

# Interlinkages between soil and tree health in the urban environment: a Citizen Science EU research project

Nerea Ferrando<sup>1,2</sup> | Vicky Struthers<sup>1</sup> | Macarena Cárdenas<sup>2</sup> | Daphne Parramon-Dhawan<sup>2</sup> | Ana Mijic<sup>3</sup> | Wouter Buytaert<sup>3</sup> | Joanna Clark<sup>1</sup>

<sup>1</sup>University of Reading, Reading, UK; <sup>2</sup>Earthwatch Institute (Europe), Oxford, UK; <sup>3</sup>Imperial College London, London, UK

## Introduction

Urban forests benefits for people and the environment are now well established, with urban greening high on the agenda in most EU countries for mitigating the negative impacts of climate change and urbanization through carbon sequestration and storage, temperature and stormwater regulation and air purification. However, many urban trees are not managed in a way that can facilitate the ecosystem services they provide, resulting in failed or diminished results. This is mainly due to inadequate soil preparation techniques and specifications required for healthy tree growth. This integrated study aims to address the knowledge gap in urban tree management practices by looking at interlinkages between tree health and productivity, soil hydrology and soil carbon and nutrient conditions. Here, we present part of this study looking at the link between litter management, soil properties and infiltration.

## Method

The two-year research project is conducted using Citizen Science at study sites located in London (Kew Gardens), Birmingham (Cannon Hill). Each site will be visited twice during Spring and Autumn. Soil measurements and samples will be collected below and outside the canopy of Lime trees (*Tilia x europaea*) in areas with and without litter removal. Measurements include:

### Infiltration rate (Mini Disk Infiltrometer)



### Soil Colour



### Soil Texture



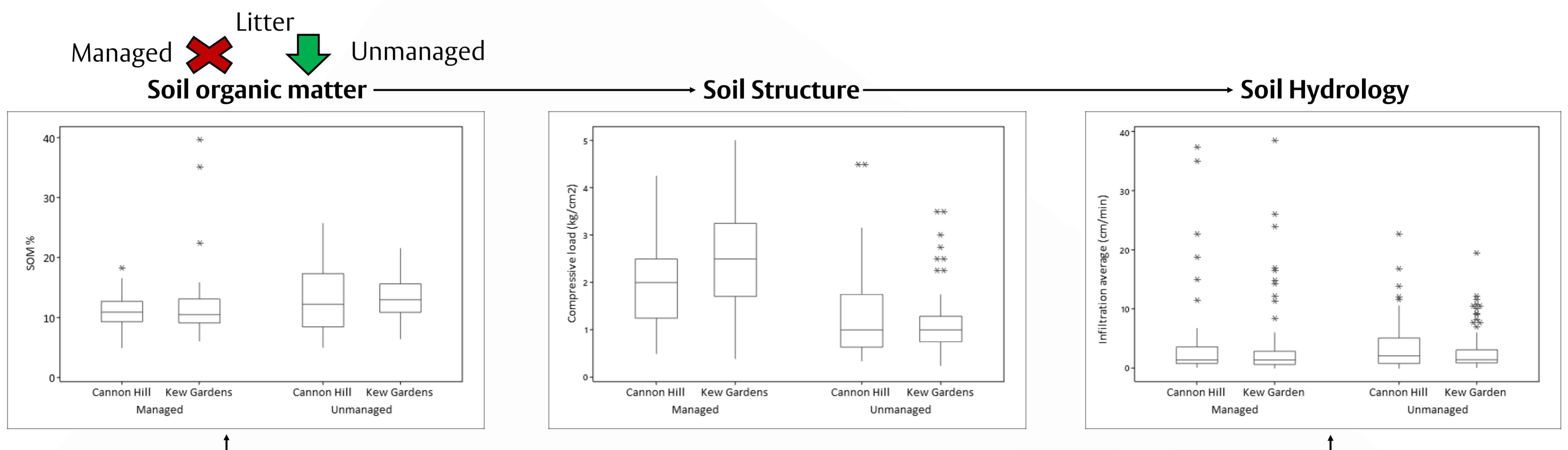
### Soil Compaction (Pocket Penetrometer)



Citizen scientist also collect samples for further analysis in the laboratory, including: LOI, total C, soil colour and texture, water extractable carbon (UV-Vis, DOC) and water holding capacity. **SUCTION RATE 1cm mini disk infiltrometer or soil compaction with pocket penetrometer.**

## Preliminary Results

The preliminary results in the UK indicate that the increased litter in unmanaged sites significantly improved measures of soil health, specifically total carbon content, reduced compaction and bulk density. Improvements in soil health were related to increased infiltration. Therefore, both climate and water regulation were improved by not removing leaf litter.



## Next Steps

Further work is needed to better understand the mechanisms underpinning this, specifically the functional role of soil organisms to identify the best land management practices for the benefit of urban trees and soils and the ecosystem services they deliver. Scientific data collection and analysis will continue for the remaining 2019 field season.

### Contact information

Department of Environmental Science, University of Reading, Whiteknights, RG6 6AH  
Email: [n.ferrandojorge@pgr.reading.ac.uk](mailto:n.ferrandojorge@pgr.reading.ac.uk)

### Acknowledgements

This project was made possible thanks to the generous support of the University of Reading and to the enthusiastic HSBC employees participating in Earthwatch's Sustainability Training Programme.