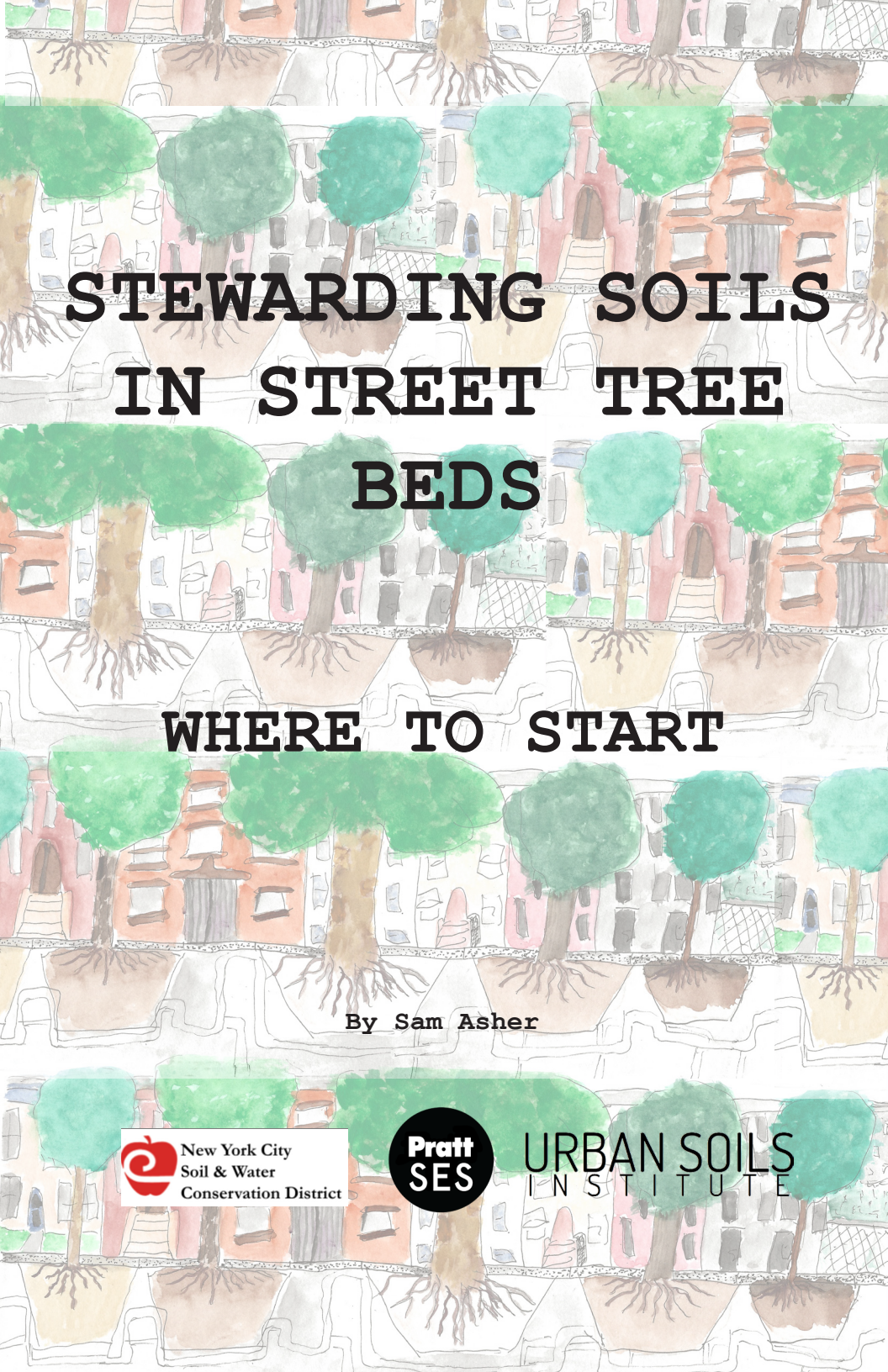

STEWARDING SOILS IN STREET TREE BEDS

WHERE TO START

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New York City Soil & Water Conservation District

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URBAN SOILS INSTITUTE

WHY SOILS AND TREES?

New York City's street trees face some of the most challenging environmental conditions, making them the underdogs of the urban forest. From spatial constraints to soil compaction, survival threats exist for every species at every stage of life.

Networks of citywide stewards help street trees thrive by cultivating strong foundations of living soils. Their actions strengthen communities and bolster ecological resilience through acts of care that support the health and wellbeing of all New Yorkers regardless of species.

This zine is both an educational resource on the importance of cultivating microecosystems in street tree beds and a guide on how to care for them. Serving both as a celebration of this ongoing work and as a call to action for collaborators of the urban forest, Stewarding Soils in Street Tree Beds has a grounding message: to equitably expand street tree canopy coverage, one must look down towards the soils.

From urban ecology experts to the canopy-curious, everyone can benefit from this information. Wherever your starting point, I hope you carry this knowledge forward to strengthen your local microbial, ecological, and community networks. The trees and their soils will thank you.

A NOTE

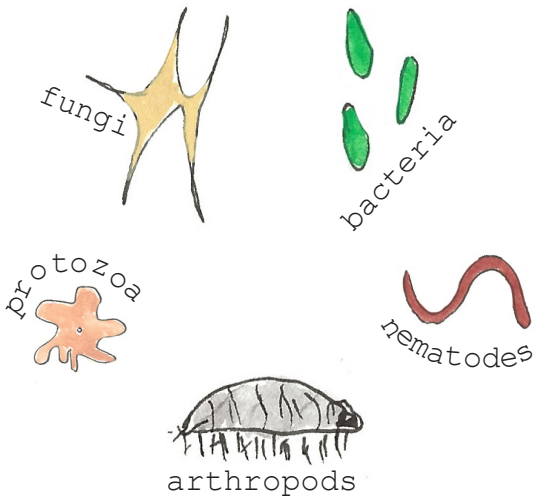
"Stewarding Soils in Street Tree Beds: Where to Start" is by no means complete. This zine is as dymanic as street tree soils themselves; in need of consistent care to achieve its full potential.

If you have feedback, questions or suggestions, please feel free to reach out to sasher59@pratt.edu.

SOILS CAST OF CHARACTERS

Soil inhabitants come in various shapes and sizes, from microscopic cyanobacteria to pea-sized pill bugs, but all organisms regardless of stature play a critical role in supporting the healthy functioning of soils and trees. By carving channels through soil layers that help with the flow and storage of water, fusing together soil particles to reduce erosion, and breaking down organic matter to release nutrients for plant uptake, soil life is essential to healthy soils and healthy trees.

Soils are the largest terrestrial carbon sink in the world, and are home to 60% of the world's biodiversity. While appearing lifeless, the earth beneath our feet is filled with activity. Without a diverse array of soils inhabitants, many of the supportive functions of soils – including carbon sequestration, water retention, and nutrient cycling – are limited.



MORE THAN DIRT

These characters make up the soil food web, which is responsible for the cycling of energy and nutrients needed to sustain the life of all living organisms.

To acknowledge the life in soils, many practitioners avoid using the word dirt which often carries a negative connotation.

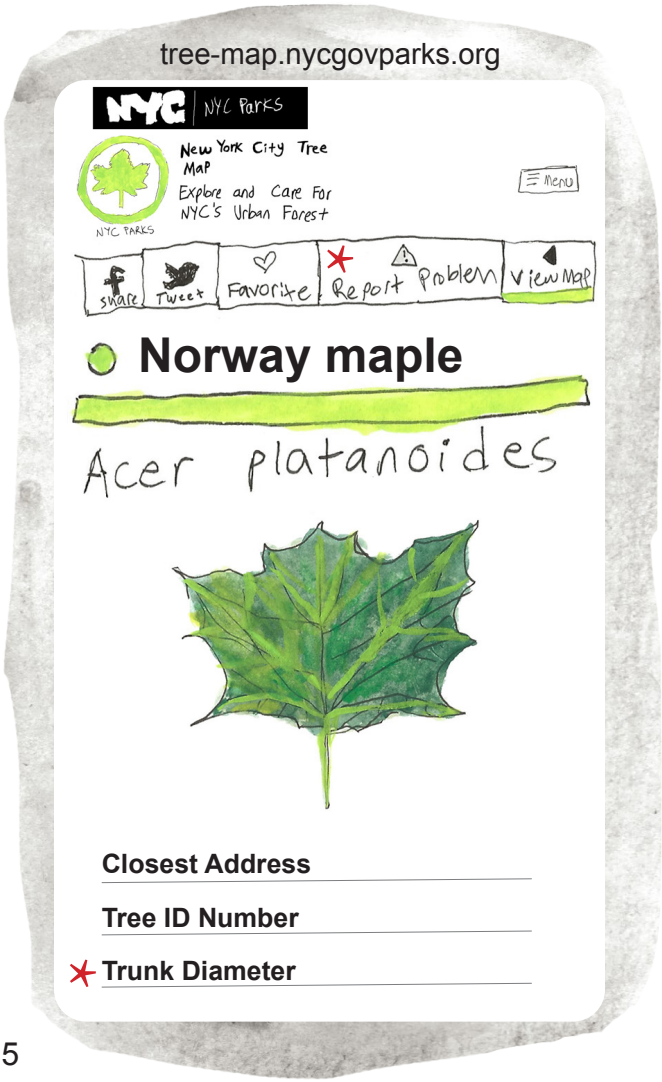
Soils are also multitudinous and unique, making the composition and characteristics of soils from one region likely to differ from another. Soils are referred to throughout this zine as a plural entity to recognize their variety.

MEET YOUR TREE

Before stewarding street tree soils, it's important to start by getting to know your tree. There are over 500 species of trees in New York City, and most publicly-owned trees are logged in the New York City Tree Map.

Each tree has a profile with its species' common name, latin name, trunk diameter measurement from the last tree census, and a log of tree care activities.

Every tree tells a story. As their neighbors, it is our duty to listen and learn from them.



✶ Report broken or dead limbs, dead trees, or infections/infestations

✶ Younger trees have smaller trunk diameters. To prioritize their care, filter for trees with a diameter of less than 6 inches

LEAVE THE LEAVES

Some of the key ingredients to healthy soils come directly from trees. Leaves are both food and habitat for a variety of insects. Decomposers shred dead leaves, releasing nutrients for tree root uptake, while bees, butterflies, beetles and moths shelter in leaf litter during winter months.

Keeping your sidewalk free of plant debris is important to maintain an accessible clear path for anyone passing through. But, the leaves don't have to be squirreled away as organic waste; instead, add them to your tree bed. Sometimes, the best materials for stewarding street tree soil beds are provided to you from your tree for free.

CYCLES OF CARE

Caring for soils and street trees has rippling outward effects. Cycles of care flow from soils, to trees, to surrounding communities. By repeating these acts of stewardship, you too can cultivate resilient ecosystems on your block, within your neighborhood, and throughout New York City.

With the support of functioning, healthy soils, street trees produce oxygen, filter air and water pollutants, absorb stormwater runoff, mitigate heat, provide species habitat, and absorb carbon dioxide.

Stewarding microecosystems within soils strengthens personal and communal relationships with seasonal changes and immuno-supporting microbes. Functioning soils support the development of healthy trees that produce oxygen, take in carbon dioxide, and support species habitats. These trees develop healthy canopies that cool local microclimates and provide relief from extreme heat.

Engaging with street trees deepens our connection with nature by allowing us to slow down, take a closer look, and consider street trees and their soils as critical parts of urban communities. This shift in perspective can take us from the tree bed scale, to the block scale, to the borough scale and beyond.

One teaspoon of soil can contain millions to billions of microorganisms. Through competition and dilution, these diverse arrays of life buffer against harmful pathogens.

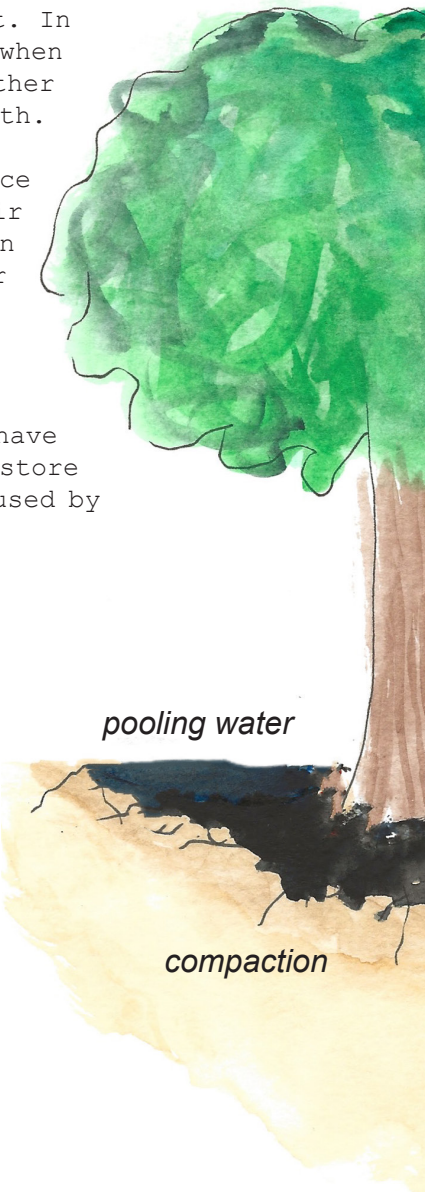

THANK YOU FOR

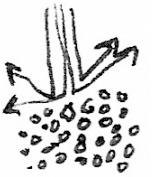
URBAN CHALLENGES

Trees need soils to survive, but not all soils offer the same support. In urban areas, soil compaction – when soil particles are pushed together – is a major threat to tree growth.

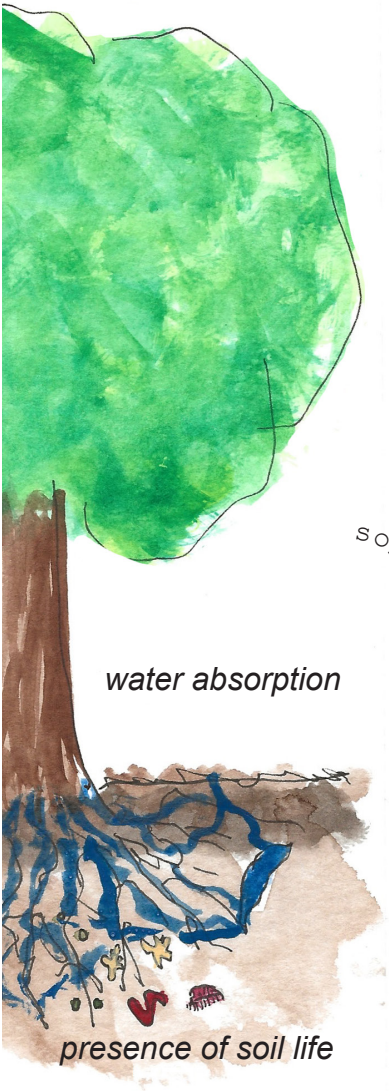
Compacted soils lack pore space to hold water, reducing their capacities for water infiltration and retention. Despite their impermeability, this can lead to flooding during excessive rainfall events.

When not compacted, soils have micro and macro pore spaces to store nutrients, water, and air to be used by tree roots and soil organisms.

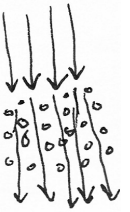




water pools atop the surface of compacted soils



water absorption



soils with proper aeration allow water to flow through

presence of soil life

TREE BED READING

TRASH & DEBRIS

Not just unsightly; tree bed litter can leach contaminants into soil, contribute to compaction, prevent air and water flow, and clog storm drains. Tree beds are not trash cans!

WEEDS

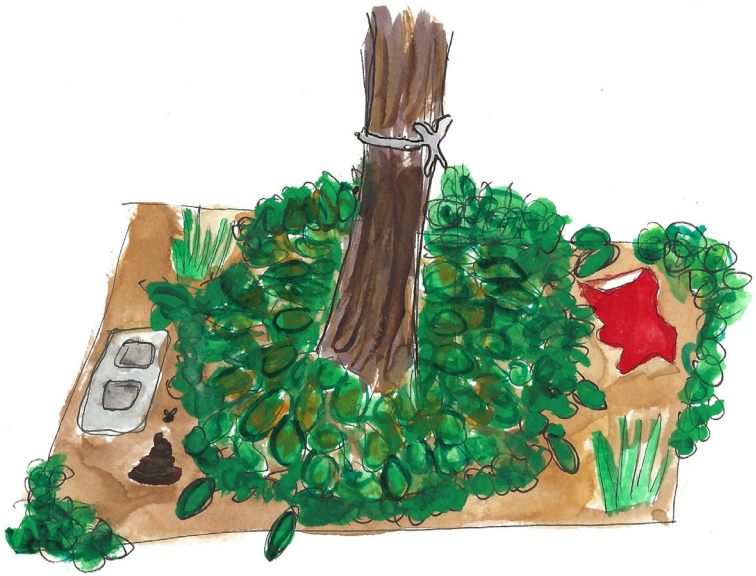
A "weed" is an opportunist plant. Often naturalized non-native species, these plants quickly occupy their surroundings and maximize their presence, competing with street trees for water and nutrients.

DOG WASTE

A common frustration across the five boroughs not limited to the sidewalk. Because of its acidity and bacterial contents, dog waste is a harmful contribution to tree beds and poses risks to communities of plants, people, and pets.

TRUNK TIES

Tightly tied signs, ribbons, and tape can cut through and injure several layers of bark. This is known as tree girdling, and is especially damaging to younger trees. Avoid girdling by using a staked tree bed sign instead.



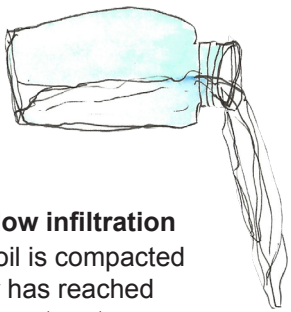
SOIL INSPECTION

COLOR Street trees are planted with structural soils that are uniquely formulated to support urban trees. Street tree soil colors indicate the presence of moisture and nutrients.

Light — **Dark**

Low in organic matter. Often compacted. Can be dry, dusty, in need of water.

Amended with compost or recently watered. If soil is dark from moisture, wait to steward until it is dry. If dark from compost, avoid adding more.



Slow infiltration
Soil is compacted or has reached its water storage capacity. Water might pool on top.

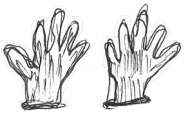
Fast infiltration
Soil has good aeration and is likely thirsty. Cultivate if planning to add compost.

WATER INFILTRATION

Observing how quickly water is absorbed and infiltrated into tree bed soils is an indicator for compaction. Set a timer, pour some water in a small area*, and note the outcome. Great to test before and after stewarding to evaluate impact.

*Avoid watering the entire bed until after stewarding is done, as working with wet soils can lead to compaction

STEWARDSHIP SUPPLIES



GLOVES
Always wear gloves! You never know what you might find in a NYC tree bed. Gloves help keep you & your community safe.

TROWEL
To dig up weeds with thick taproots. Dig carefully to not disturb tree roots.

BAGS
To collect litter and weeds

HAND CULTIVATOR/HAND RAKE
Probably the most important tool in street tree care. Gently scratch compacted soil to loosen, and keep deeper cultivation towards the exterior of the tree bed to avoid damaging tree roots.

COMPOST
A little goes a long way for trees, who like slow releases of nutrients over time. Helps mitigate compaction. Apply a maximum of one inch to cultivated soil. Cover with mulch.

MULCH
Great at slowly releasing nutrients, retaining moisture, and mitigating compaction. Avoid dyed mulches, which leach dye into tree beds. Always leave a "donut" of space around the tree trunk. Don't apply too much - up to 3 in spread evenly will do.

WATER
All trees need water, especially younger trees. Water during hot months and during dry periods.

SIGN
Celebrate your tree with a sign that proudly shows your hard work. Many say that a cared-for tree is more visible to passers-by, and thus is less likely to be harmed.

TREE GUARD
Protect your tree bed from pedestrian compaction and dog waste by installing a tree guard. Be sure not to block the outflows as this can create unhealthy conditions.

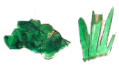
CARE RECIPES

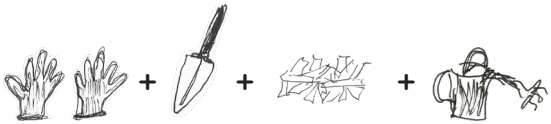
CONDITION **REMEDIES**

LITTER

Note: *if stones or bricks were intentionally placed in or around the tree bed, do not remove them*

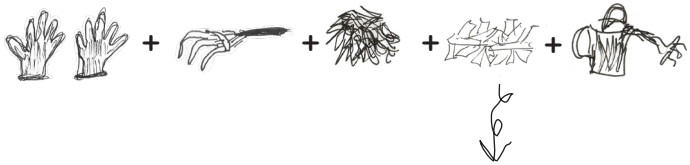
OVERGROWN



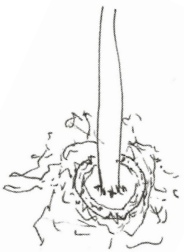


Note: *not all tree bed plants are weeds! If you aren't sure if something was planted intentionally, check with neighbors. Or, use iNaturalist or Seek to help with identification - some plants found in tree beds actually support soils and tree health.*

COMPACTED



A PROPER MULCH "DONUT"



SIGNS & TREE GUARDS ALWAYS ENCOURAGED

LAST BUT NOT LEAST: LOG YOUR WORK!

Scroll down on your tree's profile to find the 'Record Tree Care' button. Shared tree care activities help notate which trees have received recent care, and which need extra love.

GET INVOLVED

Join an existing street tree stewardship group to get started. Or, start your own with neighbors and friends. Note: this list is not exhaustive.

CITYWIDE
Big Reuse
Earth Matter
NYC Parks Stewardship
Partnerships for Parks
TreesNY

BRONX
Bronx is Blooming
Friends of Moshalu Parkland
Friends of Soundview Park
Friends of Spuyten Duyvil
New York Botanical Garden

BROOKLYN
Brooklyn Botanic Garden
Coney Island Beautification Group
Greenpoint Tree Corps
Gowanus Canal Conservancy
North Brooklyn Neighbors
PlantxChange
Red Hook Conservancy
South Midwood Pollinators
Q Gardens

MANHATTAN
110th Street Block Association
The Brotherhood Sister Sol
Chelsea Garden Club
Friends of Inwood Hill Park
LES Ecology Center
Riverside Park Conservancy

QUEENS
Flowering Queens
Go Green Astoria
Jackson Heights Beautification Group
Rosedale Preservation Society

STATEN ISLAND
Snug Harbor Cultural Center & Botanical Garden

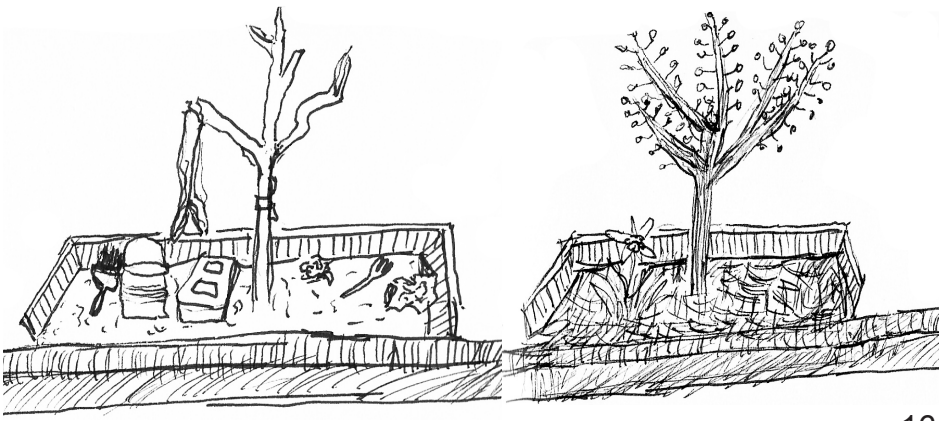
WHERE TO GET...

COMPOST?
NYC Community Compost Network
DSNY Compost Givebacks
OR... make your own vermicompost

MULCH?
Greenwood Cemetery (bring a shovel & bag!)
Home Depot
Lowes
Mulchfest
OR... leave the leaves

TOOLS?
Become a NYC Parks Super Steward
Befriend a local community garden
Use Greenpoint Public Library's Tool Share (BK)
Lower East Side Ecology Center's Tool Library (M)
Green Guerillas Tool Lending Library (BK)
James Baldwin Outdoor Learning Center (BX)

Before tree care... *...after tree care!*



FURTHER EXPLORATION

ON SOILS:

The Urban Soil Guide: A Field Lab and Manual by Anna Paltseva
A field and lab manual with accessible readings and exercises serving as both an introduction to soil science and a resource for urban environmental stewards.

Teaming with Microbes by Jeff Lowenfels & Wayne Lewis
A book about the importance of organic soil amendments and how they support intricate webs of soil life. Includes detailed chapters on the cast of characters in the soil food web and gardening practices that enhance their activities.

Urban Soils Institute (urbansoils.org)
New York City's only soils research and education institute. USI programming includes free soils testing on Governors Island, arts-based soils workshops, and an annual multidisciplinary Urban Soils Symposium.

Brooklyn College Urban Soils Lab (brooklyn.edu/usl)
For more local soils testing and education.

Soil Life (soillife.org)
A collaborative project by UC Davis PhD students and the USDA's Natural Resources Conservation Service. Interactive graphics for visual learning.

Soil Food Web School (soilfoodweb.com)
Courses and educational resources dedicated to sustaining the life within the soil. Founded by the late Dr. Elaine Ingham.

New York Botanic Gardens Soil Science Courses (nybg.org/education)
Part of the NYBG's Horticulture Classes and taught by soil scientist George Lozefski. Counts towards NYBG's Horticulture Certification!

NYC Master Composter Certificate Course (nyccommunitycompostnetwork.org)
An education and outreach program making community composting equitable and accessible in NYC. Funding pending for FY27 - tell your city councilmember to #SaveOurCompost! Visit saveourcompost.org

ON TREES:

NYC Parks Super Stewards
(nycgovparks.org/reg/advanced-stewardship)
Become a certified Super Steward with NYC Parks to gain access to critical stewardship resources that you can use for hosting your own tree care event.

TreesNY Citizen Pruner
(treesny.org/citizen-pruners-stewardship/)
Regular pruning is also important for street tree health. TreesNY's Citizen Pruner course is a combined tree-based education and NYC pruning certificate.

Brooklyn Botanic Garden / New York Botanical Garden / Snug Harbor
(bbg.org / nybg.org / snug-harbor.org)
Register for continuing education courses on urban forestry to learn more about stewarding healthy trees.

Follow Forest For All NYC
(@forestforallnyc / forestforall.nyc)
Support the movememt to expand citywide access to healthy and resilient urban forests.

ACKNOWLEDGEMENTS

This work could not hae been possible without the support of so many. Thank you to Shino Tanikawa and Tatiana Morin for your trust and collaboration. Thank you to Leonel Ponce and Lisa Bloodgood for their guidance and encouragement. Thank you to the countless tree stewards and soils experts who took time out of their busy schedules to answer my questions - you are all heroes. Thank you to the Forest For All Coalition for your advocacy. Lastly, thank you T for always grounding me.

ABOUT THE AUTHOR

Sam Asher is an artist and environmentalist based in Brooklyn, New York. This zine was produced as part of their graduate capstone in Sustainable Environmental Systems from Pratt Institute.

Endless gratitude to the soils, the trees, and the stewards of all species who care for them.

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