

# Bioremediation

Methods for In-situ Soil  
Decontamination

# Bioremediation Types

- Intro
  - DIY/low-tech
  - Solutions are cheap and safe
- Types
  - Mycoremediation
  - Phytoremediation
  - Bacterial/compost remediation
- Caveat
  - No guarantee of complete decontamination
  - Ideally combined with testing

# Contaminants

- Heavy metals
  - Can't be created or destroyed
  - Just accumulated e.g. Chernobyl
  - Vectors: direct soil contact (get mulching)
- Molecular contaminants
  - Hydrocarbons, PCBs etc
  - Can be broken down (metablised)

# Bacterial/Compost Remediation

- Organisms chelate metals
  - Reduces bioavailability
- Examples:
  - Compost Tea
    - Aerobic brew of compost organisms in water
    - Application 500ml/1m<sup>2</sup>
  - Effective Microorganisms
    - Beneficial bacteria in a bottle

# Bacterial/Compost Remediation

## *Bioremediation of Contaminated Soil*



**Before**



**After**



This scene where a diesel road tanker overturned was bioremediated using a bacteria enhanced agent.



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# Phyto-Remediation

- Cultivated mineral accumulating plants
  - Several selected plantings
  - Heavy metals
- New Jersey car battery contamination
- Soil pH affects reactivity of metals
  - Cationic (lead) an anionic (arsenic)
- Examples: mustard, sunflowers
- Key points
  - Disposal of plants
  - Clear signage

# Has it Worked?

- Testing
  - Can be most accurate
  - Only accurate for tested area
- Inspection
  - Hydrocarbons: smell, oily, lightening of soil
- Timescale
  - May take years to fully decontaminate

# Case Studies



## The Rhizome Collective

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### Rhizome Collective Grove Brownfield Cleanup

*Brownfield: A property that re-use of is complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.* [Download the Video \[Mac | Win\]](#)

In 2004, the Rhizome Collective was donated a 9.8 acre brownfield in the Montopolis neighborhood. The property served as legally operated municipal landfill from 1967 to 1970, and was illegally dumped on for approximately fifteen years following the closure of the landfill. We received a \$200,000 EPA Brownfield Cleanup Award to clean the property. From January 2005 to July 2006, we removed 680 tires, 10.1 tons and 36.5 cubic yards of trash, and 31.6 tons of recyclable metal from the site. Huge amounts of wood scrap and concrete were diverted from landfills and used for erosion control on site. A 1,380 foot fence was constructed along the southern edge of the property to prevent further dumping. The process of turning the brownfield into an Ecological Justice Education Park has begun!



### Background

The project began in 2002 when the City of Austin Brownfields Redevelopment Office told us about a property that had 5,000 cubic yards of illegally dumped debris on it. The cost of removing the mountain of debris on the property would be greater than the amount that could be made back by selling the property afterwards. The owner of the property was therefore looking for a nonprofit group to donate it to. We were intrigued by the opportunity and went to see it firsthand.



Initially, the collective was daunted by the amount of work that the cleanup would entail- giant concrete boulders were intertwined with rebar, metal scrap, tires, asphalt shingles, and household trash. However, we were able to see beyond the towering garbage pile, and envisioned creating an ecological justice park in a beautiful urban greenspace.

We decided to apply for an EPA Brownfield Cleanup Award. The grant provides federal funding to clean contaminated properties. In our application we outlined a vision to use innovative sustainable technologies to clean the debris from the site. Instead of just moving the trash to another landfill it would be utilized to



# Resources

- Toxic Soil Busters -Worcester Roots
  - <http://www.worcesterroots.org/>
- The Radix Ecological Sustainability Centre
  - <http://radixcenter.org/radix-center/>
- Toolbox for Sustainable City Living
  - Scott Kellogg & Stacey Pettigrew