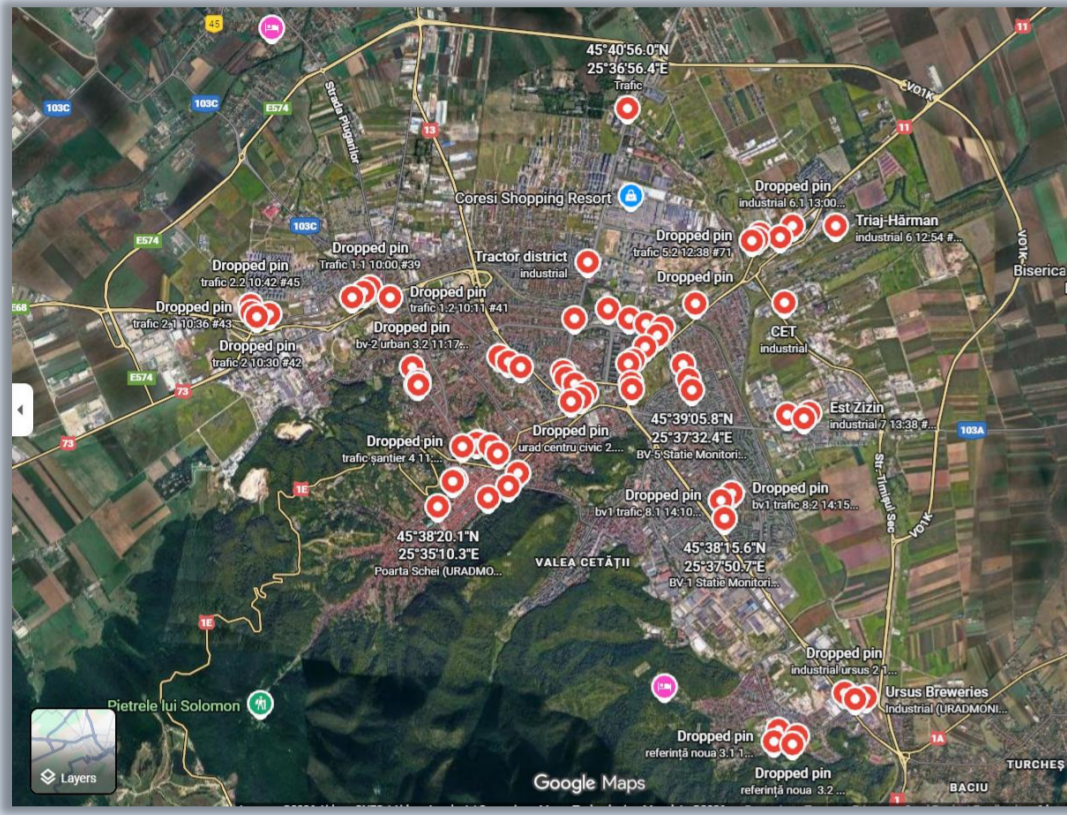


Geochemical characterization and spatial variability of urban soils under anthropogenic pressure as a baseline for nature-based solutions

INTRODUCTION

- “ The aim of the experimental activities was to assess urban soil quality and potential contamination levels, while characterizing the spatial variability of soil chemical composition in support of NbS implementation within the urban fabric of Brasov, Romania.
- Nature-based Solution** (NbS) are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.
- Soil and mineral** element concentrations were measured in situ at 74 key locations across the city using a portable X-ray fluorescence analyzer (Thermo Scientific XL2 Plus). ”

MATERIALS & METHODS



Soil Measurement Locations

- ❖ Ecological restoration priority areas (PROPARK);
- ❖ High-pollution urban areas;
- ❖ Areas near official air quality monitoring stations;
- ❖ Areas near uRADMonitor sensors;
- ❖ Reference areas.
- ❖ TOTAL: 74 locations

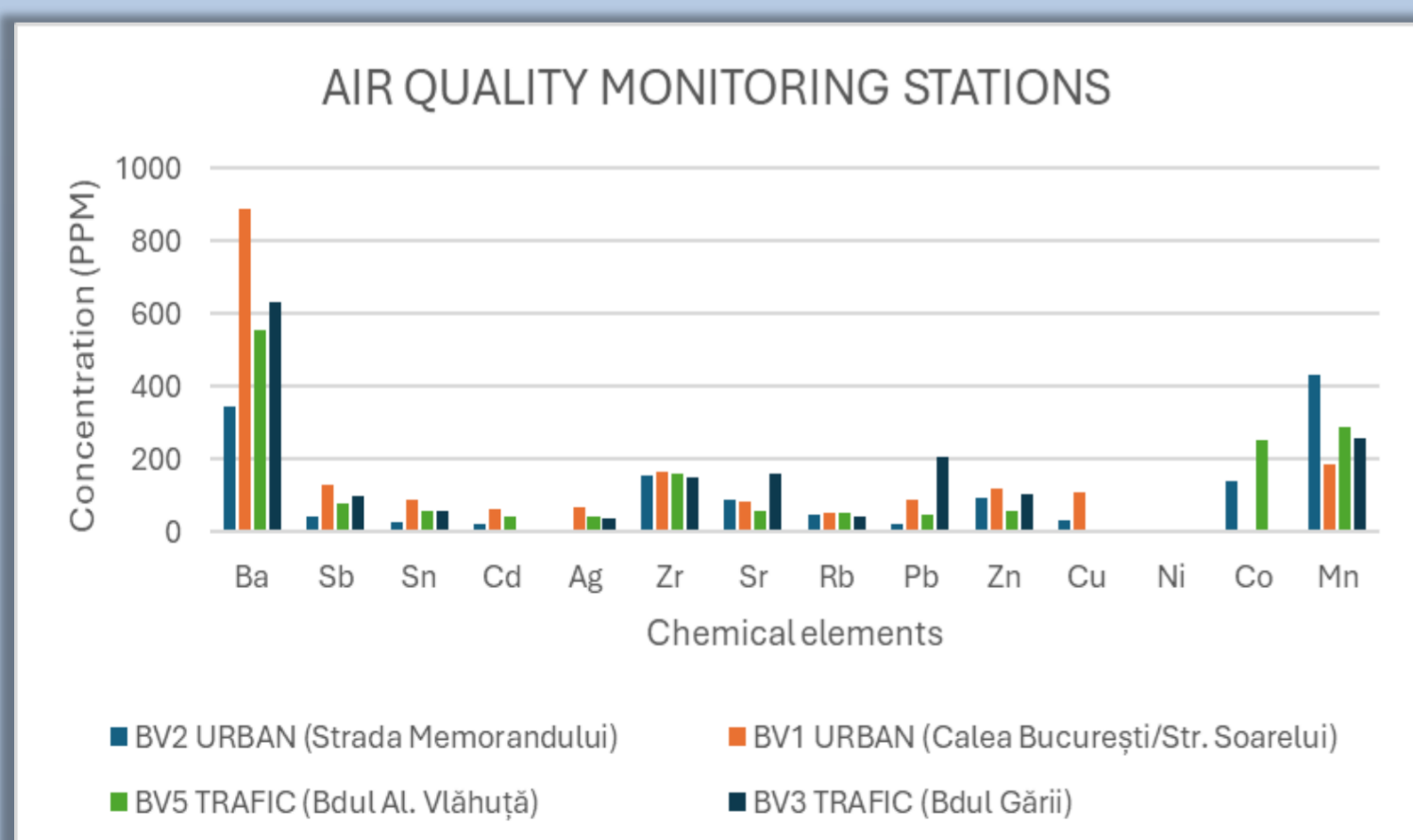
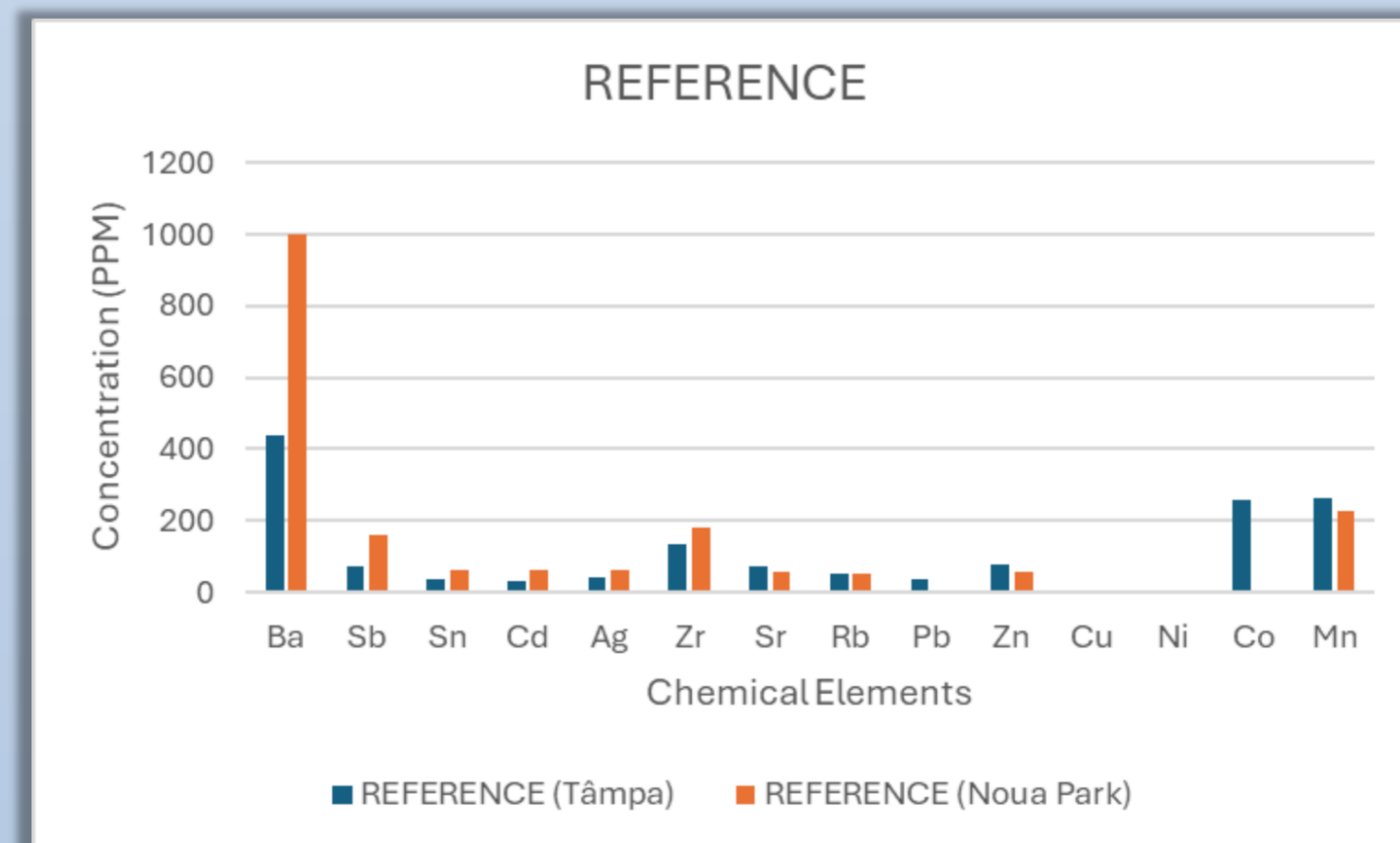
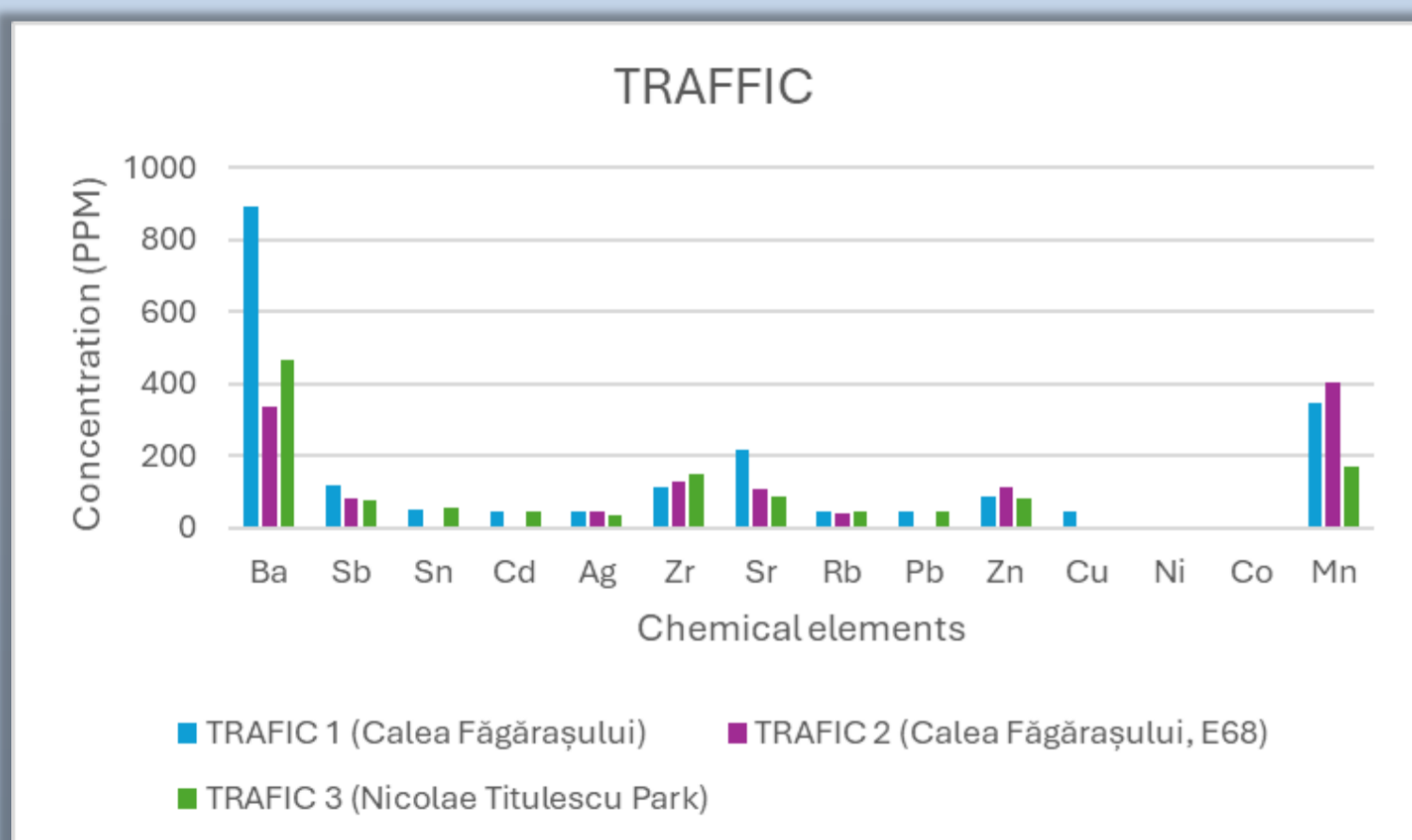
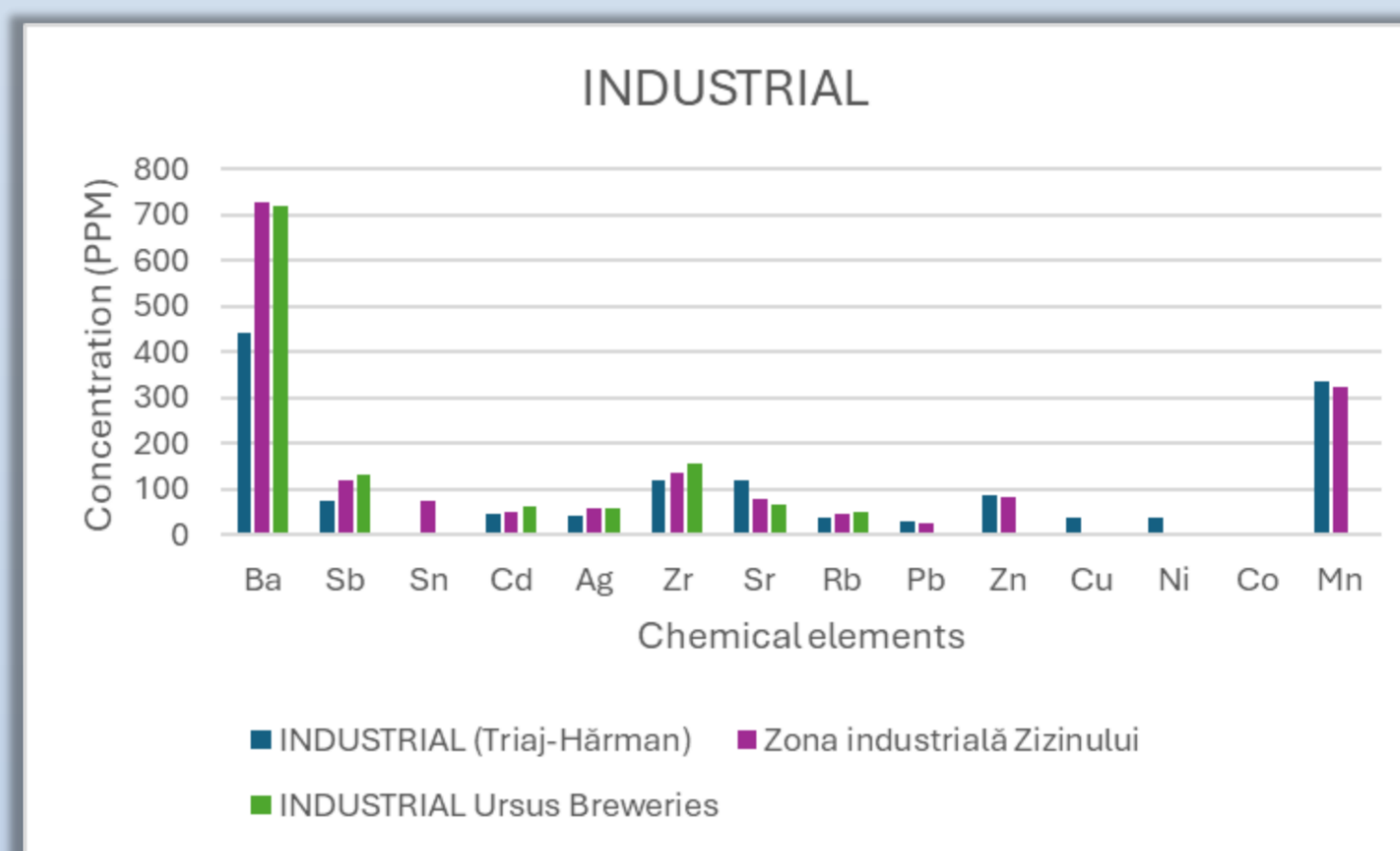
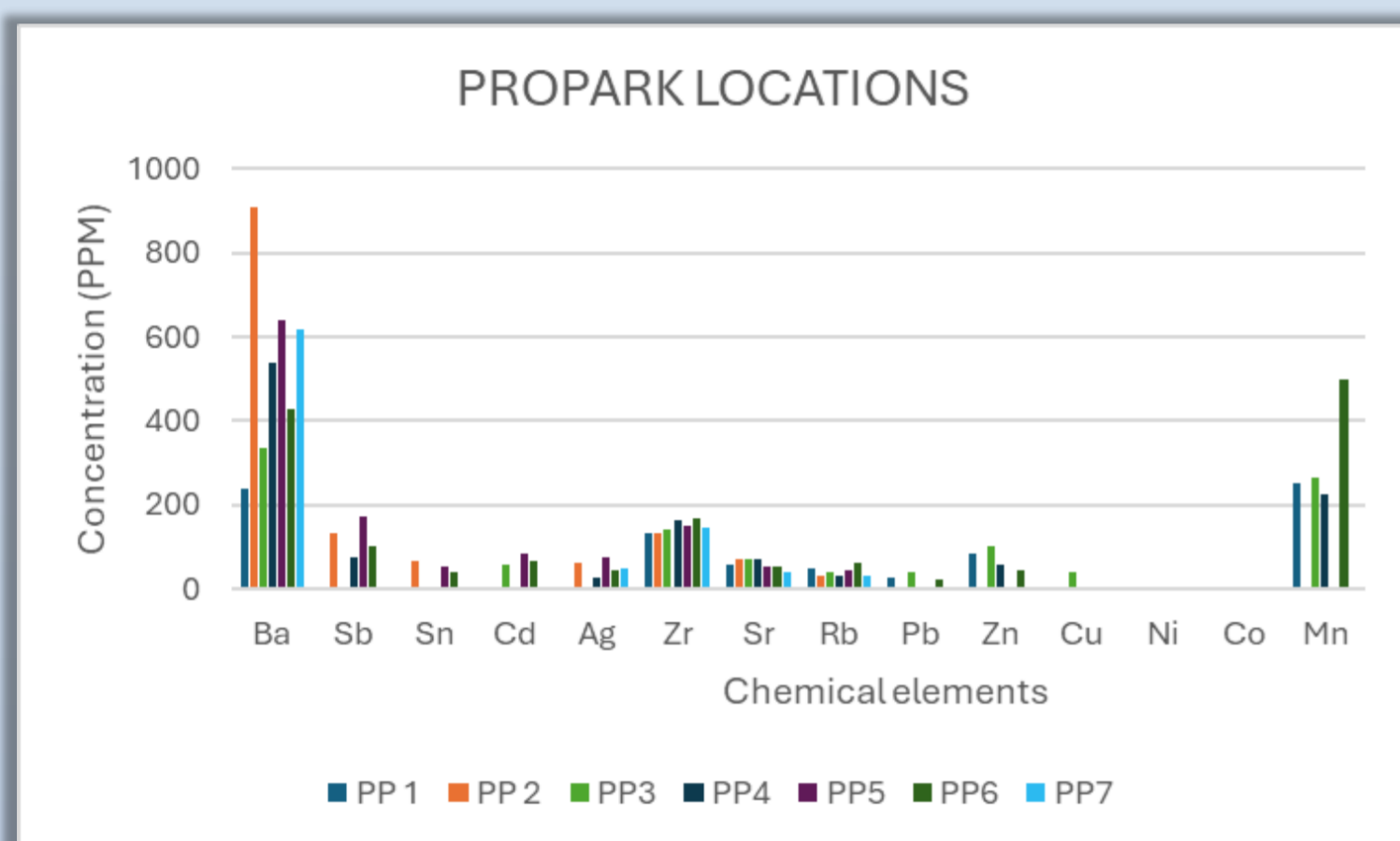
Thermo Scientific XL2 Plus

- ❖ Portable, handheld X-ray fluorescence (XRF) analyzer for rapid, non-destructive, in situ element analysis of soils, minerals, metals, and other solid materials.
- ❖ Enables qualitative and quantitative measurements of a wide range of chemical elements by measuring the characteristic secondary (fluorescent) X-rays emitted by a material when it is excited by a primary X-ray source.

Soil Measurement Procedure

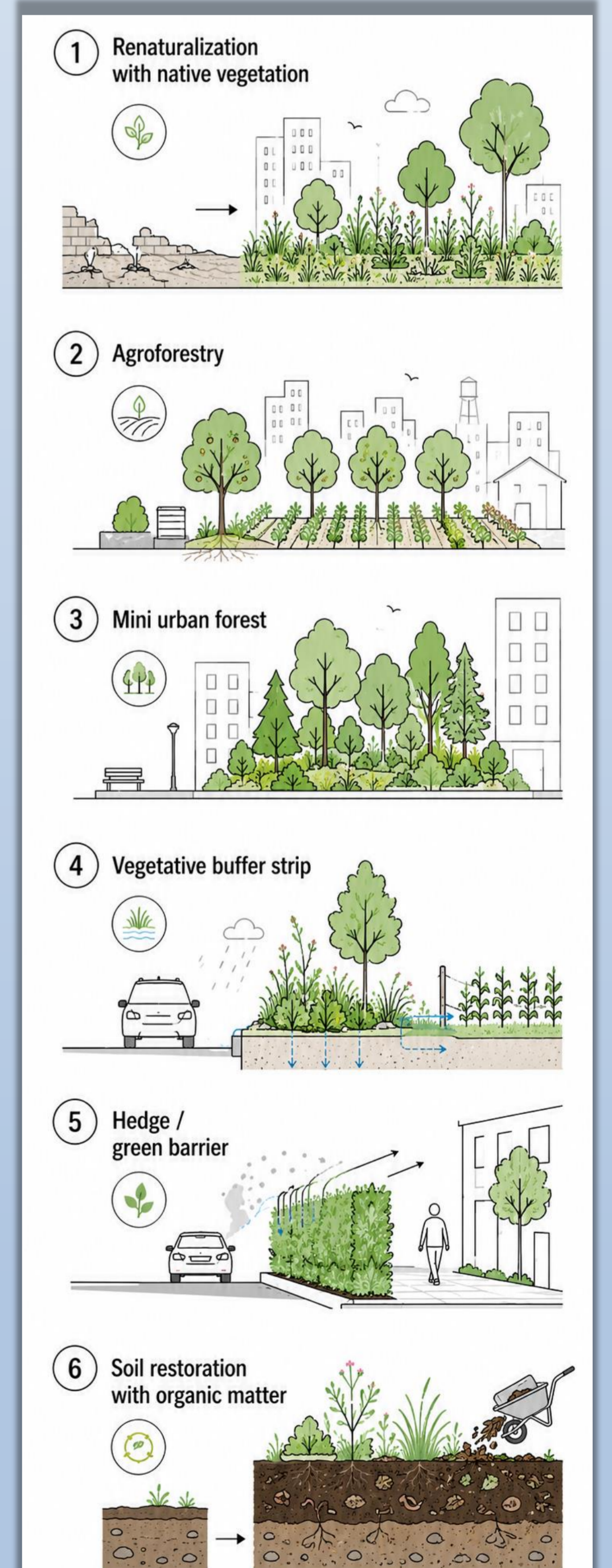
- ❖ In situ soil measurements were conducted at each site using the XRF analyzer;
- ❖ The device was placed directly above the exposed soil surface after removing visible impurities;
- ❖ One 60s reading was performed per site;
- ❖ Dry and clean soil surfaces were preferentially selected to reduce moisture-related interference.

RESULTS & DISCUSSIONS



Interpretation of Results

- ❖ Airborne pollutants may accumulate in urban soils, increasing long-term environmental risk;
- ❖ PAHs and PTEs are key urban pollutants, frequently linked to PM10;
- ❖ Major sources include traffic, domestic heating, industry and waste burning;
- ❖ Traffic-related processes such as fuel combustion, brake wear, and tire wear are important source of metals such as Pb, Cd, Zn, Cu, As, and Ni.



BIBLIOGRAPHY

- ❖ Walters, G.; Janzen, C.; Maginnis, S. *Nature-Based Solutions to Address Global Societal Challenges*; ISBN 9782831718125.
- ❖ Ravansari, R.; Wilson, S.C.; Tighe, M. Portable X-Ray Fluorescence for Environmental Assessment of Soils : Not Just a Point and Shoot Method. *Environ. Int.* **2020**, *134*, 105250, doi:10.1016/j.envint.2019.105250.
- ❖ Colombo, C.; Palumbo, G.; He, J.; Pinton, R. Review on Iron Availability in Soil: Interaction of Fe Minerals, Plants, and Microbes., doi:10.1007/s11368-013-0814-z.
- ❖ Raț, N. Linking Atmospheric and Soil Contamination : A Comparative Study of PAHs and Metals in PM 10 and Surface Soil near Urban Monitoring Stations. **2025**.

