USA: Idaho: West Page Swamp Wetland Restoration Project (Bunker Hill)

Overview

The West Page Swamp wetland restoration project lies within the Bunker Hill, Idaho superfund site. This individual restoration project was set up as a research site to evaluate the use of a cap of biosolids (including compost, wood ash, and wood waste) over soils contaminated by heavy metals as a result of mining. It appears that these methods are useful. These new soils limit the bioavailability of lead to plants and animals and also provide nutrients for plant growth. This site was being monitored as of 2005 and will probably continue to be monitored. If this method of remediation is successful, it may be used in further restorations both in the Bunker Hill (Idaho) superfund site and elsewhere.

Quick Facts

Project Location:
Bunker Hill idaho, 43.43962769999999, -114.34754709999999

Geographic Region:
North America

Country or Territory:
United States of America

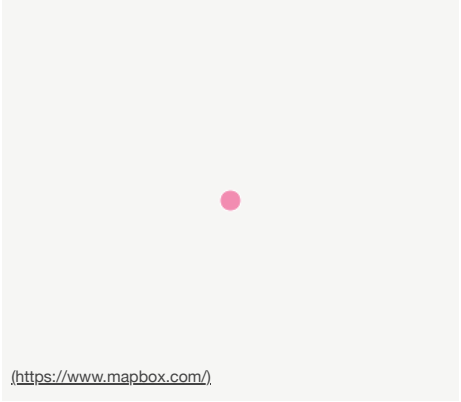
Biome:
Freshwater

Ecosystem:
Freshwater Ponds & Lakes

Area being restored:
11 hectares

Organization Type:
University / Academic Institution

Location



TIMEFRAME

Project Stage:
Completed

Start Date:
1997-06-01

End Date:
2000-09-30

DEFINING THE PROBLEM

Primary Causes of Degradation

Mining & Resource Extraction

Degradation Description

Starting in 1916 and into the 1980s, the Bunker Hill site was used for the mining and smelting of lead (Pb) and Zinc (Zn). The West Page Swamp site was used for direct tailings deposition between 1918 and 1929. This resulted in contamination from Lead, Zinc, Cadmium (Cd), and Arsenic (As). Mine tailings reached depths of 18 inches to 10 feet, vegetation was sparse, and the soil was found to be contaminated with very high metal concentrations (lead was found at about 30,000 mg/kg; zinc at concentrations of about 15,000 mg/kg; and cadmium at concentrations of roughly 100 mg/kg).
Because of the mining activity, the soil on site lacked vegetation due to the poor physical properties of the soil, acidity, salts, and metal toxicity. Additionally, this ecosystem had an elevated lead level, endangering any waterfowl that may use these wetlands for feeding or nesting.

PLANNING AND DESIGN

Reference Ecosystem Description

Unknown.

Project Goals

The goals of the West Page Swamp wetland restoration project were:
– Test the effectiveness of using compost and organic residuals to remediate lead-contaminated sediment so that these techniques and components could be used on similar sites.
– Establish a place where native vegetation could grow and thrive
– Reduce the bioavailability of lead and other contaminants to animal species

If these goals are attained, then the site will have better ecosystem function and not pose a hazard to life currently or in the future.

Monitoring

The project does not have a monitoring plan.

Stakeholders

University of Washington
U.S. Environmental Protection Agency, Region 10
Coeur d'Alene Indian Tribe
Mining companies listed as potentially responsible parties (PRPs)
Idaho Department of Environmental Quality

PROJECT ACTIVITIES

Description of Project Activities:
- This site was set up as a research site, to determine the usefulness of this type of remediation as a solution to contaminated soils in wetlands - Tailings in the area were removed to a depth of 0.7 meters - About 15 cm of compost and wood ash were spread over the site using heavy equipment - Significant problems arose with rising groundwater and poor accessibility so that they constructed a road for heavy equipment and used a blower to spread the new soil - But in September of 2000, the remaining area were covered by the new soil - The outlet end of the wetland was closed to make sure a water depth of 2 feet was maintained. - The movement and settling of the treatment was monitored at 12 and 24 months - The effluent quality (suspended solids, pH, species, and water quality) was monitored monthly - Plant establishment and their uptake of metals was monitored - Carbon and Nitrogen dynamics were monitored at 6, 12, and 24 months - A greenhouse study was implemented to determine differences between treated and untreated soil including: bioaccessibility of sediment lead, plant growth, and metal uptake. - Monitoring for metal bioavailability continued at least until 2005

PROJECT OUTCOMES

Ecological Outcomes Achieved

Eliminate existing threats to the ecosystem:
This appears to be an effective method of remediating lead contaminated soils. Plants grown in the treatment area (with added soil) had less lead mg/kg than plants grown in the control areas (without added soil).

Factors limiting recovery of the ecosystem:
Using biosolids is a good decision economically. This method is cheaper than other methods such as capping with non-biological substances or removing the soil. Biosolids are also easily obtainable because they are just recycled by-products of other human activities. Future monitoring will be needed at this site to ensure this method is a permanent solution since the contaminants are still on site.

Socio-Economic & Community Outcomes Achieved

Economic vitality and local livelihoods:
Remediation of this site minimizes the amount of lead and other contaminants that could enter the human food supply through consumption of waterfowl that have used this site. This research site also provided scientific evidence on the efficacy of this treatment.

KEY LESSONS LEARNED

Key Lessons Learned

Application of simple, recycled, natural materials including wood ash, compost, and wood waste seems to have provided the nutrients to encourage vegetative cover and reduced the bioavailability of lead to plants and waterfowl.

This site will continue to be monitored and the lessons learned will probably be implemented at larger sites.

LONG-TERM MANAGEMENT

Long-Term Management

Mining, the major reason for the degradation of this site, is not longer practiced in this area.

FUNDING

Sources and Amounts of Funding

150,000 USD Funding for the project was provided by US EPA Environmental Response
Team, a division of CERCLA.

LEARN MORE

Other Resources

Sally Brown
Research Assistant Professor
Ecosystem Sciences
University of Washington
http://faculty.washington.edu/slb/

Chuck Henry
Senior Lecturer

Pam DeVolder
University of Washington

Harry Compton and Scott Fredericks
US EPA Environmental Response Team

Earl Liverman
US EPA Region 10

Main page for project http://faculty.washington.edu/clh/wet.html
Journal article http://jeq.scijournals.org/cgi/content/full/32/3/851?ck=nck
Presentation at meeting http://www.rtdf.org/PUBLIC/iinert/minutes/062399.htm

CONTACTS

Primary Contact

Organizational Contact

(http://ser.org)

(https://www.facebook.com/Society
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