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Community Tree Inventory: Data Collection

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Community Tree Inventories: Data Collection

Data Acquisition Methods

Various strategies for the collection of field data for inclusion in an urban forest management program can be employed, based on the ultimate intent of use. Broad strategic planning decisions on items such as land-use, regional planning and forest types can be obtained using tools such as satellite imagery, air photos and other remote sensing methods. Finer scale collection methods are needed for developing specific operational planning strategies related to urban forest management. A wide range of methods have been developed for this scale of information collection and analysis, including Global Positioning Systems (GPS), hand held data recorders, bar code readers, electronic telemetry and advanced surveying instruments. The tools that are useful in a community, in order to gather information on for managing their urban forest resources are variable and can include a cadre of methods and types.

Street and park tree inventories can include the collection of data on a large scale such as canopy cover, forest type and condition, or examine the specific condition of individual trees, based on field inspection and assessment. This wide range of scale presents problems and opportunities related to the level of management that is being employed in a particular community. Long term strategic planning may utilize a more broad scale analysis of the forest, while short-term operational planning often used a finer scale of analysis, based on day-to-day management of individual trees. Many tools are available for use in assisting these management strategies, but often the most difficult decision is which one will provide the most flexible and robust opportunity for usefulness in a community.

A Geographic Information System (GIS) provides a logical foundation for any data collection, analysis and planning initiative related to a community's urban and community forest. GIS programs such as ArcInfo® and ArcView® are powerful and important tools to consider, whether looking at the overall urban forest, or managing individual trees growing along streets or in parks. Whether looking at the urban forest from a broad scale, or more closely examining individual trees, a GIS pro-

vides a strong backbone to any useable system. The ability to geo-reference, display, print and archive database and mapping information makes a GIS an invaluable tool for urban forest management.

American Forest's CityGreen® analysis program provides an opportunity to look at the overall benefits of a community's urban forest, including water analysis, cooling benefits and growth projections. The Forest Service's UFORE model examines similar characteristics of the urban forest and more closely calculates air pollution mitigation provided by urban forests. Both of these are useful analysis tools that examine the urban forest on a broad scale, providing useful information for strategic and long-term planning.

Commercial software packages are available for the management of individual trees growing in a community. ACRT, Natural Path and Davey Tree are three of the most popular firms, which have produced tree management software programs. These programs provide the ability to manage individual trees, based on regular work routines, customized for individual communities. These programs should be considered as one alternative to managing the operational planning needs of a community's urban forest. It is critical that these programs be integrated with a GIS in order to obtain their full value and functionality.

Custom software packages can be prepared for an individual community. Often these are databases that are incorporated into a GIS, and provide the flexibility of providing a range of functionality that can be expanded as a community's urban forest needs grow, or change. The ability to build a management tool from the ground up, based on the specific needs of an individual community, makes this method attractive to many municipalities.

Data Collection

Today, a variety of data collection tools, for collecting information on individual street and park trees are available, making the work of an inventory specialist faster, easier and less prone to input error. Proper training of survey personnel is the only way to reduce inaccuracy during the collection process, but the newest electronic collection tools elim-

inates many of the common problems of data entry and lost records.

Palm OS® and Windows CE® operating systems provide the mechanism to collect data and incorporate it into a GIS database, or any other tree management software that is available. ArcPad®, based on the Windows CE® operating system is one of the more popular methods of bringing GIS data into the field for verification and editing. Palm OS® and the PalmPilot and Handspring personal digital assistants provide very simple, inexpensive and useful methods for data collection in the field. Several data collection programs for the Palm OS are available, and the ability to link to a GIS provides even more applicability to these tools. Commercial firms, the Forest Service and many state agencies have developed data collection programs based on the Palm OS®. Commercial development software, requiring minimal computer expertise, is also available for the Palm OS®, providing the opportunity to write custom applications at a low cost.

Global Positioning Systems are a component of the arsenal of tools that are available to the tree manager, and their cost, functionality and accuracy is specific to individual application. Low cost units range are available for under $500, while more precise units range up to $5000. A careful analysis of how data on individual trees will be incorporated into a management system will dictate the applicability of a GPS to a community forest inventory program, and other methods may be used in conjunction with this tool. Air photography, surveying instruments such a Total Station and field mapping should be considered as options for gathering the specific location of city trees.

Staffing

The collection of data for use in an urban forest resource management strategy should be viewed as the most critical component of a strategic initiative. The accuracy and reliability of the data that is collected will determine the ultimate value and usefulness of the management tools that are developed for management a community's urban forest. The cost of collecting data on individual trees is directly related to the amount of information that is obtained on

each tree and the expertise of the data collector. In many cases inadequate resources are designated for this component of an inventory and poor results are the often the outcome.

It is critical that trained personnel conduct the data collection, and that the correct information is obtained, based on the specific use of the data. It does not make sense to have unqualified personnel conduct a survey of a community's trees, since the data collected will be of questionable reliability. Trained personnel can consist of in-house staff, contracted services, paid internships or community volunteers. A combination of any of this staffing is acceptable, and often will lead to the likelihood of the timely completion of the inventory.

The cost of training each of these personnel is variable based on experience and expertise. Utilization of completely inexperienced volunteers will require a minimum of 8-12 hours of training, while training of experience personnel is normally completed in 3-4 hours of instruction. Contracted commercial vendors will provide survey teams with varying amounts of skill and expertise, so even those crews will require some training and instruction on local conditions. The benefit of using community volunteers in conducting an inventory has been documented, and the costs associated with their use can be considered economically reasonable. The accuracy of the data collected by properly trained volunteers is comparable to that of professional arborists. (Bloniarz & Ryan, 1996.)

Additionally, it is important that the specific survey criteria be well established in order to reduce the actual amount of data collection in the field. For every piece of information that is collected, a cost in labor, data manipulation and archiving is incurred, therefore it is critical that the optimal amount of information on each tree be collected. Since most community forest inventories are completed in order to develop effective strategic and operational planning regimes, and not for strict scientific or research purposes, flexibility of the data collection criteria is normally the case. As a rule of thumb, only collect data, which will be used as part of the strategic and operational planning initiative. In

this way, an affordable mechanism will be established for use in your community.

A survey of practicing urban forest managers in 1995 (Bloniarz & Ryan, 1995) provided useful feedback on the specific variables that were indicated as useful for inclusion in an urban forest management program. These variables are widely used as the basis for data collection in many municipal street and park inventories. Genus and species, DBH, Condition (Good, Fair, Poor or Dead), Location, Presence of dead wood, weak forks, cavities and overhead wires, and Management Needs (Pruning or removal) were identified as the most useful informational criteria that should be included in a management program. Additionally, a hazard rating may be established for trees that present obvious hazard conditions.

Data Management

The usefulness of a community tree inventory is related to how accessible the data is to the end user, and how simple it is to integrate with other components of municipal management, including public works, health, safety, education, planning and human services. The more accessible the data is, to a variety of users, the more likely that it will be updated and maintained. Sharing data between municipal departments, agencies and organizations provides the opportunity to fully utilize the functionally and potential of any database. In the case of city trees, it is useful to share the information with a variety of cooperators, who ultimately will provide the basis for expansion and updating.

However, a mechanism should be established for access and archiving the data. All tree data should remain udder the control, and responsibility, or a central archivist or IT manger. Data can be shared with other users and partners, but manipulation, updating, editing and archiving should be the responsibility of an individual, or team, that ensures that the data will not be corrupted or misused.

Many communities have a central Informational Technology Manger, who controls data for a variety of municipal departments and agencies. Other communities rely on managing the data in their own department. Finally, others have the data archived by outside vendors. Whatever method is employed, it is important that data be provided in a format that is useful, easily updateable and fully functional.