University Report – Soil Survey in the Classroom

Wisconsin Cooperative Soil Survey
Work Planning Workshop

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UWSP – Soil & Waste

• Soil and Waste Resources Major
  – Soil Science Option
  – Soil and Land Management Option
  – Waste Management Option

• Soil Science Minor

• Certifications and training programs
UWSP – Soil & Waste

Number of enrolled students

- Soil Majors
- Waste Majors
UWSP courses using Soil Survey

- Soil Survey Interpretation
- Soil Genesis, Morphology and Classification
- Soil Profile Description Writing
- Wetland Delineation
- Wetland Soils
- Urban Soils
- Private On-Site Wastewater Treatment Systems
- Field Experience in Soil Inventory Methods
- Introduction to Soil and Water Resources
- Agronomy, Agriculture and the Environment
- Solid Waste Management
- Soil Judging
Soil Survey Interpretation

• Understand what Soil Survey is and its importance
• Understand the data contained within Soil Survey
• Utilize data from Soil Survey in land use planning
Soil Survey Int. & Soil Quality Assessment

- Working towards combining aspects of soil quality assessment with soil survey interpretation
- Can dynamic soil properties be added to Soil Survey?
Soil Genesis, Morphology & Classification

• Understand soil forming factors
• Know soil processes and properties
• Classify soils using US Soil Taxonomy
Soil Genesis, Morphology & Classification

• Working on building and expanding exercises utilizing NASIS data

• Are tools and tutorials available to make this data more accessible?
Field Experience in Soil Inventory Methods

• Understand soil forming factors
• Perform soil profile descriptions
• Classify soils using US Soil Taxonomy
• Map soils
• Interpret uses based soil maps
Field Experience in Soil Inventory Methods

• New technologies are allowing us to build databases of the student mapping projects

• Could this or other data be useful to others?
Fieldtrips & Soil Tours

• Soils of Puerto Rico
  – Winter 2016
  – UWSP and U. of Puerto Rico

• Soils of Wisconsin
  – ????????????????
Urban Soils

• Understand important factors, properties and processes in urban soils

• Working towards classification, mapping and interpretation of urban soils
N = 190
AG = 30
CITUV = 40
FOR = 40
PARK = 39
RES = 41
Deep soil (0-100 cm) ⊕

Shallow soil (0-20 cm) ⊥

Litter ▽

0.04 ha

11.3 m

5 m
Laboratory analyses

• Deep soil cores (0-100 cm) (N=378)
  – Horizons delineated (N=1,293)
  – Color, structure, texture and bulk density
  – SOC, N, pH and EC

• Surface soils (0-20 cm) (N=191)
  – Texture, aggregate stability and moisture
  – SOC, SOM, DOC, POM, POX-C, MBC and RES
  – pH, EC, N, P, K, Ca, Mg, Na, Al, As, B, Ba, Cd, Cr, Fe, Mn, Ni, Pb, Sr and Zn
“natural” soils
“disturbed-natural” soils
“urban” soils
SOC

Latituden
Longituden
Soil moisture

Slope
Elevation

Vegetation
Basal area
Litter depth

Moraine
Drift thickness
Silt and clay

Taxa
Land use
Impervious surface area
Distance to Navy Pier
Distance to road
Distance to building

Varies by land use
$P<0.0001$

$R^2=0.734$
-1.2 [ELV] $P=0.0081$
-0.01 [Na] $P=0.0124$
3.5 [C] $P=0.0397$
Acknowledgements

- Robert Fahey, Emma Bialecki and Michelle Catania
- Miles Sax, Corrine Erickson, Mike LeDuc, Victoria Colclasure, Jason Marzurak, Chris Burns, Kevin Garbis and MASS volunteers
- The Morton Arboretum, Center for Tree Science
- USDA-Forest Service-National Urban and Community Forestry Advisory Council
Thank you

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Objectives

• Improved understanding of the spatial distribution of urban SOC
• Develop a model to predict urban SOC
Mean = 36.4
Med = 34.2
Max = 132
75% = 44.7
25% = 23.5
Min = 4.13
SD = 19.1
N = 190
$P=0.0004$

SOC (kg m$^{-2}$)

AG  CITUV  FOR  PARK  RES

n: 30  40  40  39  41
HSD: b  a  ab  ab  ab
Land use
Impervious surface area
Distance to NP

SOC

Varies by land use
$P = 0.0636$

$R^2 = 0.610$

-1.2 [ROAD] $P = 0.00496$

CEC, MBC, LIT, HWY, ELV, SLP, K, POM, Ca, Db, EC, DOC, pH