RESULTS OF NATIONAL IN SITU MAPPING OF POTENTIAL TOXIC ELEMENTS IN NATURE BASED BIO SWALES AND RAINGARDENS

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BACKGROUND

Many cities are currently implementing nature-based solutions to deal with the effects of the changing climate (heat, drought, floods). Many of these measures collect rainwater from roofs, streets and other surfaces. Often, these contain small bits of polluting substances, which can stack in bioswales and raingardens. They can become harmful when they get in direct contact, e.g. when children play in these areas. There is little data about how this pollution looks like in practice and what can be done to counter these effects. Because not all measures can be investigated thoroughly, we attempt to connect environmental factors to the potential pollution of measures.

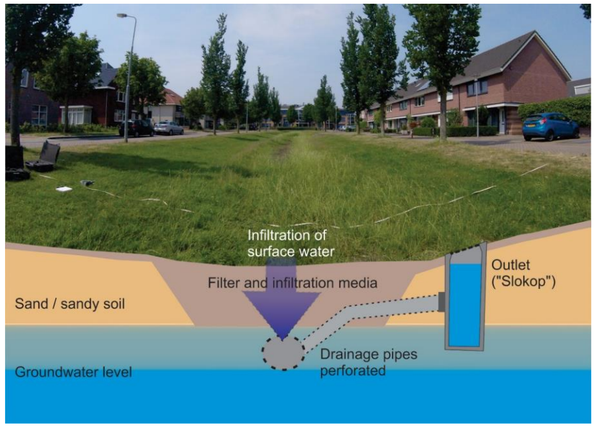

***FIGURE**: Illustration of swale and how pollution concentrates*

METHOD

Pollutants are measured by a portable XRF hand scanner. This in situ instrument allows for the detection of metals in the soil in ppm. Measures follow a step-by-step routine:

1. Callibration of the scanner
2. Visual inspection of area on indicators of pollution
3. Determination of paths through the area for measurements
4. Execution of measures at multiple sections
5. Measuring repeatedly for 60 seconds per location, both on top of vegetation and soil directly

The readings that are found can be plotted in a graph. If they surpass national thresholds, a location is considered polluted and actions can be taken to deal with this.

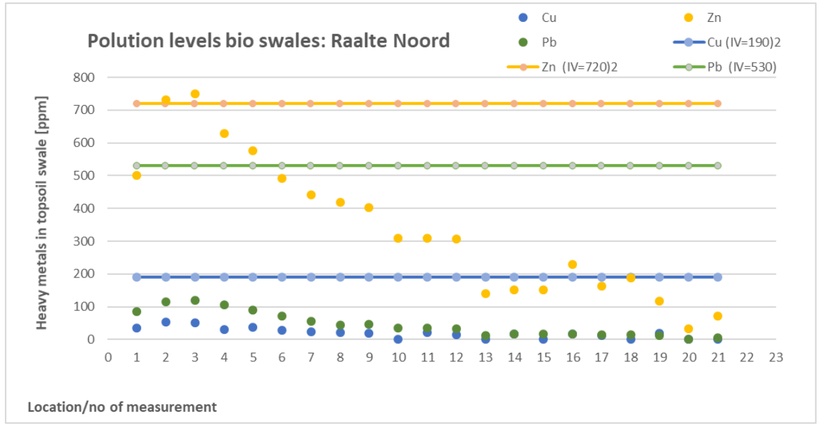

***FIGURE**: XRF values for measures in Raalte Noord, The Netherlands*

Metals	National Background Concentration ppm (mg/kg)	Target Value ppm (mg/kg)	Intervention Value ppm (mg/kg)
Lead (Pb)	85	85	530
Zinc (Zn)	140	140	720
Copper (Cu)	36	36	190

***FIGURE**: Threshold values for pollution in soil*

***FIGURE**: Impression of fieldwork with XRF scanners*

APPLICATION

The data that is collected on pollution is part of a bigger research project on the long-term functioning of nature-based solutions. Together with students through interactive fieldwork methods, these measures are explored and mapped on the online tool 'Climatescan'. Along with the XRF pollution data, we investigate environmental factors, infiltration capacity, biodiversity and public perception of measures. This integrated approach helps in interpreting and explaining pollution data, in order to help cities adapt effectively.

LESSONS LEARNED

The mobility of the XRF scanner supports the finding of substance pollution on site, which allows us to look for explanatory factors in the environment, making it a cost and time efficient instrument. Moreover, it allows the inclusion of students and citizens in doing fieldwork, adding to the transparency of adaptation research. As we are still in the process of doing research, conclusions on the relation between environmental factors and the pollution of adaptation measures will be shared at a later opportunity.

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