DETERMINING NEEDS FOR STREET TREE INVENTORIES[1]

by Douglas A. Ziesemer

In recent years, municipal forestry organizations have shown considerable interest in inventorying their street shade trees. Today, many municipalities are either seriously considering or have already completed some form of inventory. Unfortunately, little standardization exists in this area and much work remains before the state-of-the-art reaches a satisfactory level. Of particular interest is the need to develop a rational means to determine whether an inventory is even necessary in any particular municipality.

Designing, completing and maintaining a street tree inventory is not an easy task. From the moment a municipality first considers inventorying its trees, numerous questions arise. For example:

a. Should specific trees be identified? If so, how should that be accomplished; by house number, by measurement from some standard point, or with identification tags? If house-numbers are used, what about trees on vacant lots? And how will multiple trees at the same address be distinguished?
b. What data should be collected for each tree? Should diameter be measured or only estimated? Is height important? What kind of condition classes should be used?
c. If work is needed on any tree at the time of the inventory, how should that be noted? How will it be programmed later?
d. When work is done after the inventory has been completed how can the data be updated? Or should the data be updated at all?
e. What about emergency activities? Should data be updated to reflect emergency trimming and removal? Could our foremen do that? Could our foremen do anything related to the inventory, or will some training be necessary?
f. Who will conduct the inventory? How much will it cost? How long will it take? Should it be computerized? How accurate will it be? How long will it stay accurate?

These and similar questions emphasize the complexity confronting a municipality from the moment it first considers undertaking the task of inventorying its street shade trees. The success any municipality realizes from an inventory will be closely related to how well it has dealt with these questions. Perhaps this can best be understood by briefly examining two actual cases.

Municipality "A" conducted an extensive inventory of its street trees. So that others could benefit from its experience, it published a detailed documentation of its system. However, the documentation dealt almost entirely with the mechanics of collecting and processing the data. The rationale behind the inventory was only briefly mentioned. The documentation left the reader to assume that municipality "A" knew precisely what it was going to do with the data once it had been collected and processed. This is not a safe assumption to make.

Included in its documentation was the statement that Municipality "A" had decided to collect as much data as possible with the hope that sooner or later it would all prove useful. Furthermore, at the time the data were collected no means existed to update it. It was realized that the useful life of the data was probably less than five years. Under these circumstances, it is doubtful that Municipality "A" benefited as much as it could have from the time and money invested to inventory its trees.

In another actual case, municipality "B" was experiencing funding problems that threatened the very survival of its tree program. It was decided that an inventory could provide the data necessary to support its budget requests. The inventory was hurriedly designed and implemented. Problems were encountered immediately.

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Accordingly, the accuracy of the data was highly questionable. Even worse, the computer support that had been promised was withdrawn at the last minute. The result was the collection of unreliable data that couldn't be processed.

There is much to be learned from the experiences of Municipalities "A" and "B". They reemphasize the fact that designing, completing and maintaining a street tree inventory is not an easy task. However, that is not to say that it is an impossible task. If approached systematically, as any complex problem should be, it can be handled successfully. The purpose of this paper is to propose a systematic approach that any municipality could use to identify its inventory needs and input them into a successful inventory system.

From the moment a municipality first considers inventorying its trees, it should be concerned with two things: 1) is an inventory really needed? and 2) if it is, how should it be designed?

Let's examine the first of these. How can a municipality determine if an inventory is really needed? Determining the need for an inventory involves being able to identify numerous specific needs that collectively comprise an overall need for an inventory. Thus, the question of how to determine the need for an inventory is really one of how to identify specific needs that could be fulfilled by an inventory.

There are a number of ways to identify inventory needs. One way is to make a preliminary analysis of the urban forest. What condition are the trees in? How much work is currently needed? Are there a large number of planting spaces available or are the parkways well stocked? How many stumps need removal? How long have they existed? This type of on-the-street evaluation could point out existing needs that could be satisfied through an inventory.

Another place to look to identify inventory needs is at the tree program itself. How is work being assigned? Is difficulty being encountered in this area? How are priorities set? Are they based on the needs of the trees or on other factors? Examining the tree program should indicate the type of information the program is based on. An inventory might provide some of that information.

After examining both the tree program and the trees themselves, it would be beneficial to compare them. If program priorities are based on the needs of the trees, how accurately are the existing needs reflected in the present priorities? Do estimates of the volume of work requiring completion correspond with the actual conditions of the trees, or are there discrepancies in this area? For example, does the municipality project that only 20% of the existing trees presently need trimming when the actual number is closer to 70 to 80% of the total population? Discrepancies between the tree program and the actual conditions on the street indicate the need for receiving more or better information upon which to base the program. That need might be fulfilled by a tree inventory.

Another indication of inventory needs might be found in the public's reaction to the tree program. Is the public satisfied with the program or are numerous complaints being received? Are citizens receiving routine service on their parkway trees or must they request service? If they request it, how long will they have to wait until their requests are fulfilled? Valid complaints and requests from citizens can indicate program deficiencies. Again, an inventory might provide information that could correct such deficiencies.

Each of the above is a means for a municipality to identify inventory needs. Unfortunately, these methods are more subjective than they are objective and, even though they are of some value, they are not very reliable. What is needed is a more objective approach.

Can a municipality objectively identify its inventory needs or not? The answer, of course, is yes. And, surprisingly, that objective identification is quite easy to make. In order to understand how this can be done, let's first take a step back and put a few things in perspective.

A large part of an urban forester's job is managerial in nature. As managers, those of us responsible for street shade tree programs should be concerned with optimizing the services we provide the citizens of our respective municipalities while we minimize the costs of those services. To this end, we make numerous decisions every day. Ideally, the better the decisions we make, the better the services we can provide.

The basic decision-making process we each utilize should vary little, even though the type and magnitude of the decisions we each make might vary greatly with the size of our municipality and our specific responsibilities. Of primary importance in the decision-making process is the information available as input. That information must be both accurate and timely and, in addition, be in a form that facilitates its use. Above all, that information must accurately represent the existing physical needs of our urban forest. Being able to identify those needs and process them for input into managerial decisions is the key to developing a successful inventory system. But there is one problem. How do we determine which information about our forest is important enough to collect and which isn't? There should be a definite rationale behind determining what information to collect. Approaching an inventory from a decision-making viewpoint can provide that rationale.

The decision-making process within an organization does not rest with a single individual, but rather is divided among the various managerial and supervisory levels or positions into which the organization has been stratified. We can easily identify the types of information an inventory should provide by looking at these various positions and determining three things for each:

1) the functions performed at each position,
2) the decisions that must be made at each position to enable the successful completion of each of those functions, and
3) the information required at each position to enable making those decisions rationally.

An example will illustrate how this three-step approach can be utilized. A sample municipal tree organization is represented in Figure 1. The first thing that must be done is to identify those positions where information concerning the physical needs or characteristics of the urban forest are input into the decision-making process. As in this case, this will primarily involve the field operations branch of the organization. Within that branch, inventory needs will probably begin with the lowest level supervisor, the crew foreman, and go up the chain of command to the bureau head. For this example, seven levels or positions are involved.

After the positions have been identified, the functions performed at each should be listed. Hopefully, that information will already be available within the organization and all that will be necessary will be to list those functions that involve tree-need type decisions. If the functions aren't already listed for the organization, some definition will be necessary. This can be done in either of two ways. Either examine each position separately and list the functions for it, or list all operational functions for the organization and then determine which position or positions are responsible for them. Because there will undoubtedly be some overlapping of functions among the various positions, it would be helpful to develop some visual representation of them to show their interrelatedness (see Figure 2).

FORESTRY ORGANIZATION

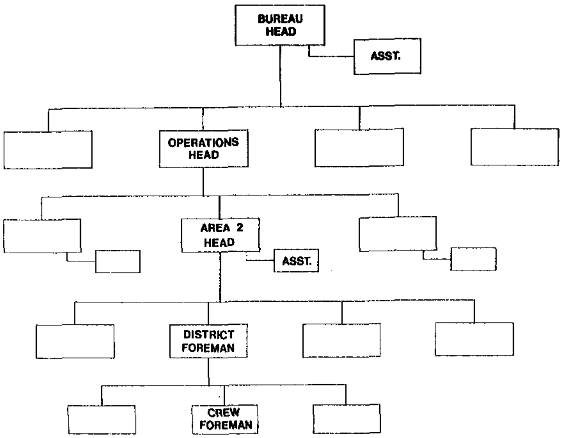

Figure 1. Sample municipal street tree organization.

Once the functions have been listed for each position, the next step is to list the decisions typically made to enable the successful completion of each function. Then, in the third step, the information required as input for each of these decisions must also be listed. A couple of examples will demonstrate how this process can be applied to specific positions.

First, let's look at the lowest supervisory level in the sample organization, the crew foreman. Four functions are listed for the crew foreman in Figure 3. The detailed breakdown of decisions and information required for the first function demonstrates how the three-step approach works for this position. To show that it works equally well for all positions, Figure 4 provides a similar breakdown for the top position in the sample organization, the bureau head. There is no reason to expect that this approach will not apply to the remaining positions. The end result of the three-step analysis of positions is an extensive list of information required within the organization as a whole. In analyzing that list, a municipality would know what tree-related information it needs, who needs it, when they need it and what they need it for. However, even with this detailed information in hand, the overall need for an inventory still cannot be determined. Further analysis is necessary.

Municipalities that consider inventorying their trees must recognize that the opportunity rarely exists to develop an inventory in a vacuum. They must remember that theirs is a viable organization where, undoubtedly, some flow of information already exists. Unfortunately, this flow of information can be such that many municipalities find they are drowning in paperwork but gasping for information. The mere addition of a new system can represent more paperwork that, instead of supplying badly needed information, might well choke the organization into an even worse situation. Therefore, if an inventory is needed, it should be designed as an integral part of the existing information system. Fortunately, the task of determining how to integrate an inventory into an existing information system can be completed simultaneously with the task of determining if the inventory is needed in the first place. The Project Plan in Figure 5 illustrates how this can be done.

As shown, the overall inventory project can be divided into three major phases; planning, implementation and operational. The focus in this paper is on the planning phase and is specifically concerned with being able to rationally reach the "decision to implement".

As previously stated, the identification of specific needs that might be fulfilled through an inventory is not sufficient to determine the overall need for an inventory. This is true mainly because the possibility does exist that those needs are currently being met. Thus, the existing information system must be analyzed to determine how tree-related information is being collected, distributed, processed, disseminated and utilized within the organization.

One way to complete this information analysis is to examine all forms or reports that either go to or

FUNCTION LISTING

Functions	Bureau Head	Ast. Bur. Head	Operations Head	Area Head	Ast. Area Head	District Foreman	Crew Foreman
XXXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX		
XXXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX		
XXXXXXXXXXXXX	XXXX		XXXX	XXXX			
XXXXXXXXXXXXX	XXXX	XXXX	XXXX				
XXXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
XXXXXXXXXXXXX	XXXX		XXXX	XXXX	XXXX		
XXXXXXXXXXXXX	XXXX	XXXX	XXXX				
XXXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
XXXXXXXXXXXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
XXXXXXXXXXXXX			XXXX	XXXX	XXXX	XXXX	
XXXXXXXXXXXXX			XXXX	XXXX		XXXX	XXXX
XXXXXXXXXXXXX				XXXX	XXXX	XXXX	
XXXXXXXXXXXXX				XXXX	XXXX	XXXX	XXXX
XXXXXXXXXXXXX					XXXX		
XXXXXXXXXXXXX						XXXX	XXXX
XXXXXXXXXXXXX						XXXX	XXXX

Figure 2. Function-position comparison.

POSITION ANALYSIS
(Crew Foreman)

Function	Decisions	Information
Schedule men and equipment	Whether crew is at correct address Whether work is done on correct tree Whether crew is doing correct work When to move to next job site When to alter schedule	Addresses of jobs for day Identification of trees needing work at each address - size, species, position Work to be done on each tree
Assure that crew does all work in accordance with established standards		
Enforce bureau rules and regulations		
Complete records and reports		

Figure 3. Partial three-step analysis of crew foreman position.

POSITION ANALYSIS
(Bureau Head)

Functions	Decisions	Information
Directs development and initiation of programs Establishes program priorities	Are trees' physical needs being met Do insects/diseases warrant control Are ongoing programs on schedule Are service requests handled promptly	Size, species, condition and location of trees Location and number of planting sites Status of ongoing programs Number of requests for service, by category Turnover of requests for service, by category
Maintains awareness of status of all programs Maintains awareness of condition of trees Directs preparation of budget Etc.		

Figure 4. Partial three-step analysis of bureau head position.

originate from each of the supervisory and managerial positions studied in the position analysis. In addition, interviewing the personnel in each of these positions to collect information detailing the reason they receive or send each form or report, what they use it for, when they need to receive it and so forth will provide enough data to enable construction of a flowchart of the organization's information system.

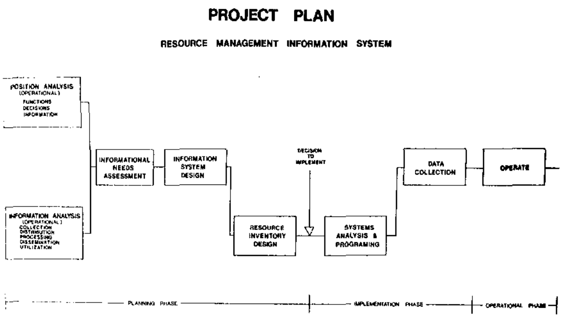

Figure 5. Inventory project plan.

Comparison of the flowchart from the information analysis with the inventory needs from the position analysis will enable the identification of any gaps and overlaps that might exist. Problem areas identified in that comparison, termed the information needs assessment, can be carried forward to the next step in the project plan, the information system design. There, the problems are resolved through the modification of the existing information system. It is at this point in the project that the need for an inventory can be readily determined.

Actually, three separate situations can arise during the information system design:

1) an inventory is not necessary. Inventory needs are presently being met or can easily be met with minor modifications to the existing information system.
2) an inventory is not necessary. Although inventory needs are not presently being met, they can be met with modification of the existing information system.
3) an inventory is necessary. Inventory needs are not being met and cannot be met even with major modification of the existing information system.

Two important points should be emphasized here. If the results of the analysis completed through the planning phase indicate that an inventory is not necessary, as in the first two instances above, then the municipality should not inventory its trees. As obvious as this is, some municipalities have already spent significant amounts of time and money to conduct inventories that were not needed. Doubtless, others will follow. While one reason this occurs is the failure or inability to establish need, or lack of need, for an inventory, more often municipalities simply succumb to the glamour of having a computerized inventory. Any municipality that considers inventorying its trees should continually remind itself that the objective of an inventory is to provide decision-making information that cannot otherwise be made available. The objective is not to develop a computerized system.

Equally important, if the analyses indicate that an inventory is necessary, as in the third instance above, the inventory still must be designed. To this end, a municipality that has completed the analyses described herein has a tremendous advantage over a municipality that has not because the data resulting from these analyses is available for direct input into the design of the inventory system. Since the inventory needs identified in the position analysis tells a municipality what data must be provided or collected, who needs it, when they need it, and what they need it for, those needs can actually dictate, in part, how the inventory should be designed. Designing an inventory to fulfill such clearcut, predetermined needs is certainly preferable to the all too common practice of arbitrarily designing an inventory only to find that that design later dictates the needs the system can fulfill.

As a final point, it is paramount that the term "inventory" is not used synonymously with the terms "total inventory" or "computerized inventory". Whichever is the best way to satisfy inventory needs is the way the inventory should be designed. The inventory needs might well be satisfied by less than a total inventory. Indeed, statistically sound samples and one-time or periodic surveys might well provide all the information a municipality needs at only a fraction of the cost of a total inventory. Furthermore, computerization of inventory data may or may not be warranted. Computerization has the advantage of quick retrieval and easy cross-tabulation of data, but it can be costly and has its own inherent problems and shortcomings.

In conclusion, I would like to emphasize that the state-of-the-art of street tree inventories is still in its infancy. Much work lies ahead. What is needed today more than anything else is the development of a systematic approach that any municipality could use to design, complete and maintain an inventory system. Just where this is going to come from might be argued, but I think the most logical direction to look is to the trial-and-error experience currently being gained by the hands-on practitioners who have a comprehensive knowledge of the overall functioning of street shade tree programs. However, if we are to benefit from this vast field of experience, we must increase our communications. To this end, the free exchange of ideas at sessions like this is crucial for the continued development of street tree inventories. The contributions we are each willing to make in the future will largely determine how fast the state-of-the-art develops and how soon street tree inventories reach their maturity.

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URBAN FOREST PLANNING[1]

by Gary A. Moll

In Southern Maryland we have developed a unique opportunity for the practice of urban forestry and we have called it Urban Forest Planning. The idea for an Urban Forest Planner was conceived by the Southern Maryland Resource Conservation and Development Board (R.C. and D.) with the assistance of persistence of the Southern Region Forestry Staff. The project is funded by the U.S. Forest Service through R.C. and D. and Maryland's Department of Natural Resources, Forest Service.

The Urban Forest Planning project encompasses three counties in Southern Maryland: Calvert County, Charles County, and St. Mary's County, which we title the Tri-County area. The northern borders of the Tri-County are only fifteen miles from Washington and thirty-five miles from Baltimore. Each county is a peninsula extending into the tidal waters of the Potomac River, Patuxent River, and the Chesapeake Bay Estuary. This estuary system is an important natural resource to the area and also acts as a physical barrier limiting population movement.

The R.C. and D. project area includes 1,166 sq. miles of land and water area, all of which is coastal plain. Traditionally, the major industries have been forestry, farming, and seafood. However, recently, real estate and land speculations have been goldmines for today's entrepreneur. Housing developments are sprawling throughout the area at an alarming velocity due to the pressure from the Baltimore-Washington area. Population projections from the Council of Organized Governments for the Washington D.C. area indicate a continuous arm of urban population stretching well into the Tri-County area by 1995! The density is 1-5 households per acre.

Through Urban Forest Planning we intend to retain valuable forest vegetation in this developing area. We are concerned with single tree selections around home sites, strategically retaining screens, buffer strips, and recreation areas

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[1]Presented to the Urban Forestry Working Group, Society of American Foresters, Albuquerque, New Mexico in October 1977.