

PHYTOSCREENING – AND REMEDIATION: Low-cost, simple and green technologies

Background and objectives

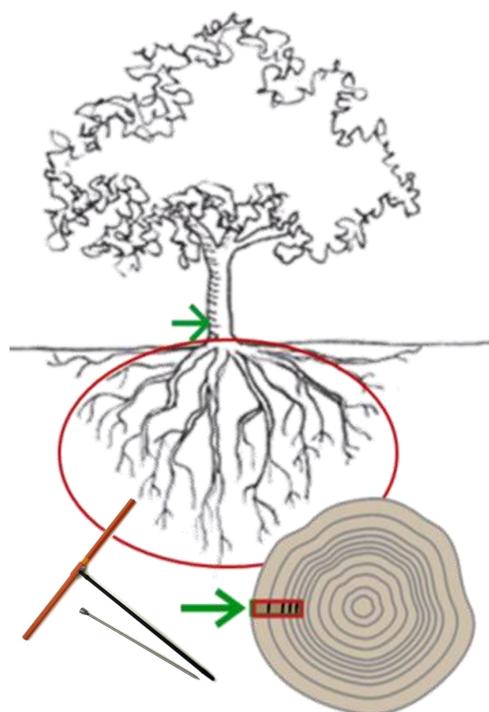
In the European member states and elsewhere a rising concern has been the still growing number of huge brownfield sites e.g. former industrial sites, military airbases and mining facilities, now contaminated, deserted and out of use. Often the desolated sites occurs hideous and unattractive or even fenced to keep the public out. By use of existing conventional methods regeneration of such brownfields is almost impossible and if done, very costly.

Phytoscreening and **phytoremediation** are promising low-tech technologies for screening and remediation of subsurface pollution by use of trees. The methods are specially useful at large areas and leaves the sites non-disturbed.

Phytoscreening

Function: Subsurface are taken up by the root system and transferred to stem and leaves. Tree cores are collected, analyzed and used for mapping the contamination.

- **Low-cost:** Due to fast sampling and a minimum of equipment needed.
- **Simple:** Low-tech equipment is used for sampling. No special training required.
- **Green:** The method is harmless for the trees and the site is left almost untouched, thereby leaving it undisturbed.



Volume of soil represented by a tree core sample and a picture of a hand drill

Application: Feasible for chlorinated solvents down to app. 12 m, and for strong shallow metal pollution (Cd, Cu, Ni and Zn). Investigation of BTEX, MTBE and PAH compounds requires more research.

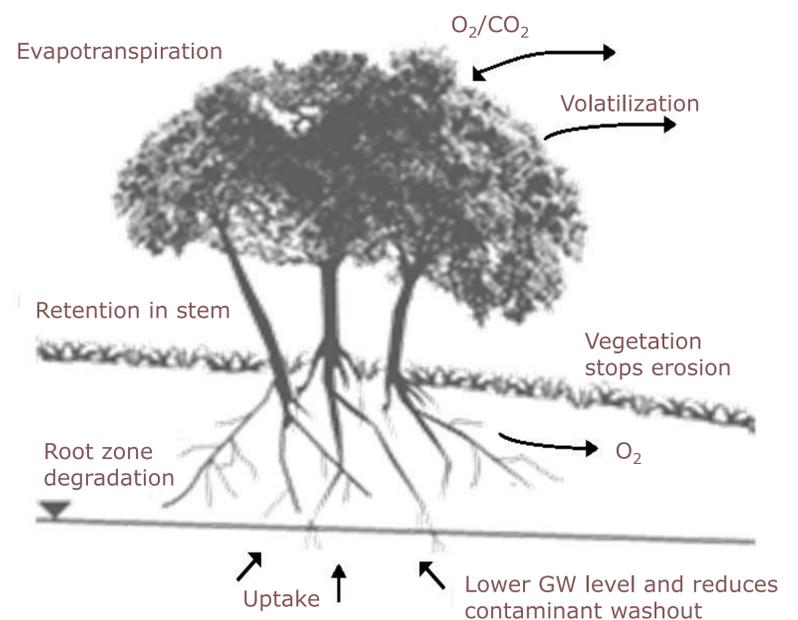
It is a semi-quantitative method why it is useful as a pre-screening method.

Very useful at sensitive sites like private land or in forest-, swamp-, or other areas where traditional sampling can be complicated.

Phytoremediation

Function: The processes includes phyto-extraction, -volatilization, rhizo- and phytodegradation, hydraulic control and soil fixation, all occurring simultaneously.

- **Low-cost:** Planting and monitoring costs equals those of natural attenuation.
- **Simple:** Fast growing trees are planted and proper monitoring is established.
- **Green:** The area occurs "natural" during the treatment period and can be used as "green area".



Overview processes of phytoremediation

Application: Useful for large area remediation of shallow pollution and for stabilization of low priority sites. The method can extract, degrade or volatilize BTEX, MTBE, chlorinated solvents, PAH, heavy metals and explosives to acceptable levels or immobilize them.

Final remarks

- **Phytoscreening** by tree coring is a low-cost and easy method, for screening of subsurface pollution at large areas which can be used to focus other more advanced and cost-intensive screening methods, with the overall goal to make site characterization more efficient.
- **Phytoremediation** is a cheap alternative or supplement to existing conventional remediation technologies and can be implemented for multiple purposes. When implemented the area appears beautiful throughout the remediation period and can be used as "green area".