



Food and Agriculture
Organization of the
United Nations



Consiglio Nazionale
delle Ricerche



CNR IRET
Istituto di Ricerca sugli Ecosistemi Terrestri



FAO GREEN
CITIES
INITIATIVE



SUITMA 13
PISA 2025



International Union of Soil Sciences

The Importance of Soil Health In Urban And Peri-urban Settings

Anna Paltseva, PhD

Clinical Assistant Professor

Departments of Agronomy |

Horticulture & Landscape Architecture

Purdue University, USA



**GLOBAL SYMPOSIUM
ON SOIL SEALING AND
URBAN SOILS**

*Healthy soils for
healthy cities*



College of Agriculture

Urban soils:

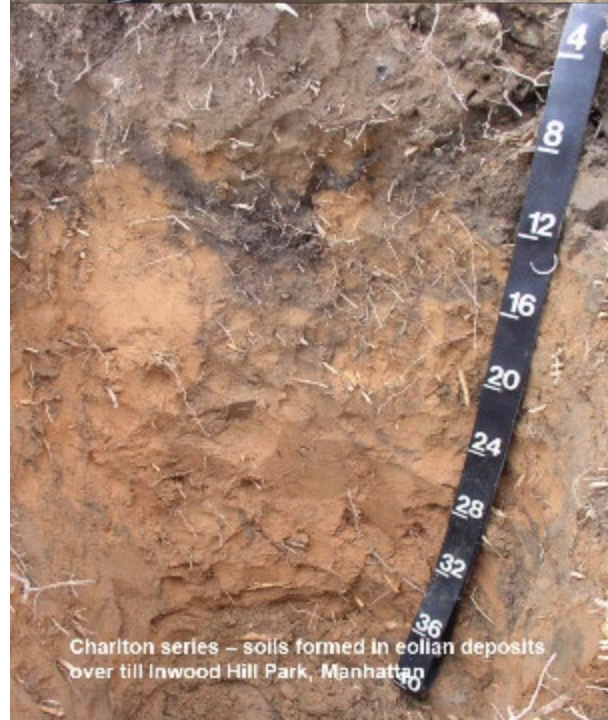
- High heterogeneity
- Modified temperatures
- Artifacts in soil profiles
- Limited soil resource

New York City



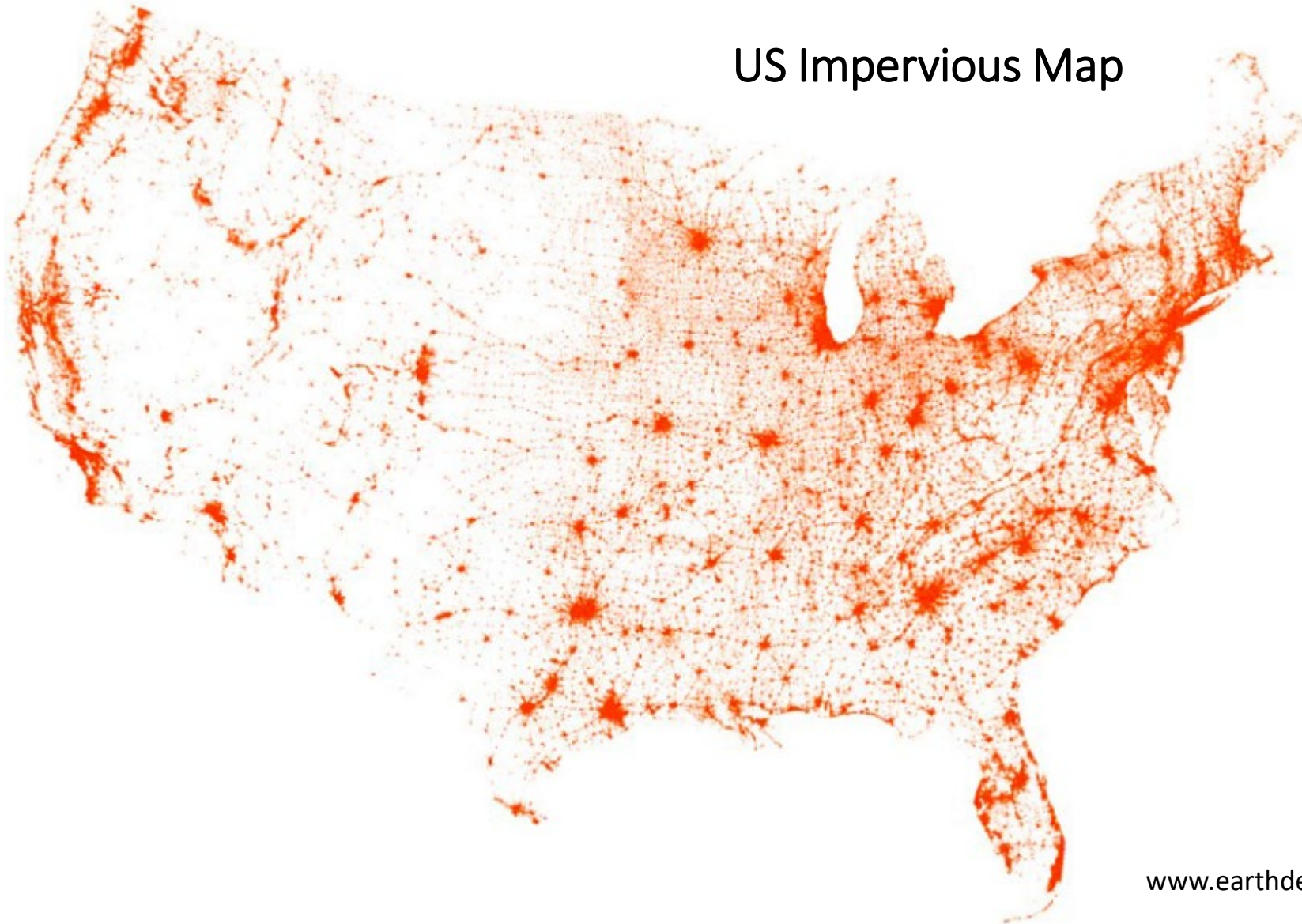
Urban Soils of New York City

- human-altered
- often contaminated
- but full of potential



~ 83% of the US population resides in urban areas

US Impervious Map



What Happens When We Don't Protect Urban Soils



Soil sealing blocks rain infiltration, causing rapid runoff → runoff increases flood risk and water pollution



Over 50% of urban growth replaced forests, transforming natural habitats into urban landscapes



Impervious surfaces raise urban temperatures by 1–3°C vs. rural areas



~ 25% of U.S. residential soils exceed the EPA's new Pb screening level of 200 ppm; in cities like Indianapolis and Chicago, 37% and 53% of soils respectively exceed this level



~ 80% of US cities have peri-urban areas close to intense agriculture using high pesticide volumes without sufficient protective buffer zones, increasing contamination risk

Urban Soil Services



Archaeological artifacts,
Rome, Italy



Education and research,
Brooklyn, NYC, USA



Cultural and aesthetic
Pyatigorsk, Russia



Food production,
Governor's Island, NYC, USA



Habitat for biodiversity,
Guangzhou, China



Carbon sequestration,
Governor's Island, NYC, USA



Building foundation support,
New York City, USA



Stormwater management,
Chicago, USA



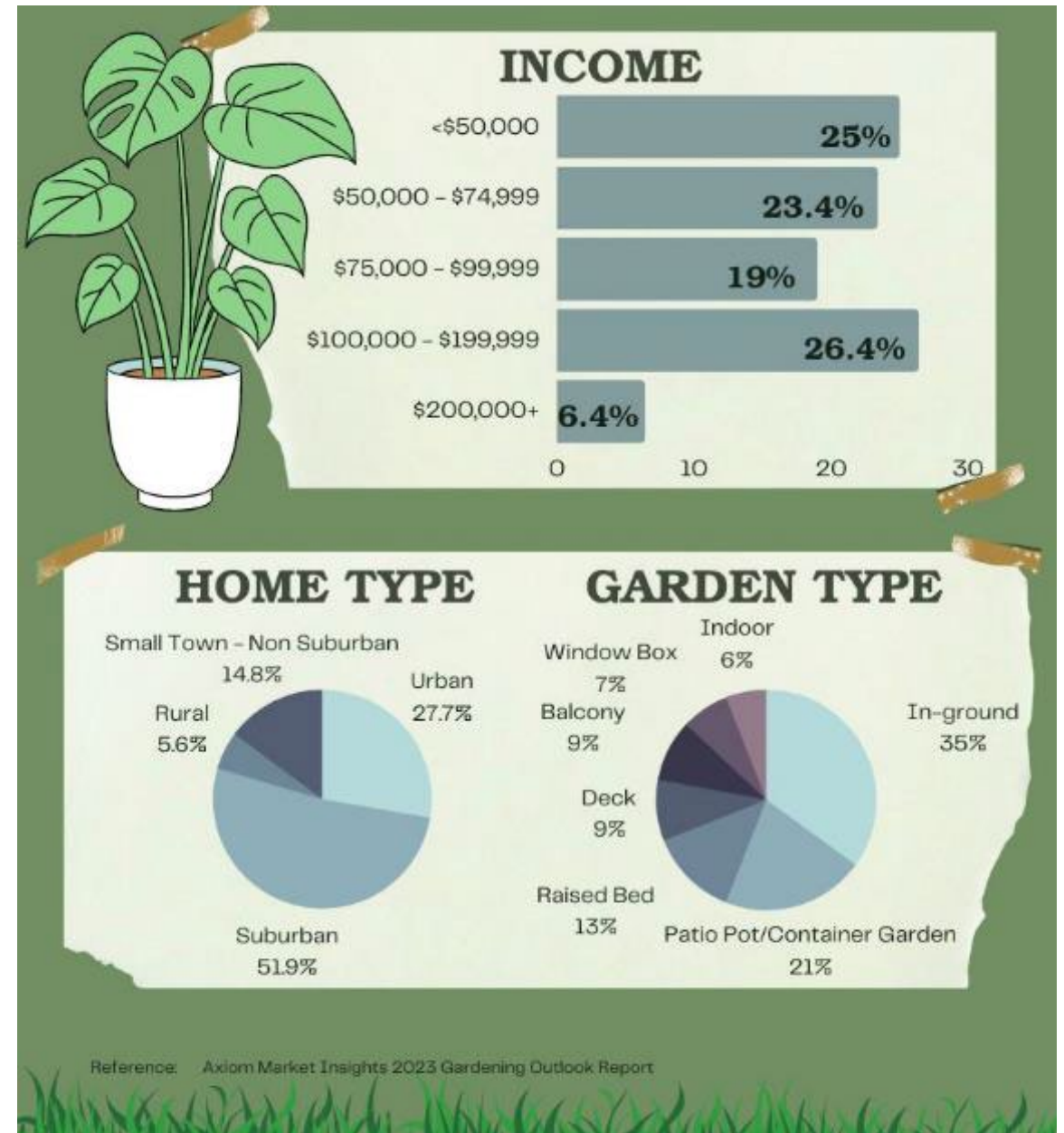
Green spaces,
Lugano, Switzerland

Urban Soil Guide -
Paltseva (2024)

Why do people grow food in cities that have everything in stores?

Urban Garden Trends in the U.S.

- 55% of American households engage in gardening
- Impact of Covid-19 led to 18.3 million new gardeners, mostly millennials.
- Children involved in gardening more likely to eat vegetables.



Top Reasons People Garden in America in 2025



Sources: National Garden Bureau, CNN, Minnesota State Horticultural Society, Garden Media Group, Colorado State University

Key Recommendations for Advancing Participatory Science in Urban Soil Projects

01

Integrate mobile apps, web platforms, and geospatial tools to streamline data collection and engage individuals. Leverage real-time feedback and interactive features to enhance participation.



Develop targeted outreach programs to involve underserved and marginalized communities. Partner with local organizations to build trust and ensure inclusivity in urban soil projects.

03

Collaborate with policymakers, urban planners, and environmental advocates to turn participatory science data into actionable policy recommendations. Facilitate workshops and present data to local governments.



04



Partner with schools and educational institutions to integrate soil science into science and geography curricula. Create hands-on activities, projects, and fieldwork that involve students in soil testing and analysis.

05

Establish an open-data platform where individuals can access, share, and analyze soil data. Ensure transparency by making results publicly available and encouraging collaboration between researchers and the public.



06

Analyze participant demographics and behavior to tailor engagement strategies. Use data insights to refine messaging, outreach methods, and community involvement to maximize participation.



07

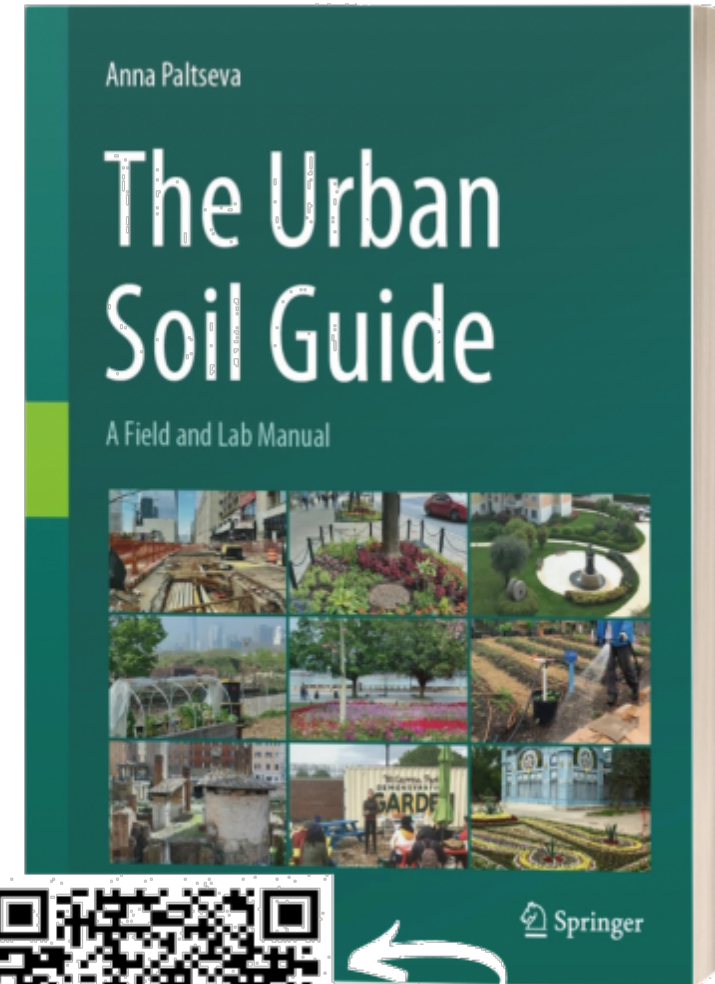
Create gamified elements, challenges, or reward systems to maintain long-term involvement in participatory science projects. Encourage participants to reach milestones and offer recognition for their contributions.



SCAN ME



A Practical Resource for Urban Soil Education and Testing



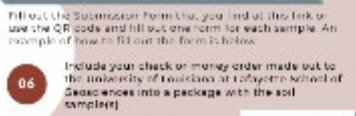
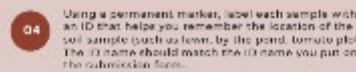
**Get Your
Copy**

The use of attractive graphics and modern, digitally based strategies significantly improved soil education performances

Innovative Tools for Soil Education

Making Soil Science Accessible, Engaging, and Actionable

HOW TO PREPARE SOIL SAMPLES IN 7 EASY STEPS



Strategies and Techniques to Mitigate Soil Contamination

ORGANIC MATTER

How:

Add compost • biosolids • biochars to soils

Benefits:

Promote soil aggregates that adsorb contaminants • Improve soil structure • Reduce erosion • Reduce fine particle suspension in air

LIMING

How:

Add Ca and Mg rich material in soils

Benefits:

Increase in soil pH • Reduce trace metal availability to organisms • Increase soil aggregates and texture

What is a soil aggregate? These are soil particles that are bound together stronger than the particles around them. Some space is formed around them which helps the soil move or retain water and helps the movement of air within the soil.

CONSERVATIVE TILLAGE PRACTICES

How:

Use no-till • ridge-till • strip-till methods • Have stable vegetation coverage

Benefits:

Immobilize metals in soils • Reduce topsoil erosion • Lower organic mineral decomposition rates • Longer remediation rates from organic matter • Increase soil aggregates • Reduce fine particle suspension in the air

PLACEMENT

How:

Install garden areas at least 50 meters from heavy traffic areas

Benefits:

Directly avoid accumulation of contaminants in soils

DUST CONTROL

How:

Add mulch on contaminated soils • use drip irrigation

Benefits:

Reduce fine particle suspension in air • Reduce flooding and spashing • Decrease risk of recontamination of surface soil or plant tissues



Paltseva AA, Cheng Z, McIlrath M, Deeb M, Spindler SR, Croftman PH (2022) Legacy Lead in Urban Garden Soils: Communicating Risk and Limiting Exposure. Front. Ecol. Evol. 10:873542.

SIMPLE STEPS TO SOIL REMEDIATION

ANNA PALTSEVA, PHD, SHARES WHAT LANDSCAPERS CAN DO ABOUT SOIL CONTAMINATION



After the greenhouse of lead comes from the soil, however, soil in urban and suburban environments can be contaminated due to past industrial activities, lead paint, gasoline emissions and pesticides. Some legacy pollutants like lead, mercury and chromium stay in the environment for a long time, making their fate and transport unknown. With climate change, more frequent and severe weather events can cause soil erosion as well as a redistribution of contaminants.

With more rainfall, more contaminants may redistribute laterally over larger areas. Present metals in soils may move downward, which might be beneficial for healthy gardening and farming in topsoil but cause an increase of groundwater contamination. On the other hand, fertilizers and amendments may wash away or leach out more rapidly in

soils that are dry and dusty and decrease when soil is wet, and dust is settled. The effect of climate change on soil pollution is an emerging topic that needs further research. So, what can a professional landscaper do? If your job site was built before 1978, is next to a highway, or within one mile of an industrial site, it's a good idea to get the soil tested. Landscape professionals as well as

homeowners need to protect themselves from toxic soil. Homeowners are often unaware of potential risks associated with soil contamination and hope to help fix this. But the good news is, there are some simple ways you can help remediate the soil without digging too much into science.



Start with testing the soil. There are multiple labs around the country that measure heavy metals in soil. Here at the University of Louisiana at Lafayette, we are currently building the Delta Urban Soil Lab where anyone can submit soils to find out the pH, organic matter content, salt levels, heavy metals and texture.

“ANY LANDSCAPE PROFESSIONAL CAN BE THEIR OWN SOIL DOCTOR. TEST, DIAGNOSE AND TREAT YOUR SOIL FOR BETTER, HEALTHIER RESULTS.”



Soils that are contaminated, you can also build a microhabitat for your existing field with clean sediment and topsoil, separated from the contaminated layer by a landscape fabric. Any landscape professional can be their own soil doctor. Test, diagnose and treat your soil for better, healthier results.

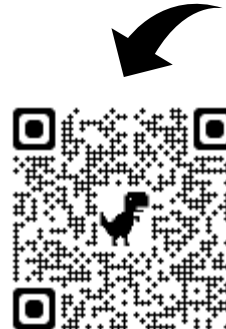
ABOUT DR. ANNA PALTSEVA
Dr. Anna Paltseva is an associate professor and assistant dean at the University of Louisiana at Lafayette. She is currently building the Delta Urban Soil Lab where anyone can submit soils to find out the pH, organic matter content, salt levels, heavy metals and texture.

Building a Digital Classroom Beyond the University

The screenshot shows the YouTube channel for Anna Paltseva, a soil science educator. The channel has 280 subscribers and 63 videos. The video grid includes:

- Got Plants?** (10 views, 11 days ago)
- Reporting the Ecosystems of Lake Balkhash: The Wolf's Den and the Mind of a Lake** (19 views, 2 weeks ago)
- The Tale of the Vegetable System Trials** (121 views, 8 months ago)
- Soil Lead Testing in Communities: Communicating Risk and Limiting Exposure** (89 views, 7 months ago)
- Industrial Composite: Impacts of the Top 400 on Climate Change Outcomes** (46 views, 10 months ago)
- Tracking pedology practices using combined magnetic properties and pH** (22 views, 10 months ago)
- Cereals and Potatoes in a Changing Climate** (42 views, 7 months ago)
- Soil Art in the Dirt Studio** (153 views, 1 year ago)
- Using portable ERP in the field** (107 views, 1 year ago)
- Soil Remediation and Agriecology** (329 views, 1 year ago)
- Robotic & Precision in Architecture** (151 views, 1 year ago)
- Urban-rural gradients** (87 views, 1 year ago)
- Urban soil and urban soil survey: Focus on interpretative and classifications** (57 views, 1 year ago)
- Carbon stocks in urban soils** (83 views, 1 year ago)
- Heavy metals distribution in green infrastructure** (83 views, 1 year ago)
- Pedogenesis of polar cities** (702 views, 1 year ago)
- Soil Survey Overview and Land Resource Regions** (40 views, 1 year ago)
- Oceanic Pedology: Is There a Death Tree Deep?** (24 views, 1 year ago)
- Web Soil Survey** (170 views, 1 year ago)
- Formation, functions, and evolution of soils in anthropic areas** (106 views, 1 year ago)

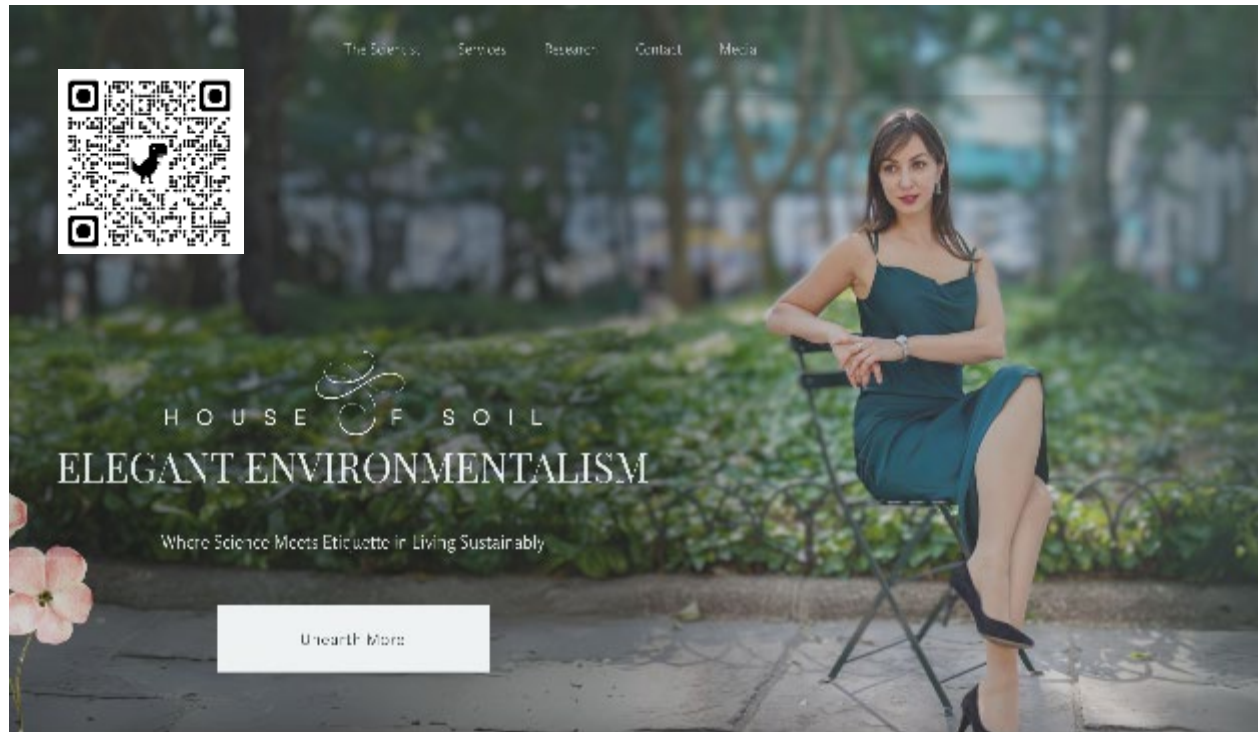
SCAN ME



A collage of social media content related to soil science, featuring:

- SPARKLE TONIGHT, POLLUTE FOREVER** (Instagram post)
- SOIL ROCKS** (Instagram post)
- FROM GROUND TO GIGLES** (Instagram post)
- THE QUIRKY QUOTATIONS OF SOIL SCIENCE** (Instagram post)
- HOW SOILS FORM FROM COMMON ROCKS** (Instagram post)
- POTTING MIXES** (Instagram post)
- YOUR APARTMENT MIGHT BE MORE TOXIC THAN YOU THINK** (Instagram post)
- HOUSE_OF_SOIL** (Instagram profile)
- SCAN ME** (Text with an arrow pointing to the QR code)
- EVERYBODY'S DISCORDER SHOULD GET THEIR SOIL** (Instagram post)
- SEMINARS TO GROW YOUR CAREER** (Instagram post)
- The Los Angeles Tribune** (Instagram post)
- LOOKS THAT KILL (THE PLANET)** (Instagram post)
- FACT YOU WISH WEREN'T TRUE:** (Instagram post)

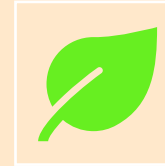
Bringing Science to Culture



Pathways to Healthier Urban and Peri-urban Soils



Integrate soil into urban planning



Promote unsealing & green infrastructure



Foster soil literacy & participatory science



Bridge science, policy, and citizens



Stay Connected

Email me with any questions
apaltsev@purdue.edu

THANK YOU!



HOUSE_OF_SOIL