Land Revitalization Fact Sheet

Improving Urban Soils

Many urban areas are experiencing a dramatic increase in the number of vacant properties, resulting in the underuse of significant tracts of land. In an effort to revitalize these areas, communities are looking to reuse these properties as locations for green infrastructure or urban agriculture. Green infrastructure is a term used to describe an array of technologies and practices that use natural plant-soil systems to enhance environmental quality and provide utility services such as reducing stormwater runoff.

Green infrastructure and urban agriculture require soil conditions that support healthy plant growth. However, urban soils often are severely compacted, lack sufficient organic matter and nutrients, contain large amounts of construction debris, and may be contaminated, making them unsuitable for these reuses.

The natural processes that generate healthy soils are often interrupted in an urban environment. Development projects use heavy equipment for excavation, grading, filling, paving, and building. These development activities alter the condition and characteristics of urban soils and their suitability for growing vegetation. The construction of pavements, bagging and removal of leaves and grass clippings, and removal of tree branches prevent the cycling of organic matter and nutrients back into the soil. In heavily urbanized areas such as downtowns, the most common soil characteristic is compaction.

Heavily compacted soils can act like pavement and not readily absorb stormwater runoff. Compacted soils contain less oxygen, water, organic materials, and microbiological activity than natural soils. Contaminants that can be found in urban soils include heavy metals, hydrocarbons, and industrial chemicals. In older residential areas, contaminants can include lead paint residues, asbestos, coal and wood ash deposits, used motor oil residues, and pesticides. Residential areas will typically have less compaction and better quality soils than more heavily urbanized areas.

If a community plans to reuse a site for urban agriculture or green infrastructure, site soils will need to be tested to determine its suitability for growing plants and for potential risks to human health. If this evaluation determines that soils are unsuitable for the site's intended purpose, then soils will need to be reconditioned to support plants or contamination will need to be removed. In general, the objective is to restore disturbed urban soils to a condition consistent with undisturbed soils.

Sites intended for urban agriculture may need considerable reconditioning to grow crops, whereas areas intended for recreation (parks, play-

Example of of the effect of soil compacting from foot traffic.

New Environmental Solutions

EPA's land revitalization initiatives are producing significant environmental benefits and helping to transform communities into more sustainable and livable places. The strategy of encouraging market-driven redevelopment of brownfields and other contaminated sites for economic reuse is proving to be a successful approach at many sites. However, challenging real estate markets and economic realities can leave some formerly contaminated properties unused, possibly for a long time. New approaches are needed to revitalize these sites and protect human health and the environment.

EPA's Land Revitalization Team is working with communities, states, other federal agencies, academic institutions, nonprofit organizations, and the private sector to develop and test new approaches that recognize valuable reuse alternatives for formerly contaminated properties. Building green infrastructure to help manage stormwater runoff and floods, promoting safe soil management to support urban agriculture, and siting renewable energy on contaminated sites can bring environmental, ecological, and social benefits to communities. Unlocking the potential value of these underused properties often requires creativity and close collaboration with many public and private partners. These projects can help stabilize communities and spur economic development.

Example of demolition debris left in soil following a home demolition.

grounds, hiking trails) may only need moderate soil reconditioning to allow for vegetation restoration. Urban sites that will be transformed into natural, open spaces may need the least amount of soil reconditioning.

A key to improving urban soil characteristics is that long-term management is needed to ensure successful reconditioning. Soil management is a dynamic process usually requiring a large initial effort with smaller sustained efforts to achieve a lasting beneficial result. Ongoing maintenance (watering, mulching, weeding) is needed to ensure the project performs as expected. The EPA is working with communities to determine best practices and strategies for improving urban soils.

Cleveland Green Infrastructure Project

The Bellaire Puritas Development Corporation undertook a project in 2010 to implement green infrastructure at a vacant parcel located at West 131st Street in Cleveland, Ohio. Water levels in the adjacent Chevy Branch stream increase dramatically during and after rain events due to runoff from impervious surfaces in the area.

Green infrastructure was seen as a beneficial reuse at this location because retaining and infiltrating stormwater helps to reduce the volumes of water in the stream and the associated adverse water quality impacts. The home and driveway previously on this site had been demolished. Testing of soil conditions by the EPA Office of Research and Development found soils compacted and poorly suited for infiltrating stormwater or growing plants. Low levels of lead also were found in the soils.

Restoration activities included physically loosening the soil, removing debris, grading to create a swale, excavation to create a rain garden, and amending the soil with a mix of compost, sand, and topsoil. The rain garden and swale will retain runoff from the drainage area and reduce localized flooding in the area. The soil amendments will allow planting of the rain garden and swale with native plants and broadcast seeding of the remaining portions of the site using native grasses and flowering plants.

The restoration work was done by a private contractor and cost approximately $13,500. Signage was installed with information on the Chevy Branch, native plants, and green infrastructure. This formerly vacant parcel will soon be a productive and educational green space that helps to protect the surrounding residential area from flooding.

Site after demolition.

Partners in this project are the U.S. EPA, community members, Neighborhood Progress Inc. (NPI), ParkWorks, Inc., Cuyahoga County Soil and Water Conservation District (SWCD), Ohio State University, and the Northeast Ohio Regional Sewer District (NEORSD). Funding for this project was provided by NEORSD and NPI.

More Information:

Visit EPA's green infrastructure website at http://cfpub.epa.gov/npdes/home.cfm?program_id=298
Visit EPA's Land Revitalization program website at http://www.epa.gov/landrevitalization/

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