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Storm Water Program
excellence in conservation
Technical Quarterly

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Soil Classification and Mapping Began in Russia

Russian Concept Benefits America

The concept of soil as an independent, natural, evolutionary body was founded by Vasily V. Dokuchaev (1846 – 1903). Dokuchaev, a Russian geologist & geographer, is commonly regarded as the father of pedology (soil science) due to his work in creating the first soil classification and mapping methods. Dokuchaev's early work set the stage for American soil scientists to develop and publish (1975) the official soil classification system of the U.S. National Cooperative Soil Survey, known as U.S. Soil Taxonomy. Following adoption in the U.S., many other nations around the world adopted and still use U.S. Soil Taxonomy today.

Early applications of soil surveys in America were primarily focused on larger tract land uses (e.g. farming, ranching, forestry & highway planning). During World War II, however, soil surveys were used in places like the outskirts of Chicago to locate suitable placement of anti-aircraft guns. In the bustle of post-WWII America, applications of soil survey and interpretations spread to urban and suburban areas, and by 1966, the Soil Conservation Service known today as NRCS, was authorized (U.S. Public Law 89-560) to make and interpret soil maps for community planning, resource development and environmental quality.

Today, soil scientists are sought out to perform site-specific soil surveys (1st Order). These 1st Order Soil Surveys are often related to soil quality, vegetative and wildlife habitat improvements, sewage (septic) treatment functions, wetland construction, and increasingly for redevelopments and infrastructure renovation projects where infiltrative and wetland-type water quality improvements are planned.

It is interesting to know that the most comprehensive natural resource survey ever undertaken in the history of America began as a revolutionary concept in Russia.

Plant Selection For Bio-retention Cells

Plant and soil interaction is a key component in the water quality function of bio-retention cells. Removal of total suspended solids and heavy metals, microbial breakdown and nutrient assimilation are some of the water quality benefits that occur in this living system.

When it comes to the selection of plants and landscaping a bio-retention cell, there are a variety of design themes that can achieve ones overall visual objective yet still maintain a water quality benefit. When making these selections, some things to consider include:

- Toleration of wide fluctuations in soil moisture content and ponding
- Ease of maintenance
- Toleration of urban stresses including soil temperature
- Aesthetic appeal
- Compatibility with surrounding plant communities

It is recommended to consult with a professional, such as a landscape architect or horticulturist, when planning for bio-retention landscapes. As with any water quality Best Management Practice, it is always important to make the appropriate selections that are compatible with the site and soil conditions for a successful water quality feature.

Thermal Pollution: Fish Worried

Water temperature affects numerous aspects of an aquatic ecosystem. Many aquatic organisms, such as fish and insects, are *ectotherms*, meaning their body temperatures are regulated by their surroundings. Increased water temperatures can lead to behavioral changes, such as increased feeding or aggressiveness, as well as physiological changes, such as increased metabolism or loss of motor function. Although heated runoff potentially can affect any aquatic ecosystem, it is especially a concern in *colder-water* stream environments.

These environments exist in streams and rivers capable of supporting fish, such as steelhead trout and salmon. A study conducted at North Carolina State University highlights the benefit of common urban storm water Best Management Practices (BMPs). These include features such as, vegetative shading, deeper soil medium (deeper is better), and the release of water from the bottom of permanent pools so cooler water is discharged into receiving streams and lakes.

3 Pillars of Quality BMP

1. Water Quality Services and Functions Provided
2. Accessibility and Maintainability
3. Site and Soil Compatibility

Build Success into Your Next Post-Construction BMP Design

True or false?

Storm water runoff that has been heated above the temperature of the receiving water and discharged into a lake or stream is considered a non-point source pollutant.

True...

Thermal pollution is considered a non-point source pollutant and occurs when storm water flows over *hot* surfaces and increases in temperature then discharges to receiving *colder* water lakes, wetlands and streams.

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Take advantage of the Technical Quarterly hyperlinks, visit: http://www.cuyahogaswcd.org/services-stormwater-publications.html

Soil Drainage Classes

Drainage classes are groups of soils defined as having a specific range (frequency and duration) of wetness. Classes range from excessively drained (water moves very rapidly) to very poorly drained (water ponds at surface). Drainage classes with terms that include *somewhat poorly*, *poorly*, and *very poorly* drained are typified by wet conditions with either a perched or seasonal high water table. A seasonal high water table is a zone of saturation closest to the surface during the wet season (November to June). For example, the upper boundary (expression) of this zone will be at or near the surface of a poorly drained soil during the winter months of most years. Perched seasonal water, however, occurs over a relatively impermeable horizon or substratum layer (e.g. clayey subsoil, fragipan, or dense till) with unsaturated zone(s) below.

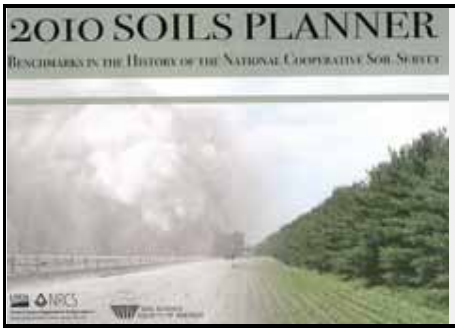
In Cuyahoga County, areas mapped within the "wet" drainage classes account for over 75% of the total area of the county.

Understanding soil drainage classes is useful for initial planning related to construction, water quality improvements, and even urban agriculture. To find out more about the soil drainage classes you may encounter on your next project, check out Web Soil Survey , select your area of interest, then go to *Soil Data Explorer* -> *Soil Properties and Qualities* -> *Soil Qualities and Features* -> *Drainage Class*.

New Techniques For Streambank Stabilization

When it comes to stabilizing an eroding streambank, conventional approaches tends to call for hard armoring. FEMA's *"Engineering with Nature: Alternative Techniques to Riprap Bank Stabilization"* highlights several successful methods to streambank stabilization that have been taken throughout the Washington State.

The guide offers a look at some of the varied techniques that are available for consideration. These Best Management Practices illustrate that it is possible to make living by the water much safer and secure in the long run.



2010 Soils Planner is available!

The theme of the 2010 Soils Planner is "Benchmarks in the History of the National Cooperative Soil Survey". The Planner focuses on the history of the National Cooperative Soil Survey and its important contributions to conservation on the land. Order the Planner from NRCS Landcare Publications, call 888-LANDCARE (888-526-3227), or email landcare@usda.gov.

Coarse Soils and Pollutant Pathways

Excessively well drained soils are comprised of coarse-textured sandy and gravelly materials that water moves through rapidly. Coarse-textured soils are generally low in organic matter and have a relatively low ion exchange capacity. *(More on nutrient and chemical retention of soils in the next T.Q.)* Based on this and the fact that coarse-textured soils tend to have more connected pores, including larger macropores, dissolved chemicals and their decomposition products have a tendency to be carried rapidly downward.

Downward movement of dissolved chemicals has implications related to chemical loading and the resulting quality of the receiving water resources like streams, wetlands and Lake Erie. The greatest zone of soil microbial activity is in the plant root zone. Once carried below plant roots, removal and degradation of a chemical is less likely.

By managing site-specific applications of infiltration-type basins and trenches, and sewage treatment practices (e.g. septic systems), chemical loading of water resources can be minimized. To do this, we need to take a closer look at compatibility of the practice in relation to soil capacities and limitations at each site. The cheapest and most effective way to accomplish this is through a 1st Order Soil Survey. The print and Web Soil Survey are 2nd Order. A 1st Order Soil Survey is a very intensive examination and delineation of soil characteristics and is often used as a basis for detailed planning and design.

Fiber Check Dams: Better Stream Protection

Researchers at North Carolina State University (NCSU), have found a method that is more effective than the commonly used Best Management Practices (BMPs) at keeping sediment-laden discharges from entering surface waters. Dr. Rich McLaughlin, Associate Professor of Soil Science at NCSU, and his colleagues found that natural fiber check dams (FCDs) enhanced with polyacrylamide (PAM) drastically reduced the amount of yielded sediment as compared to the more standard BMPs. This practice may be helpful in addressing the U.S. EPA's new large construction site effluent guidelines.

USDA Program Participation

USDA has federal programs that individuals, organizations and businesses can participate in. Agricultural programs that the Farm Service Agency (FSA) administers include Honey Loans, loan deficiency payments, loans to purchase farmland and, finance agricultural operations. Many conservation programs offered by the USDA are administered by the Natural Resources Conservation Service (NRCS). These include the Environmental Quality Incentive, Conservation Stewardship, Wetland Reserve, and Wildlife Habitat Incentive Program. Participation starts with the applicant being entered into the Service Center Information Management System (SCIMS). SCIMS is an electronic database administered by the FSA.

If interested in participating in these USDA programs, it is encouraged to have the pertinent information entered into SCIMS as soon as possible and to obtain the necessary Farm and Tract numbers. Please contact FSA or NRCS to get started.