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September 29, 2011
CE 394 – GIS in Water Resources
Project Proposal

While there is consensus in the scientific community that anthropogenic climate change exists, the locations and magnitudes of its effects are far less certain. Some regions will experience wetter climates, whereas other regions will receive less rainfall than ever before. This summer Texas suffered (and continues to suffer) one of the worst droughts on record. It is not known conclusively whether this can be attributed directly to climate change, but it follows that having a system in place to understand the drought situation better would improve future preparedness for such events, whether climate change-related or otherwise.

For my project I propose to create a system that provides information about the available water content in Texas soils and updates in real-time. This will be accomplished through a combination of the available water storage data provided by SSURGO (Soil Survey Geographic Database) and the continuously-updating current soil water content data made available by NLDAS (the North-American Land Data Assimilation System). The SSURGO data divides land areas into polygons with unique values describing the maximum potential water content for the given area. The NLDAS data, on the other hand, details how much moisture that soil is currently holding. Think of the SSURGO data as a bucket and the NLDAS data as the amount of water in the bucket. The problem arises in the fact that NLDAS provides one value for every 7.5 minute quad across the country; the SSURGO data operates on a smaller scale than that, so there is one NLDAS value for many different SSURGO soil polygons. In order to provide meaningful information, one must determine what fraction of the NLDAS value should be distributed to each soil polygon; it does not make sense to allot the same value across the quad.

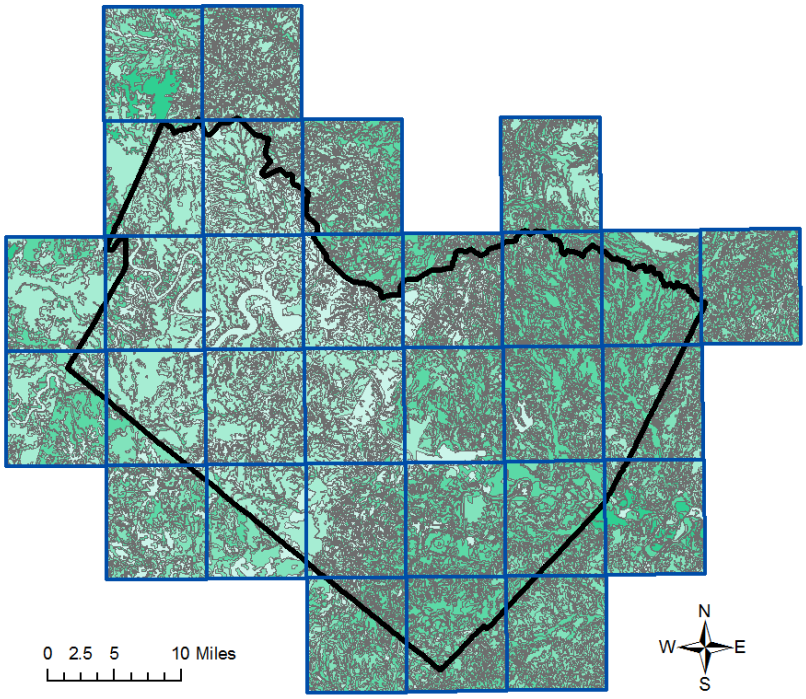

Figure 1. Map of Travis County, TX showing SSURGO soil water polygons with 7.5 min quads overlaid; darker green corresponds to greater available water storage.

This will be accomplished by downloading the NLDAS data, which is in the grib file format, and creating a program to automatically convert it to the netCDF format. Research will then be conducted to ascertain the best system by which to apportion the NLDAS data across the quad. One idea is to sum the available water storage values, divide each individual value by this total, and multiply the NLDAS value by this fraction, thereby evenly distributing the water content. This system neglects numerous important factors, however, such as topography, infiltration rate (as a function of soil type), and land development. As such, further research will be required to create a system that accurately allocates the soil water data.