EGU25-18888, updated on 22 May 2025
https://doi.org/10.5194/egusphere-egu25-18888
EGU General Assembly 2025

Ground Penetrating Radar and Community Engagement for Enhancing Resilience in Green Infrastructure

Livia Lantini[1,2], Yasemin Didem Aktas[3], David Sanderson[4], Laden Husamaldin[1,2], and Parisa Saadati[1,2]

[1]University of West London, School of Computing and Engineering, London, United Kingdom of Great Britain – England, Scotland, Wales (livia.lantini@uwl.ac.uk)
[2]The Faringdon Research Centre for Non-Destructive Testing and Remote Sensing, University of West London, London, United Kingdom of Great Britain – England, Scotland, Wales
[3]Department of Civil, Environmental & Geomatic Engineering, University College London, London, United Kingdom of Great Britain – England, Scotland, Wales
[4]School of Built Environment, University of New South Wales, Sydney, Australia

As urban areas face increasing challenges from climate change, rapid urbanisation, and environmental degradation, enhancing urban resilience has become crucial for ensuring the sustainability of cities. Green infrastructure, particularly urban trees and green spaces, plays a central role in this effort, providing essential ecosystem services such as stormwater management, urban cooling, and carbon sequestration. However, the health and interaction of these natural systems with the built environment and infrastructure remain underexplored. Traditional methods for assessing the health of urban trees, particularly underground root systems, are often invasive and detrimental to the environment. This research explores the potential of non-destructive testing (NDT), specifically Ground Penetrating Radar (GPR), as a tool for assessing the health of urban trees and their underground root systems.

This project aims to develop an innovative, non-invasive methodology using GPR to assess the underground root systems of urban trees and their interaction with infrastructure. By providing urban planners with accurate, actionable data, the project seeks to identify risks to both urban trees and surrounding infrastructure, thereby enhancing urban resilience. This research supports cities in managing green infrastructure more sustainably, promoting the integration of natural systems into urban planning, and helping cities become more adaptable to the challenges posed by climate change.

The methodology involves using GPR technology to conduct surveys on urban tree root systems across various sites, mapping the underground root structures to identify potential risks to infrastructure, such as road damage or interference with utilities, and areas requiring preservation efforts. The GPR surveys are complemented by a review of tree species, urban settings, and

environmental factors that impact root growth and health. A community-driven approach ensures that the data generated is applied in a way that directly benefits local communities, promoting collaborative solutions that integrate green infrastructure into urban planning. This approach aligns with the Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action), by promoting climate-resilient urban environments through sustainable infrastructure practices.

Preliminary results demonstrate the feasibility of using GPR as a non-invasive tool for enhancing resilience in urban planning. The research lays the foundation for developing a resilience framework to help cities integrate green infrastructure into climate adaptation strategies. This work will provide urban planners and policymakers with critical data for making informed decisions that strengthen the resilience of both urban ecosystems and infrastructure.

Acknowledgements:

This project is supported by the UK Department of Science, Innovation and Technology's International Science Partnerships Fund (ISPF) via the Royal Academy of Engineering under the Frontiers Seed funding scheme (FS-2425-22-157).