GIS in Water Resources Term Paper Suggestions

Following is a list of potential topics you could use for term papers. In addition to these ideas you are encouraged to review the web sites giving term papers from previous years.

1. Something related to your own research. If there is any GIS aspect to your research you are encouraged to do this so that the work done is useful to you.
2. An integration of data from multiple sources for an area of interest to you to address a problem or question of interest. GIS is good at facilitating analyses that integrate and juxtapose information from multiple sources so something that combines streamflow, precipitation, land cover, terrain, snow and other data sources to look at an aspect of hydrology or water resources may be interesting.
3. A tool or model for doing something useful in GIS. ArcGIS is designed to be extendable and customizable and there is a lot of online information on customizing ArcGIS (using python programming). If you have programming skills consider developing a tool to do something cool.
4. A database/dataset and map or maps shared in ArcGIS Online/ArcGIS.com that provide information on, or tell a story about a GIS subject of interest.
5. An examination of land cover change. This could consider deforestation, urban reforestation, and impact of change on the water system. NLCD information on land cover in past and present may be helpful
6. Flood plain mapping. The North Carolina Flood Risk Information System depicts maps of potential flooding and holds data on the models used to produce these maps. Some questions related to this may be which cities or counties have the most property at risk (from land cover information) due to flooding. You might also try rerun some of the models to examine alternatives for reducing flooding, say by reducing impervious area in the watershed or obstructions in the rivers.
7. Prioritize watershed restoration (river restoration and upland changes). The EPA EnviroAtlas gives the conditions of streams and watersheds. Develop metrics based on these to prioritize river restoration that may be based on the length of degraded stream length, amount of impervious surface, ecosystem services (heat island, carbon sequestration) supported and ecosystem stressors present. Devise a composite weight for all the HUC12s in a HUC 8 to prioritize for restoration. Synergize with ongoing NC DENR research project to prioritize HUC 12s within each HUC8 for mitigation. Examine sensitivity to change using models (SWAT, RHESSys)
8. Riparian buffers. An examination of land use and land cover in riparian buffer and mapping the quality of buffer and length of flow through buffer. TauDEM has some buffer flow length functions that could be used.
9. Terrain stability analysis. Based on DEM Slope, contributing area – e.g. SINMAP
10. Stream bank stability analysis. Based on flow, slope and channel conditions (NC Flood maps)

Team projects

I will consider "team projects" (up to 3 people per team), as long as the role of each in the project is clearly written out and that when the project is presented, each presents their contribution to the overall project. I will also consider "associated projects" that are separate but related and have been developed cooperatively. For example one person may develop a dataset as the product of some analysis, and the other person may develop an Internet Map Server to interactively disseminate it on the web. As another example two people may each develop custom ArcGIS tools that can be used together to achieve some result. If contemplating a team project, you should choose team member partners carefully, as you will need to rely on them produce something your project depends on. For team projects each team member will need to write up and present their contribution separately, i.e. the papers from different team members may have overlap for the common parts, but should be different in the specific contribution.