

**GIS Symposium 2011:
Inspiration through Networking and Technology**
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Presenter Abstracts

Incorporating a Stormwater Management Model (EPA SWMM5) into ArcMap

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Hillsborough County has developed a stormwater analysis system inside ArcMap. The system is integrated with their modeling software, SWMM5, and allows the County to quickly develop floodplain information including inundation extents and flood depth grids in GIS. The system addresses the long-standing issue of keeping the GIS and model in sync by providing the modeling environment inside the GIS where the stormwater model is available on-demand, generated from the geodatabase. The system includes the capability to extract a model for a sub-area of an existing model, complete with boundary conditions extracted from the overall watershed-wide model's binary results file. Model extraction is useful for quickly evaluating alternatives for a particular region of the model, as long run times associated with large models are avoided. This presentation will also describe the County's development strategy which was centered on minimizing future redevelopment efforts when the ArcObjects library is modified by ESRI.

How to Squeeze Out More Results with Python

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Most organizations today have to do more with less time and money. The easy to learn Python scripting language included with ArcGIS is an excellent tool for this. Scripts from the 2010 "Hole in the Donut" Everglades National Park project will be presented in both ArcGIS 9.3 and 10. These scripts allowed consistent data production, saved processing time & storage space and even provided documentation.

Time permitting; there will be a Q&A session afterwards -- bring your computer, Python scripts and questions. Example data and scripts will be available for download.

ADA Sidewalk Crossing Assessment

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The City of Fort Myers was found to be non-compliant with *The Americans with Disabilities Act (ADA) of 1990*, which is a disability rights law that protects qualified individuals with disabilities from discrimination and provides for equal access and opportunity. The ADA requires that city owned and maintained facilities, sidewalk crossings and buildings must be readily accessible and useable by persons with disabilities.

The Department of Engineering was assigned the task of identifying and repairing all non-compliant sidewalk intersection crossings for all streets, roads, and highways that had been constructed or altered since January 26, 1992 (that are owned and maintained by the city), within the city limits.

In order to meet this requirement the engineering staff had to come up with a way to physically inspect and inventory all of the City's non-compliant sidewalk crossings within the entire city boundary. Staff realized quickly that a GIS enabled solution was needed to solve this issue. A GIS SDE database was used to store, manipulate, and create graphics and mapbooks of the data that were used throughout the project.

The City's GIS and engineering staff compiled an exhibit depicting all streets, roads and highways that were constructed or altered since January 1992 and all of the sidewalk crossings and ramps under City jurisdiction per the Settlement Agreement that may not comply with the Standards or UFAS.

All the data collected for each intersection of roads, streets, and highways having curbs or other barriers to entry from the street level was inputted into this GIS layer for ease of reporting, identification and costing purposes. After the field inspections were complete the City then analyzed the data and provided a report depicting the ramps under City jurisdiction which did not comply with the given standards. A breakdown of why they did not comply, the corrective measures needed and cost estimates to achieve compliance was also compiled for consideration.

GIS Data Automation

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Automating the processes to maintain GIS data is becoming more valuable every day. For an organization whose systems rely on GIS data in more than one format, automation can drastically reduce the time needed to maintain it. Collier County developed processes that combine multiple technologies and platforms to automate the maintenance and conversion of GIS data. The goals of these processes were to;

leverage existing enterprise server technologies to provide a way to publish spatial data and in so doing offer an alternative to expensive licensing costs, convert and transfer data from Shapefile and flat file format to ArcSDE Feature Class format and again to Microsoft SQL Server 2008 tables using the spatial data type and finally to automate the update of ESRI ArcGIS Server geocoding services thereby reducing the time and steps required to accomplish that task. The processes use varying combinations of ESRI's ArcGIS Server services, ArcSDE, ArcObjects Development Platform, native Python and the arcgisscripting module and Microsoft SQL Server 2008 with the spatial data types.

Collier County Flex Zoning Viewer

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The Growth Management Division (GMD) develops and maintains zoning boundary designations that provide the public with requirements (guidance) for new and existing developments. The public often requests access to this data, either in written or presentation form, and would need to visit the Division's offices in order to do so. These requests require GMD staff time to research and provide; delaying additional services provided by the Division. In order to facilitate this process, the Division worked to create an online mapping-application that would allow the public to perform basic searches. The application consisted of four components: zoning feature data in the Division's GIS; a digital map designed in ESRI's ArcGIS Desktop; an ESRI ArcServer map service based on the map; and an Adobe Flex web application utilizing ESRI's Flex Application Programming Interface (API) which provided the user interface (UI). The existing data stored the zoning and overlay designations within a single attribute field and was divided to reduce complexity when symbolizing in the map and displaying within the UI. Further enhancements were made by simplifying the data based on these attribute fields to reduce the overall amount of features returned by the map service. Utilizing the Division's address point and the Collier County Property Appraiser's parcel data, the web application allows the public to search for zoning and overlay designations either by address or parcel identifier.

Assessment of land use change impact on water resources variability using GIS and hydrological model

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In this study we have used SWAT (Soil and Water Assessment Tool) model to predict the impact of land management practices on water and sediment yield in the Haina watershed, Dominican Republic. The SWAT system is embedded within geographic information system (GIS) that can integrate various spatial environmental data including soil, land cover, climate and topographic features. The ArcSWAT is an ArcGIS-ArcView extension and a graphical user input interface for the SWAT model. ArcSWAT uses hydrologic response units (HRUs) to describe spatial heterogeneity in terms of land cover, soil type and slope within a watershed. The digital elevation model (DEM) is used to delineate the watershed and to analyze the drainage patterns of the land surface terrain under GIS environment. Sub-basin parameters (slope gradient, slope length of the terrain), and the stream network characteristics (channel slope, length, and width) were derived from the DEM. The annual and seasonal hydrological water balances as well as the spatial distribution of hydrological resources in the watersheds were estimated. Three land use scenarios were proposed for the year 2030. First proposed scenario show an increase in broad leaf scrubs, rice, urban areas and broadleaf forest, and a decline of intensive agriculture, cocoa and coffee, and pastures. The second scenario includes an increase in forest cover that is considered as "Best scenario". The third scenario shows an Increase in intensive and extensive agriculture, pastures, urban areas and human settlement in high lands, and important decrease in forest land in mid and upper watershed. The different land use scenario maps were imported to the ArcSWAT model. The modeling result based on the different land use scenarios indicated that the stream flow changes between -3 to 4% in the basin for the year 2030. The result of this study will help the decision makers for appropriate land and water resources planning and management.

Keywords: Hydrological Modeling, Land use change impact, GIS, ArcSWAT, Water balance