

## Phytoremediation – Cleaning With Plants



Phytoremediation is an innovative technology that offers an economical and aesthetic solution for remediating brownfields, landfills, pipelines, military bases, gas stations and other contaminated sites through the use of plants in situ (on site) to absorb, transform and contain a variety of contaminants including soft and heavy metals and volatile organics.

Plants have always been important aesthetic and ecological tools in the field of Landscape Architecture. Now, thanks to the ever-increasing amount of despoiled sites in the post-industrial landscape, the role of plants has significantly increased. Certain plants ability to degrade and uptake many chemicals and hazardous substances has made them important players in many brownfield redevelopment initiatives.

Some species of plants have the ability to take heavy metals such as lead and uranium into their tissue. This is called phytoaccumulation. Studies made in the Ukraine showed that sunflowers can accumulate large quantities of uranium into their roots. Poplar trees also have the ability to trap metals between root cells. Indian mustard has been successfully used to remediate lead contaminated soils. When these plants are harvested, they are air dried, sampled for metal content and then sent to a smelter to recycle the metals or ashed and sent to a toxic waste landfill. This is a much less expensive process than excavating and removing contaminated soils.

Degradation is another process whereby plants increase their metabolic rates to speed the development of microbial life in the soils surrounding the root zone. This increase helps degrade harmful contaminants by adding more oxygen, water and nutrients to the soils.

A third application of phytoremediation involves using plants to control the movement of contaminants in groundwater by increasing transpiration. Trees such as willow and poplar take up large quantities of water and store it in their roots and plant tissue, thus reducing migration through the soils.

While phytoremediation is an evolving science, knowledge of its potential is vital for site designers to effectively improve degraded sites. It can be used solely or in combination with other conventional remediation techniques, but the process is always site specific, since each site contains a different set of environmental conditions. Please visit these web sites or contact our office for more information.

**USDA Agricultural Research Service:** <http://www.ars.usda.gov/is/AR/archive/jun00/soil0600.htm>

**The Great Plains/Rocky Mountain Hazardous Substance Research Center**  
<http://www.engg.ksu.edu/HSRC/phytoem/>

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