Soil Restoration BMP 26

Description

Soil restoration is achieved by aeration through mechanical loosening, and addition of organic matter and soil amendments, as appropriate. Some practices, such as bioretention, require special attention to soils and vegetation to ensure their effectiveness.

General Information

Topsoil, the top few inches in which 70 to 100 percent of all root activity occurs, is a living part of every site. A healthy soil supports plant growth, protects air and water quality, and ensures human and animal health. Soils offer critical pollutant removal functions through filtration, biological processing by microbial action, and chemical processing.

The structure of any healthy soil is permeable, with spaces between solid particles where water, air, and soil organisms can move. Soil compaction occurs when weight on the soil surface collapses these spaces, creating a hard, solid mass. Water, air, and roots may be completely unable to penetrate compacted soil, reducing or destroying its capacity to sustain life.

If grading or excavation has removed soil from the site, healthy soil may need to be recreated. Methods that rebuild the soil on-site are more sustainable than importing topsoil. Only in rare occasions should soil materials be imported in quantity, and never at the expense of another site.

In areas where soil disturbance occurs, there are techniques that can be used to reverse its effects. Aeration, mechanical loosening, dense vegetation, and soil amendments reduce compaction and increase infiltration rates into soil. Methods for addressing compaction include deep-water jetting and air injection, in which compressed air or water is injected to fracture the compressed soil; the fractures are then backfilled with some dry material such as vermiculite. Other approaches include deep plowing, subsoiling or the use of a backhoe to loosen the soil profile. The addition of organic matter that has a low bulk density such as compost, leaf mold, partially rotted manure, or composted sewage sludge are excellent, inexpensive soil amendments that can reduce compaction and can often be found commercially.

There are also many situations where a loss of soil fertility has occurred and conditions are present which make soil improvement appropriate. In these cases, soil life processes can be encouraged by provision for green crop, humus, mulch, and the root associates (mycorrhiza) of plants.

A sustainable approach to creating landscapes should protect healthy soils and limit “improvement” to carefully chosen areas. Soils should not be improved when the existing soil is an undamaged local type as it may have negative effects. Increased fertility can cause problems to native plants and may hasten the growth of invasive weeds. The objective for soil fertility should be the approximate fertility levels of the best soils in the local region. Use regional

plant species, tolerant of poor soils, as alternatives to soil amendment and irrigation.

Specimen plantings that require high soil fertility can be grouped together and the remainder of the site can then retain unamended soils, an unirrigated water regime, and native plants. Selected areas of soil can be amended for specimen planting and vegetable gardens.

To reduce the need for soil restoration, topsoil should be scooped off of all parts of the site that will be built on, as well as access paths and the staging area, prior to construction. In addition to stockpiling existing topsoil in areas of construction, soils in other areas should be protected to minimize compaction.

Suggested Practices for Soil Restoration (Thompson and Sorvig, 2000).

- Wherever possible, avoid bringing in fresh topsoil to a construction site.
- Don't over improve soils; aim to approximate fertility levels of the best soils in the local region.
- Use regional plant species, tolerant of poor soils, as alternatives to soil amendment and irrigation.
- Wherever possible, remove the topsoil from areas on which construction will occur. Stockpile it on-site and respread as soon as possible.
- Where there is only fill dirt on-site, amend that to create a viable soil rather than bring in new soil.
- Build the soil by adding compost and other recycled materials or by planting restorative plants.
- Where necessary, consult with a soils scientist to develop a soils specification appropriate to your site.
- Wherever soil amendments and erosion control materials are needed, specify recycled local materials, if possible.

Additional Resources

Craul, P. J., 1992. *Urban Soil in Landscape Design*, John Wiley and Sons.

Schueler, "Can Urban Soil Compaction be Reversed?", *Watershed Protection Techniques.* Available on Stormwater Center website.

Society of Ecological Restoration. Information available on website.

Tugel, Arlene, Ann Lewandowski, Deb Happe-Von Arb, eds., 2000. *Soil Biology Primer*, Soil and Water conservation Society, Ankeny, Iowa.

Thompson, J.W. and K. Sorvig, 2000. *Sustainable Landscape Construction: A Guide to Green Building Outdoors*, Island Press.