Data Model & Python Tools for i-Tree Eco Support

This Georgia Institute of Technology project is based on the current ***framework*** of the typical urban forest inventory management system which includes the desirability to report ecosystem services.

The ***framework***: Spatially-based inventories are the norm and those are often being managed within standard GIS formats (e.g. ESRI). Very few municipal and Campus tree inventories are managed within a Microsoft Access database. In addition, the MS Access databases produced by ***i-Tree Eco*** are not ESRI personal geodatabases which makes the direct use of the data in a GIS system (i.e. ArcMap) that supports spatial urban forest management a little more difficult (but not impossible).

Because of its current acceptance, i-Tree Eco is a very desirable model for managers that want to track ecosystem service production to support [(1)] funding requests, [(2)]management & resource decision-making, [(3)]resource productivity monitoring, or [(4)]other local programs (e.g. community involvement, Citizen Science, education or research).

The model reports on a range of benefits that include:

- carbon stored & annually sequestered
- air pollution removal for ozone, sulphur dioxide, nitrogen dioxide, carbon monoxide, and particulate matter (2.5µ & 10µ)
- avoided stormwater runoff attributed to trees
- public health incidence reduction based on improved air quality (BenMAP, US EPA)

And on the negative side of the ledger information that may support management decisions:

- volatile organic compound (VOC) emissions (impact of tree species on net O_3 and CO formation)

By developing a set of tools that connects an ESRI file geodatabase (or other ESRI compatible enterprise level DBMS) with i-Tree Eco modelling this protocol allows the urban forest manager to keep current database tools, protocols, and methods for tree management and still have access to i-Tree Eco ecosystem services as a "value-added" attribute.

This project supports an approach for a continually managed urban tree inventory using a GIS data model and a set of GIS based tools that interface with i-Tree Eco model for ecosystem services calculation and reporting.

The tools and protocols developed provide

- input to i-Tree Eco (i.e. it builds the MS Access **input.mdb**) from the tree management DBMS
- a means to retrieve the results of the modeling (i.e. it reads the MS Access **report.mdb**) and update the tree management DBMS
- The GaTech data model & tools can be found at:

  http://www.urbanforestrysouth.org/resources/library/ttresources/data-model-for-gis-database-management-and-i-tree-eco-complete-package/view

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Urban Forestry Domains for ArcGIS Online and ESRI Collector

On a somewhat related note, Urban Forestry South has developed a package that illustrates and provides examples of urban forest management data collection systems that will support the use of domains and ***ESRI Collector*** through ***ArcGIS Online*** (AGOL) for smart devices.

Domains are geodatabase components designed to make GIS editing tasks faster and more accurate ensuring integrity of your database and reliability of all products derived from that data. Within AGOL domains become the drop-down selection lists in ESRI Collector. Domains can be used in file geodatabase but not personal geodatabases.

The documents in this package discuss domains in sufficient detail to illustrate their importance, and describe a workflow using ***ArcCatalog*** and ***ArcToolbox*** for domain creation, editing, and management that eliminates the need to maintain separate Excel of DBF files for that purpose.

An example urban forestry file geodatabase (also available for download) contains four urban forestry feature classes with appropriate (or example) domains, the FGDB tables used to create the Coded domains, and the Excel spreadsheet with 36 worksheets used to create the FGDB tables for species codes compatible with ***i-Tree Eco***.

The file geodatabase and domains provided include:

- i-Tree Eco data collection (i.e. minimum data to produce ecosystem services report)
- an example urban tree inventory
- an example tree planting site inventory
- tree risk assessment (level 1)
- Urban Forest Strike Team (UFST) data collection during disaster recovery to support FEMA Public Assistance

Additional domains have been created (but not used in an example FGDB) include:

- various species lists (based on NRCS Plants database and/or i-Tree Eco species codes)
- basic tree condition
- tree condition rating based on 9th edition of the Guide for Plant Appraisal

The package also includes example Python scripts for managing data post-collection (for risk and condition) since ESRI Collector does not currently support on-the-fly calculations based on attributes selected.

Urban forestry FGDB domain examples to support ArcGIS Online & ESRI Collector can be found at:

http://www.urbanforestrysouth.org/whats-new/urban-forestry-arcgis-domains-and-arcgis-online-agol

Note: The newest release of ***XTools Pro v12*** provides additional support for domain management.

http:// www.xtoolspro.com/default.asp

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