Soil Analysis in the Outdoor Classroom's Prairie Community

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Introduction:

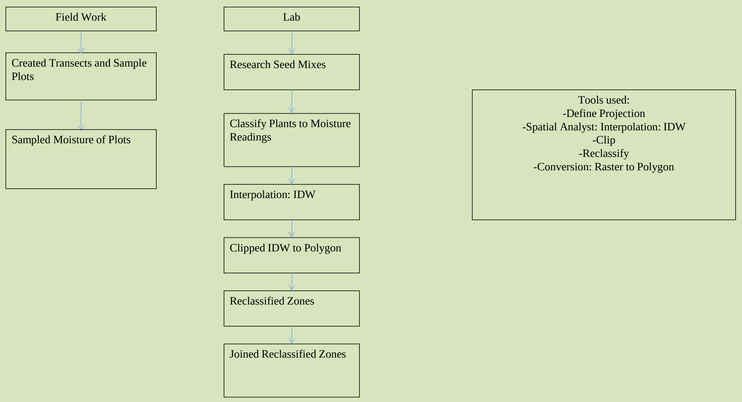
The Outdoor Classroom is a University of Wisconsin-Stout, Biology Department based project with great potential. It includes three different units, each with a different community type. These types are prairie, forest, and wetland. The prairie community would be considered dry prairie because the soil type is sandier, and genera of drier plants grow within it. The majority of the soil has a high sand content which in turn will provide low availability of water. This will cause plant species to be present that are able to grow in dryer conditions..

Our goal of the project is to understand the soil characteristics of the Outdoor Classroom's prairie section and figure out which types of plants will grow best in the different levels of the landscape, using the determining factor of moisture content.

Catena Methods:

- Starting at the summit, measured out a 30 meter transect, 4 plots were marked every 10 meters.
- Vegetation was cleared with a radius of approximately 1 foot.
- Soil probes were used to obtain a ½ inch diameter representation of the soils that stretched to a depth of approximately 1 meter.
- These representative samples were then analyzed to determine A-horizon thickness and depth at which transitions occur.
- Split Core sample was taken at 20 meters, 3rd plot.

GIS Mapping Methods:



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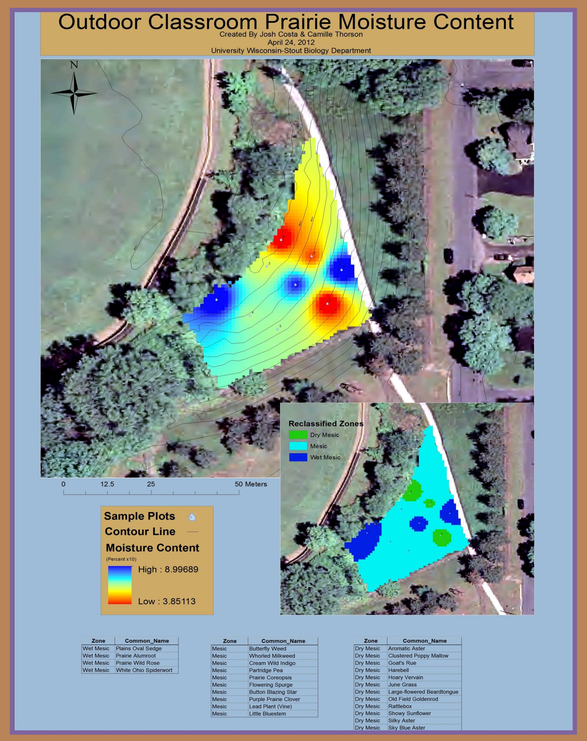

Table 1: Soil Survey of Dunn County Water Permeability and Capacity

Soil Description	Depth (in)	Permeability in/hr	Available Water Capacity in/in	Observed Water Capacity in/in	Observed Permeability in/hr
Moderately decomposed plant material	0-1	6.00-20.	0.55-0.65	0.474	0.125
Sand	1-4	6.00-20.	0.07-0.09	0.366	0.625
Sand, loamy sand, coarse sand, loamy coarse sand	4-32	6.00-20.	0.03-0.11	NA	NA
Stratified gravelly coarse sand to sand	32-80	6.00-60	0.02-0.07	NA	NA

Moisture Collection Methods:

- Measured out 30 meter transect though the prairie area, with a compass bearing of 300 degrees North West.
- Repeated for the other two transect lines
- Moisture plots were chosen at 10, 20 and 30 meter markers on each transect line.
- Moisture data was collected three times within a week, and averaged together.

Water Capacity Test Methods:

- Two core samples were taking using a split-core sampler from the 30 meter location on the catena and allowed to dry.
- A 6 inch section of the organic matter was taken and the dry weight was recorded.
- Water was then slowly added to the soil until the point of saturation had been reached.
- The weight was again recorded and the water capacity calculated.
- The same process was repeated for a 6 inch section of sand obtained from the same core sample and the water capacity again calculated.

Results:

- We found that moisture was highest as the elevation ran from west to east (Figure 1)
- Our observed reading for the organic matter water capacity correlated to the given data while the reading for sand was substantially higher than the given data (Table 1)
- Our permeability tests for the organic matter as well as the sandy soil had no correlation to the given data (Table 1)

Discussion:

Our test results show that clearly the area has been altered. While the water capacity of the organic matter aligned with the Dunn county data the results for the sandy soil was far off. We believe that this is due to the composition of the fill that was used in that the silt content was higher than that of a natural area. The higher silt content would account for the higher capacity for water retention.

The large difference in soil permeability is most likely due to the set up of the experiment. In our test the soil was added to the tube in a way that did not represent the natural state of the soil. Also, the soil was collected in a way that compacted the soil. Future test methods should be conducted with care to preserve the natural structure of the soil as well as in a way that prevents compaction of the soil.

The split core shows that it has been reconstructed, there is additional decomposed plant material being added, and overtime the area will become a typical Mollisol soil order.

This project helps the biology department understand the types of soils living in the area. It will help with restoration in the future due to the fact that certain plants are better adapted than others to specific soil compositions. The knowledge of the soil composition will aide in determining which plants will flourish and should be planted.

References:
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