chart describing the process of framing urban soils
Graphic created by Monika Shankar

Key Recommendations

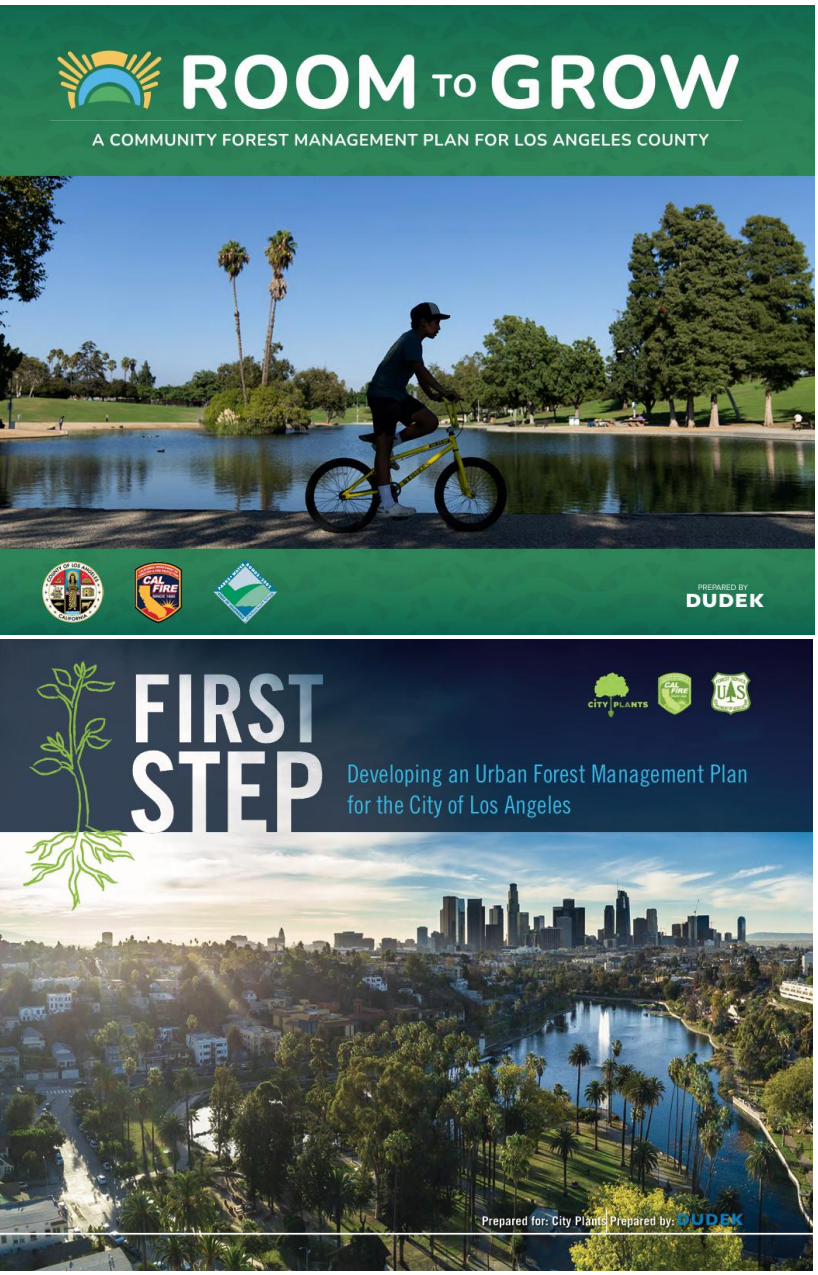
Reframe soils in municipal planning and management from simply hazardous to an integral part of infrastructure for climate resilient cities	Remediate hazardous soils with the goal of **transforming them into amenities**	**Ensure benefits of soils are fairly distributed through an equity-centered approach** by recognizing root causes of unjust systems and inclusive planning	**Greater funding for active management of soils** is needed, as most urban soils-funding is focused on cleanup of contaminated industrial sites	**Enhance investment for soil resilience and health** such as: increased funding streams, robust monitoring research, and comprehensive localized policies

Context for Climate Gardening

Soil is the most powerful biogeochemical filter on earth. It serves a central role within the Climate Gardening framework, being the medium whose function property owners have considerable control over through their actions. The actions of property owners are often influenced by guidance from government agencies – not just through incentive structures but also messaging - as is apparent by the success of campaigns promoting drought tolerant landscaping. There is a considerable opportunity for agencies to promote the potential of soil, which is currently unknown to even most environmentally-minded property owners.

Consulting Engagements

Bringing TreePeople's Soil Expertise to the Table



Top: Cover of CFMP for LA County
Bottom: Cover of the pre-planning document for the City of Los Angeles UFMP

Los Angeles County CFMP

TreePeople's Dustin Herrmann served as the subject-matter expert on Room to Grow, LA County's Community Forestry Management Plan. TreePeople's recommendations for the report included adopting a much stronger focus on urban soils management, which the report was found to be lacking. The draft version of the report focused largely on water conservation and tree species selection as the primary considerations for urban forest management. While these are important factors, they can also contribute to inequitable outcomes with regard to tree canopy due to selecting for slower growing, smaller species which naturally are less ecologically productive.

TreePeople's recommendation, in accordance with what would later be more formally referred to as the Climate Gardening framework, follows the findings of the *Soil access is an equity issue for urban climate resilience* publication, which finds that lower income areas – which have the greatest canopy restoration needs – also have the smallest and most disconnected soil patches, which limits the types of trees that can be grown without interfering with paved infrastructure.

Major portions of the Climate Gardening framework just sound like common sense. In this case, the path of least resistance is expanding soil patch size – this supports bigger, faster growing trees and allows for much more stormwater capture. Through TreePeople's contribution, depaving and improving soil access ended up becoming a larger portion of the CFMP, which is a simple approach that can pay massive dividends for generations to come.

City of Los Angeles County UFMP

TreePeople is a contributor to the City of Los Angeles UFMP, which is currently in development. Throughout this process, we anticipate applying the Climate Gardening framework to our recommendation, to fill any gaps that the UFMP draft may have in regards to taking a whole-ecosystem approach to urban forestry. The City of Los Angeles has unique considerations compared to the broader County. For instance, there is not as strong of a correlation between socioeconomic status and soil resources – the higher population density makes soil access a challenge for many communities independent of wealth. **A major strength of the Climate Gardening framework is its flexibility.** It is not committed to water conservation or native biodiversity. A city as diverse in people and in land use as Los Angeles means that water, soil or conservation-themed approaches are inherently limiting. Climate Gardening should not be viewed as a holistic approach. **We want to derive ecosystem benefit over a long period of time by working alongside human needs.**

Urban Soils Education

Providing Urban Soils Knowledge to the UC Master Gardener Program

Urban Soils Basics

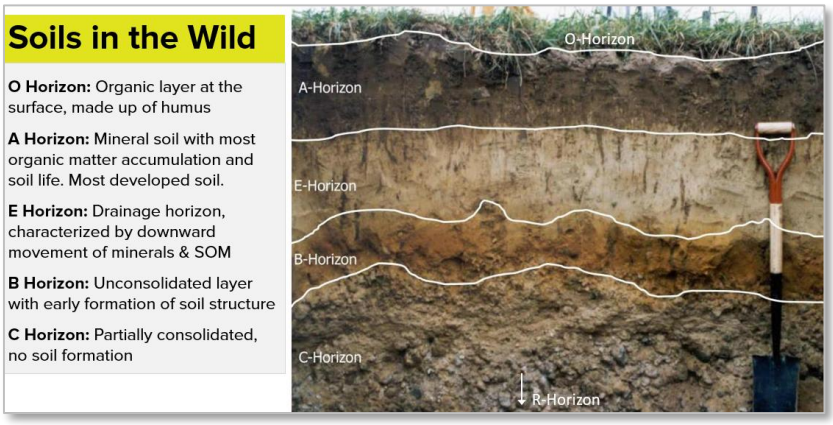
On February 24th, 2024, Igor Bronz and Dustin Herrmann delivered a Urban Soils Basics workshop to the 2024 cohort of the UC Master Gardener program.

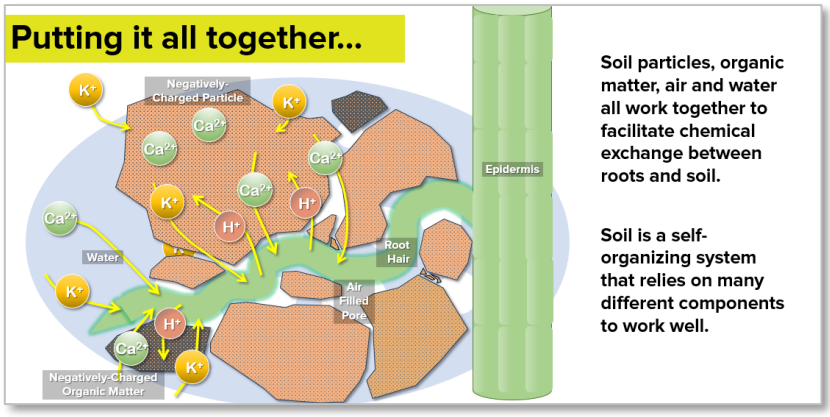
The UC Master Gardener program typically features a soil lesson as part of the curriculum for every cohort. When we were approached by Master Gardener program managers to potentially deliver that year's lecture, we saw this as an opportunity to deliver a 2-hour lesson about the nuanced aspects of urban soils, and their role within the urban ecosystem. Most Master Gardener soil lectures focus on practical components between the interface of soils and plants, answering questions such as 'how do I know how much fertilizer to add?" or 'how can I tell if my soil is clayey or sandy?". While these are important topics to discuss if you are intending to operate a community garden or improve your green thumb, they rarely address the "why" behind the function of urban soils. This leaves an incomplete understanding of soils.

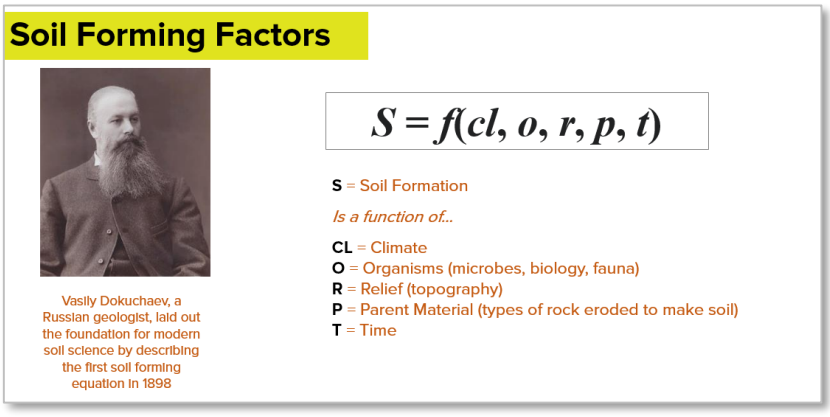
If there is a weakness to the Climate Gardening framework, its that it requires someone to have a fairly good understanding of various ecosystem functions, so we sought out if we could potentially impart this knowledge within a relatively short time-frame to a room of students who already have a pretty good baseline of environmental knowledge. If we cant succeed with these students, then the framework is probably not feasible.

The results of this experimental lecture far exceeded expectations. Over 50 students attended the lecture, with some describing it as 'eye-opening'. The lecture consisted of fundamental topics in urban soil function arranged in a format that fostered understanding of soil behavior and built upon one another in a logical way.

We were invited once again in 2025 to deliver this same lecture to a new cohort, however the impact of the wildfires resulted in the program being put on Hiatus for that year. This lecture is now a core component of our Climate Gardening curriculum due to its efficacy in conveying urban soils knowledge to a wide array of audiences.







Intern Highlights 1

Green Workforce Development at TreePeople

The Power of Internships

A large number of interns worked on the many projects and deliverables within Los Angeles' Urban Soil Future. Interns play a very important role for us at TreePeople. We are selective about who we take on for internships because we invest a lot of time and energy into developing our talented interns into skilled environmental professionals. We expect our interns to contribute to ongoing research projects, conduct their own analysis, and in some cases, manage their own projects under close guidance by a Research or Policy staff member. We are immensely proud of the work that our interns produce.

Theo Ross
University of Oregon
Spring 2023 – Summer 2023

Theo joined TreePeople as a geospatial analyst intern in his time between his post-baccalaureate fellowship at NASA JPL and beginning a career with The Walt Disney Company. He handled TreePeople's early relationships with the LARIAC-7 data setting up the soil geography project that would later be published as *Soil access is an equity issue for urban climate resilience* by Adam Berland in the journal: Landscape & Urban Planning.

Emily Peng
University of Southern California
Fall 2023

During her semester-long internship, Emily delineated the first batch of soil polygons for the soil geography study: *Soil access is an equity issue for urban climate resilience,* and conducted preliminary analyses that helped us get a sense of interesting patterns emerging within the data, prompting deeper research questions and analysis from the study team. Emily now works as a GIS Planner for the Long Beach Transit.

April Laird
California State University – Los Angeles
Fall 2023 – Fall 2024

Throughout the completion of her undergraduate degree in Sociology, April developed the critical interview component of the Residential Landscape Diversity study, and administered 25 interviews to residential property owners. This data was critical understanding property management decisions, which provided crucial social context for understanding soil. April also made important contributions to the LA County Urban Forest Management Plan and other projects.

Intern Highlights 2

Green Workforce Development at TreePeople

Iona Cich
University of California Los Angeles – Luskin School of Public Affairs
Fall 2023 – Summer 2024

During her year-long internship, Iona led the development and stakeholder engagement portion of the Cool Soils LA grant. Her efforts brought on LA Sanitation as an important collaborator for developing a soils banking system in Los Angeles. She also convinced Dan Walsh, the Founder of the Clean Soils Bank in NYC to write a letter of support for a similar system in Los Angeles. This work earned Iona the top prize for undergraduate capstone projects that year.

Jason Tumbokon
University of Southern California
Spring 2024

During his semester-long internship, Jason led community outreach for 'Calles Verdes' in San Fernando, addressing solutions to stormwater runoff through nature-based design alongside the Policy team, facilitated workshops and engaged with students during the TreePeople 2024 Youth Summit, and conducted fieldwork at over a dozen sites for the Residential Landscape Diversity Study, greatly assisting the team with ecological sampling and characterization.

Bella Jahrmarkt
Scripps College
Summer 2024 – Fall 2024

Bella was one of the first interns to start working with the Residential Landscape Diversity Study dataset, and developed a research project investigating the role of Soil Protection Mechanisms (obstacles like fences, tall plants and more) on soil physical and properties, which was presented as a poster at the Climate Gardening Symposium. Bella also conducted fieldwork for various projects, and worked with TreePeople marketing team on a social media campaign promoting shade equity.

Cielo 'Vivian' Munoz
University of California Los Angeles – Luskin School of Public Affairs
Summer 2024 – Spring 2025

Though initially hired as a summer intern, Vivian's accomplishments at TreePeople earned her a paid opportunity extended until Spring 2025 to continue her work. Vivian conducted crucial work turning recorded interviews during the Residential Landscape Diversity Study into quantifiable data she later analyzed and developed into a research project. Vivian also worked closely with the marketing team on a major social media campaign surrounding shade equity.

Intern Highlights 3

Green Workforce Development at TreePeople

Colby Dagenhart
University of Southern California
Fall 2024

As part of his semester-long internship, Colby's major contribution was conducting research to create an extensive database of over 2000 sustainability and hazard mitigation plans for the 50 largest cities in the US. This project was in support of a research study conducted by collaborators at UCLA to use machine learning techniques to perform thematic analysis on the regional evolution of how sustainability topics are discussed within policy documents.

Zoe Goldstein
University of Southern California
Fall 2024

Picking up on the large amount of data analysis that needed to be performed for the Residential Landscape Diversity Study, Zoe performed a digitized over 100 patches across 25 sites and performed a geospatial analysis to track patch measurements, which was a critical component of the study's results. Zoe also supported our collaborators at the US Forest Service in their Socioeconomics of Trees Study by creating a database of site biodiversity data from field notes.

Hector Espinoza
University of Southern California
Spring 2025

Hector provided major contributions to a wide number of projects, including conducting research for the development of Clean Soil Networks, field assistance performing physical and hydrologic tests at a number of sites for the GroundTruth study, performing over 235 soil texture analyses on samples for the Residential Landscape Diversity Study, and provided both planning and day-of assistance for the Climate Gardening symposium.

Hailey Veirs
ORISE Forest Service Fellow
Spring 2024 – Summer 2024

Hailey was an ORISE Forest Service Fellow jointly funded and trained by the U.S. Forest Service and TreePeople. Her major contributions were geospatial data analysis and field mapping in support of the Socioeconomics of Trees Study, a critical component which allows field data to be fed indexed and integrated into USFS modeling software. Hailey converted her fellowship into a full-time opportunity and is now a Data Services Specialist for the U.S. Forest Service.

Esteemed Collaborators

The Organizations Working In Service of Los Angeles' Urban Soil Future