

Chesapeake Conservation Landscaping Council's
3rd **Turning a New Leaf** Conference
Friday, December 4, 2009
George Washington University, Washington, DC

TRACK D: THE SCIENCE OF SUSTAINABILITY: URBAN ECOLOGY AND NEW TECHNOLOGIES

Session D1. *Soil Compaction*

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- I. Effects of soil in urban landscapes
 - A. Landscaping services under-appreciate the role of soil compaction
 - B. Pervious is at least as important as impervious in the landscape. There are challenges and opportunities
 1. Portfolio of services should:
 - a. Provide incentives for a shift of behaviors
 - b. Acknowledge results are generated by cumulative impacts of decisions
- II. What is the right instrument to achieve management goals of landscaping services?
 - A. Maintain a high priority on preserving undisturbed areas when possible
 - B. When not possible to preserve areas as undisturbed, minimize disturbance as much as possible
- III. Cities are complex layers of impervious surfaces.
 - A. Ubiquitous in modern landscape development are traumatic changes in soil.
 1. Thinner
 2. Compacted
 - a. Pore spaces are tighter. Individual grains of soil abrade and break into even smaller particles further tightening small spaces and creating less volume and an increase in bulk density resulting in a dramatic change in the ability of water to infiltrate
 3. Soil vitality lost
 4. Capacity of infiltration is lost
 - a. Bulk Density = Material weight per volume
 - b. Porosity = Void space per volume
 - c. Permeability = Ability to transfer water
- IV. Modern Land Development
 - A. Turf Grass Case Study – 125 year old Public Space – The hydrologic function of a landscape cannot be characterized without measurement of infiltration abilities.

1. Hydrologic test shows initial rate of infiltration high then steady state
 2. Very heavily compacted
 3. Although this is considered pervious land use (turf) there is very little capacity for water infiltration – nearly matched a parking lot level of low hydrologic function.
 2. Why is turf grass more impervious than pervious?
 - a. Modern land development leaves little to no top soil
 - b. Modern lawn treatment results in loss of soil ecology
 - c. Thatch layer in turfgrass can be impervious
 - B. Pervious concrete
 1. Pervious concrete only works if soil underneath is permeable too.
 2. If under soil is compacted the possibility of infiltration is precluded.
 - C. Engineered topographies – Graded land in developments
 1. Why?
 - a. A response to incentives – cost effective way to develop land given current incentives
 - b. Collective decision of individual landowners
- V. How do we evaluate the change in landscaping and consider alternatives?
- A. Preserve undisturbed landscapes
 - B. Minimize compaction and disturbance
- VI. The landscaping community is not familiar with the practices of restoring and renovating compacted soils including:
- A. Subsoiling – Agricultural deep tillage as a practice to “rip” compacted soils
 1. Not feasible for residential/postage stamp yards.
 2. Works for larger properties and new development.
 3. Requires machinery with at least 35 hp per blade.
 - B. Soil amendments – Deep tillage (about 24 inches) plus a chisel plow with organic composts (90% reduction in runoff!)
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 2. Works for larger properties and new development.
 - C. Practices to change lawn culture
 1. Check your lawn day with HOAs (Home Owner Associations)
 2. Maryland Master Gardeners: Soil compaction for Bay-Wise Landscape as criteria for points
 3. “Low Mow” and “No Mow” seed mixtures for turf grass
- VI. Postage Stamp Yards
- A. If you have a postage stamp sized yard, what are you trying to infiltrate?
 - B. Best route may be hyperfunctionality
 1. Rain Garden
 2. Permeable sidewalk/pavement

a. Sub base such as Cornell structural soils (visit the National Gallery to learn more) – a sub base of uniformly sized large gravel with high porosity and high permeability but can also be compacted. When mixed with planting mix allows tree roots to channel under sidewalks, water to infiltrate.

[Summary prepared by Kara Bowne Crissey]