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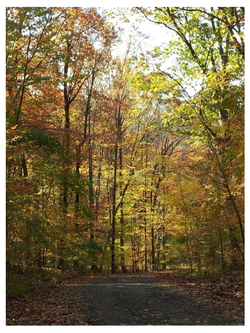

Petrology and Pedology of the Gordon Natural Area: A Collaborative Service-Learning Project

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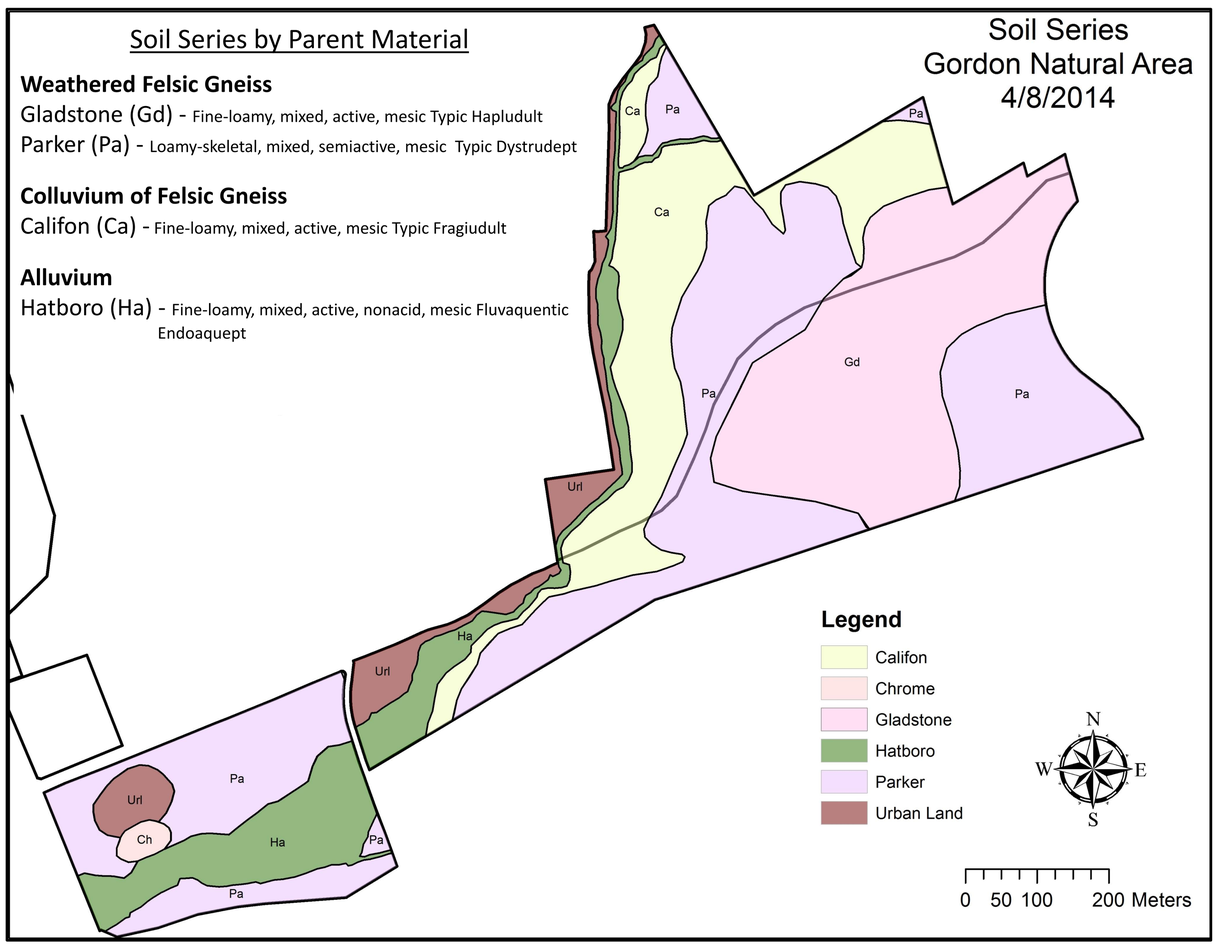
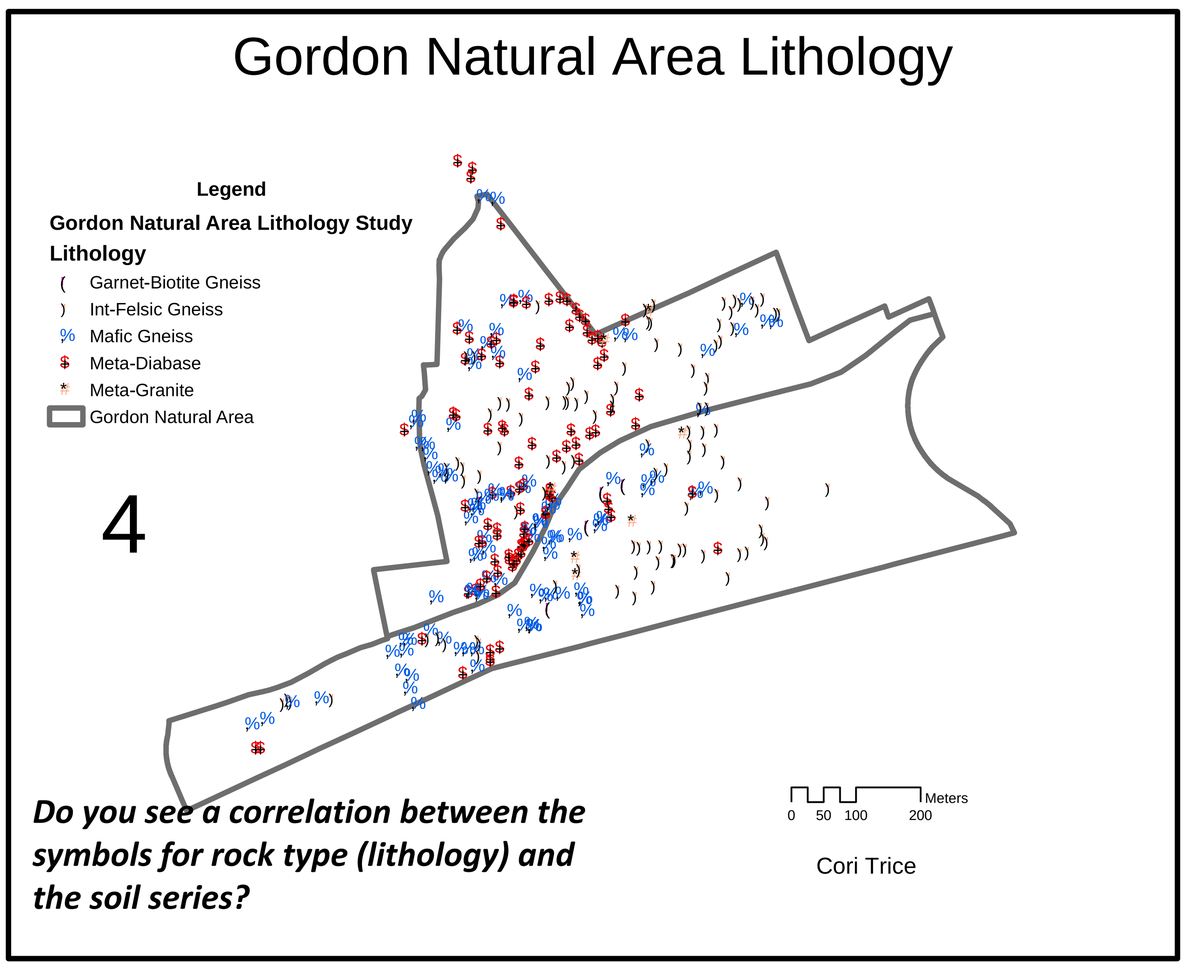
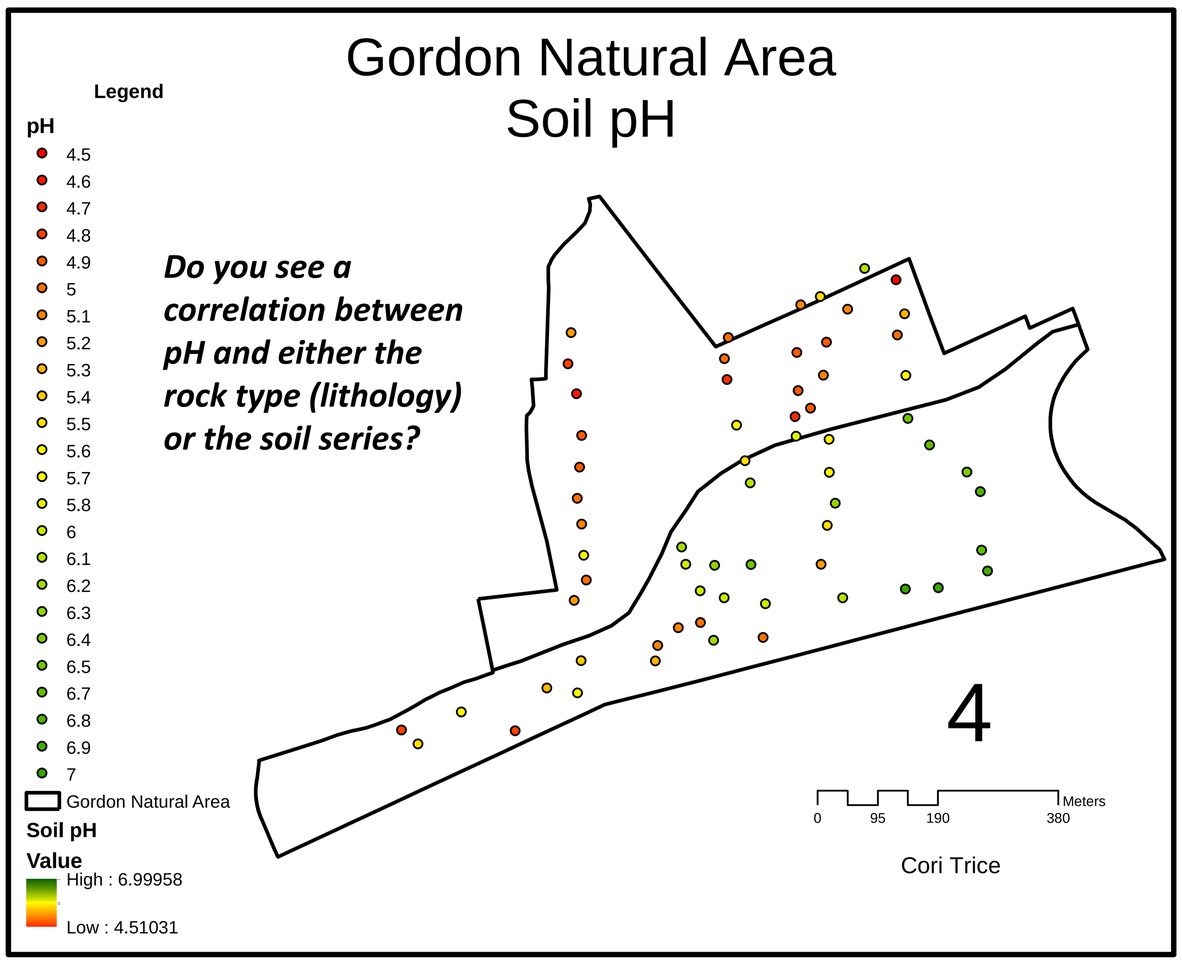
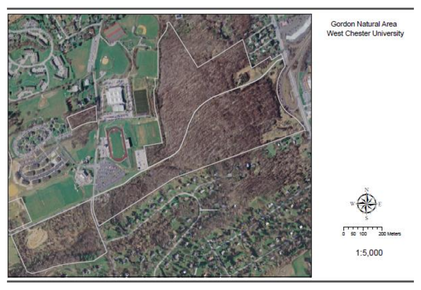
Abstract

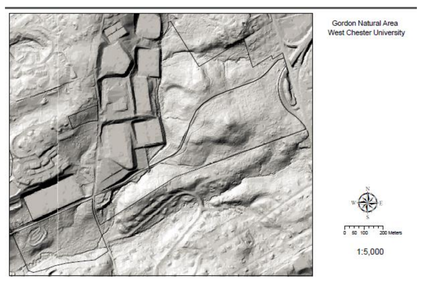
The upland soils of the Gordon Natural Area (GNA) are derived from weathered bedrock and should therefore correlate with bedrock lithology. Relatively few studies have compared the relationship between the Baltimore Gneiss Formation and associated soils.
Dr. Martin Helmke and his students taking Soils/Pedology courses (ESS 490/590 and ESS 480/580) have been sampling and mapping soils in the GNA. Dr. LeeAnn Srogi and her students taking Petrology (study of rocks, ESS 405/505) have been sampling and mapping GNA metamorphic rocks. In fall 2013 the Soils and Petrology classes carried out a coordinated study to sample soils and rocks along ten transects in the eastern portion of the GNA.
Such a study has three major sources of uncertainty. First, at least part of the study area was deforested and farmed until the early 20th century causing disturbance of the upper soil layers and clearing of rocks. Second, the area is not flat and gravity moves both rock and soil downslope on the gentle hills and valleys. Third, most of the rock exposed is loose "float" that could have been moved naturally by gravity or by people clearing the land (who can move material upslope, against gravity). Nonetheless, patterns that emerge from soil characteristics and rock identification yield useful information whether expected correlations exist or not.
We found spatial patterns in the distribution of both soil types and rock types, although these are not strongly correlated with each other. This poster presents the data and explores interpretations of the patterns. This is the beginning of a coordinated study that will help other researchers better understand the rocks and soils that form the foundation of ecosystems in the Gordon Natural Area.

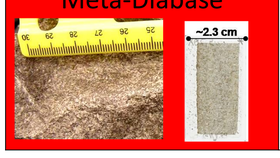










Rock Type and Picture	Description
Felsic Gneiss and Meta-Granite 	• oldest rocks, originally igneous rocks (granite, diorite) • gneiss has strong banding of different minerals formed as rocks were compressed during metamorphism • meta-granite has weak banding and is recognizable as an igneous rock • minerals visible to the eye; feldspars, pyroxene, quartz • light gray to pink colors; rich in Si, Ca, Na, Al, K
Mafic Gneiss 	• originally igneous rocks (basalt or gabbro) • strong to weak banding of different minerals formed as rocks were compressed during metamorphism • “salt-n-pepper” appearance ; plagioclase, pyroxene • rich in Mg, Fe, Ca; lower Si, Na, K
Meta-Diabase 	• youngest rocks, • recognizable as an igneous rock (basalt or gabbro) • no visible banding • minerals visible to the eye but very small crystals • “salt-n-pepper” appearance; plagioclase, pyroxene • rich in Mg, Fe, Ca; lower Si, Na, K

Significant Questions Remain:

- Why isn’t there a difference in soil series for the mafic gneiss and meta-diabase lithologies (richer in Fe, Mg)?
- How well can we know the influence of bedrock since most rock is float?
- What is the influence of agriculture (orchard, plowing) on the soil series and pH?
- ***Future plans:*** rock coring, more samples!

Students in Soils and Pedology courses take soil cores (above) and analyze soils back in the classroom (near right).
Students in Petrology class log UTM coordinates and identify rock type or lithology (far right).