Bunker Hill Hillsides to Wetlands: Residuals for Remediation

The Bunker Hill Superfund site in Idaho's Coeur d'Alene River Basin is the second largest in the U.S. Once the nation's largest and richest mining district, with mining and smelting of zinc and lead occuring from 1916 until the early 1980s, soils on these mountainsides became highly acidic and contaminated with high concentrations of lead, zinc, cadmium, and arsenic as a result of smelting operations. Vegetation died and mountain soils became highly susceptible to erosion; a substantial portion of the surface layer washed into the river basin. It is estimated that over 70 million tons of mine tailings were dumped into the river; combined with erosion, up to 700 million tons of contaminated sediment has potentially entered the basin. A remediation project jointly carried out by a team of scientists from the University of Washington School of Forest Resouces, the USDA, and the Northwest Biosolids Management Association used "supermulch" to reduce metal toxicity in the soil.

The Bunker Hill site is highly visible, and successful restoration is both environmentally and politically important. The research project demonstrated the use of mixtures of residuals (biosolids, compost, wood ash, log yard waste, and pulp and paper sludge) to remediate both the surface of these soils and existing wetlands. Applications of specifically designed supermulches reduce metal toxicity while correcting soil pH, nutrient deficiencies, and soil physical properties. In wetlands, these mixes provide physical barriers to the contaminated sediment, reduce toxicity through formation of insoluble compounds, and provide organic matter and nutrients for aquatic plant establishment.

Wetland plant restablishment

The EPA Emergency Response Team asked scientists and residuals managers to assist Region 10 EPA in demonstrating the effectiveness of this approach. Phases I and II of the demonstration, installed in spring and fall of 1997, consisted of surface application of supermulch to tailings and steep, eroded hillsides. Biosolids from King County, Everett, Tacoma and Cowlitz County, WA, and Post Falls and Coeur d'Alene, ID, were mixed with wood ash from Washington Water Power, Louisiana Pacific, or Kimberly-Clark, and logyard waste from Crown Pacific. A seeding mixture of grasses and legumes was added to the biosolids/ash amendments at different intervals following surface application.

Plant establishment was dramatic. Soil microbial communities reestablished and there is evidence of wildlife usage. The results suggest that such treatments are highly successful in revegetation and erosion control.

Phase III, a five-acre existing wetland remediation project, was completed in October 1998, through a subcontract with King County, WA. Approximately 15 cm. of a mixture of biosolids from the cities of Coeur d'Alene and Lewiston, ID, and ash from Washington Water Power and Abitibi was applied over water. This mixture quickly sank to provide a new sediment base for wetland plants. Reestablishment of wetland plants such as cattails has been dramatic and water quality has been preserved and potentially improved.

Research at these projects tracks plant establishment and growth, fate of metals, microbial activity, and changes in soil properties. The promising results to date have encouraged a number of other Superfund sites across the country to initiate similar demonstrations.

Contacts:

Sally Brown, Research Associate Professor
University of Washington
School of Forest Resources
(206) 616-1299
slb@u.washington.edu

Rufus Chaney, USDA-ARS
Rufus.Chaney@usda.gov

Harry Compton, EPA-ERT
compton.harry@epamail.epa.gov