MICROCOMPUTER DATABASES FOR DATA MANAGEMENT IN URBAN FORESTRY[1]

by Philip A. Barker

Abstract. Urban forestry records of individual trees stored as a data base in a microcomputer can be widely utilized. The data accessed can be used to generate reports of various information to aid in decisionmaking. A report of past and projected maintenance expenses for each tree species in a geographic area is an example. Momentary display of data on a video screen can be used to support immediate response to telephone inquiries.

In urban forestry, initial users of computer technology, many of whom are described by Sacksteder and Gerhold (1979), have usually used large-capacity, mainframe computers operated by the technical staff of a computer department. These arrangements generally have been and can continue to be satisfactory. But since the mid-1970's, development of microcomputers — variously called stand-alone, desktop, personal, or entertainment computers — and supporting software, has greatly expanded the potential hands-on use of computers for urban forestry (Massey 1983).

Urban Forestry Databases

A primary use of microcomputers in urban forestry can be for keeping records of a city's trees in terms of location and work performed or needed. Such records constitute a computer database that can be used to generate information to carry out urban forestry decisionmaking responsibilities. Determining which trees are preferable for future planting, for example, can be based on reports that could be generated from a computer database of prior experiences with different species.

For an understanding of databases and their management, Byers' (1982) discussion of the subject is readily understandable by anyone who may have considered computer jargon incomprehensible. He defines database as "as collection of information organized and presented to serve a specific purpose." A telephone directory is a database: the addresses and telephone numbers that it contains have little value by themselves but are useful only when they are related to a name. Other familiar databases are a dictionary, a cookbook, a sales catalog, the card catalog at a library, and the maintenance report card file of a city's trees.

In each database, information is stored in a manner to simplify its retrieval. In a city's maintenance report card file of street trees, for example, the trees may be arranged according to the street and house address where each is located. Find a particular street address and you have found the name of the tree, if any is growing there. The card also may contain information about work performed on the tree, when it was done, and the amount of labor expended, indicating the cost involved.

The common element of all databases is that each organizes information so that an item of interest can be readily found (Byers 1982). A manual card file is an example. But such files can be so voluminous that retrieval of particular information is tedious and too expensive for routine operation. If, however, the database is in a computer, retrieval may be practically instantaneous. And because retrieval time is so fast, the database can be used to generate reports for decisionmaking or operational support purposes that previously were too expensive to consider.

Usefulness of a Database

Rapid retrieval of data is not the only valuable feature of a computerized database. Even more important, the records in an urban forestry database can be accessed in many ways, such as

1. Use of trade names does not imply endorsement by the U.S. Department of Agriculture.

alphabetically by street names, tree species, or type of maintenance (Datapro Research Corporation 1982). This multi-access capability permits the generation of many types of reports. Summaries can be prepared at regular intervals of the costs of manpower and other items of maintenance. Also possible are reports of an *ad hoc* or as-needed nature, such as either past or projected costs of different tree species. In addition to these hard-copy or printed reports, an operator can query the data and display desired information on a video screen. This feature allows quick recall of historical information about individual trees and immediate response to telephone inquiries.

A computerized database should enable substantial improvement in budget planning, tree species selection, interaction with the public, and operational decisions such as worker scheduling. This kind of database, for example, could be particularly useful in distinguishing between trees of high and low maintenance requirements to curtail use of the former. The comparative amount of maintenance required of various tree species currently is largely based on intuition because analyzing conventional records is so labor-intensive as to be impractical.

In traditional form, maintenance report files for a city's trees usually are destroyed after only a few years because of storage space limitation. Compact computer storage of data, however, permits accumulation of data over many years, thereby providing a cumulative history essential for generating the desired reports.

Further Considerations

Computer-based databases seem destined to become key management tools in urban forestry. But, with the more efficient storage and recall of historical information from the database, rigorous record keeping will be essential. Field crew accomplishments will need to be reported clearly and this information routinely entered into the database.

Before investing in computerized database capability, a prospective user needs to become familiar with the available software and hardware. Available database software packages are described (Datapro Research Corporation 1983a). The recently introduced dBASE II® database package for use on microcomputers (Brin 1983) currently is being customized for urban forestry purposes (Barker 1983, Crossman, 1983, Crossman et al. 1981). When completed, this will be available to prospective users nationally, with only slight additional customization necessary, depending on the microcomputer in which it is installed. Although the basic software will have to be purchased by the user from a software outlet, the customized component will be available without cost because it is being developed with public funds.

Many microcomputers have been compared (Computer Information Publishers Inc. 1983, Datapro Research Corporation 1983b, Miastkowski 1982, and Soloman 1983). Low-capacity, hobby-use microcomputers lack the necessary processing speed and memory capacity. They cannot handle efficiently the amount of data or provide the needed flexibility of an overall system, such as use for both data and word processing and eventual expansion to multiple workstations. The most useful types of microcomputers for urban forestry purposes, therefore, are apt to be the ones with mid-range capacity. These, along with the necessary peripherals and software, may cost as little as $10,000 to $15,000, an expense likely to be low enough to permit acquisition and hands-on use by separate departments of a city or a business organization.

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ABSTRACT

RUARK, G.A., D.L. MADER, and T.A. TATTAR. 1983. **The influence of soil moisture and temperature on the root growth and vigor of trees—a literature review. Part II. Arboric. J. 7: 39-51.**

In the previous issue, the dramatic effects of soil compaction and aeration interactions on tree vigor and root growth were examined. The picture of the physical soil environment, however, is not complete without an examination of soil moisture and temperature. It is difficult to separate logically the effects of these four components. When viewing the soil system, a feeling for all of these properties is helpful in order to weigh properly the distribution of each input to the vigor symptoms being manifested by a tree. Current knowledge of urban soils is very limited. Physical soil conditions in the urban environment often adversely affect soil aeration and moisture relations as well as soil structure and, consequently, cause a decrease in the growth rate and vigor of trees. More research is needed on the soil conditions that actually exist in the urban environment. A careful examination of urban soils in light of our knowledge of both forest and agricultural soils is required to better define these soils, and then to determine problems that woody plants must tolerate in order to grow in them if trees are to be effectively managed in the urban environment.