INCREASED EFFICIENCY IN URBAN FORESTRY[1]

by James A. Overbeek

Abstract. In 1975 the City of Grand Rapids, Michigan undertook a two-year study of the productivity of its Forestry Division. The study made use of a computerized cost accounting system to control and tabulate data regarding the various costs per units completed. Various work methods were used and then compared to determine the most efficient work method. By using the scientific method to evaluate performance, the Grand Rapids Forestry Division was able to increase the number of units completed and decrease the cost per unit in all of its types of work.

During the recent past urban foresters have been faced with a complex problem. They have had to deal with an increasing public awareness of urban forestry programs at a time when most municipal budgets were experiencing financial difficulties. In many cities these financial restraints surfaced in the form of reduced man power, nonreplacement of worn out equipment, and in reduced operating funds.

The Forestry Division of the City of Grand Rapids, Michigan became aware of these problems in 1975. At that time it was determined that the requests for urban forestry services had increased by sixty-five percent since 1972. During that period the budget allocated for forestry operations had remained at approximately the same level. Many items within this budget were deleted annually to accommodate salary hikes and increases in equipment costs.

To cope with these problems many programs were instituted. The most successful was a productivity study that was designed to increase the number of work units completed and decrease unit cost.

Evaluating procedure

This productivity study was conducted over a two-year period. It was designed to compare cost per work unit figures for ten types of work within fourteen areas. All labor, material, equipment, and indirect costs were tabulated using a computerized cost accounting system called the Financial Planning, Programming System. This system allowed us to separate the crews among the fourteen districts and to compare cost per work unit and number of units completed figures on a monthly basis for each type of work performed by each crew. Each crew was asked to daily record information regarding the district worked in, type of work performed, units completed, and labor and equipment used. All operating and maintenance supplies were similarly recorded and invoiced. Indirect costs such as administrative wages, vehicle repairs, vacation or sick time and departmental overhead were also prorated to these various districts and types of work. The Financial Planning, Programming System used this information to make out our payroll and to supply us with impartial and accurate data. By holding conditions of work constant and by changing the methods of work, we would be able to stretch budget dollars by increasing productivity, thereby cutting costs.

Variables

Five variables had an effect on each division's productivity and efficiency: 1) crew size, 2) crew make-up or personality, 3) equipment allocations, 4) routing of jobs, and 5) type of work performed. Each was dealt with separately for a two-month time span with all other variables held constant. At the end of that period each alternative was evaluated.

Crew size. Each type of work crew was assigned a different number of members. Trimming crews were made up of eight, six, four, and three members. These were assigned to similar but distinct trimming areas. At the end of two months it was obvious that the lowest costs per work unit were obtained from four-member crews. This approach was used to determine crew size for tree removal, tree planting, tree maintenance, stump removal, root cutting, and storm damage clean-up.

[1]Presented at the urban forestry symposium, Michigan Academy of Science in March of 1978.

Make-up of each crew. We knew that certain people performed better under one crew chief than another. What we did not know was how much better. To find out, crew members who expressed difficulties or who were not performing adequately were shuffled among crews who possibly were more compatible. In each case productivity and efficiency increased. In most cases these changes were less than ten percent, but in one situation the removal of a crew member and the substitution of another accounted for a twenty percent increase in productivity. Permanent crews were then established for each type of work performed.

Equipment allocations. The cost per work unit for tree trimming crews using one or two aerial tower trucks were compared as were crews using flatbed trucks, backhoes, dump trucks, and brush chippers. In each case at least two alternatives were explored. The result was an equipment allocation plan which resulted in the removal of all flatbed trucks from trimming programs, the substitution of hand labor for a backhoe on stump removal programs, the elimination of one hi-ranger from our trimming program, and a complete new system of equipment allocation for tree planting.

Crew routing. During the summer months our division receives over five thousand citizen requests for service. These requests are diverse and scattered. To satisfy these requests two programs were evaluated. One consisted of a priority system based on the time of entry. The second was based on a pre-established routing pattern. It became obvious after two months that by responding to requests in the order that they came in resulted in the wasting of at least six man hours per day per crew in traveling from job site to job site. By assigning crews to various routes and by inserting requests along the routes the wasted travel time was virtually eliminated. Some inconvenience complaints were expressed by citizens but these were minimal. At no time did any citizen wait longer than three weeks for service. Naturally, requests of a hazardous nature were handled immediately. Requests for work to be done within areas that were to receive tree by tree inspection and service the following winter were deleted from the special request routes.

Type of work performed. This program consists of a tree by tree assessment within a given area. All trimming, removal, maintenance, root cutting, and planting information was recorded by address in a routed fashion. The crews worked through the areas and completed the necessary work. Our concern was the best approach to complete the work. Was it best to first complete the trimming within an area and then come back for the tree removals or was it best to take the trimming and removal orders concurrently? The efficient approach was separate trimming and removal programs within an area. Although this alternative increased travel time it decreased equipment downtime and provided a cost per unit decrease of at least ten percent.

Results

At the end of our two-year study period the costs per work unit completed for each operation were compared with 1974 base figures. The results were as follows:

1. Tree trimming operations increased by 11% and the cost decreased by 9½%.
2. Tree removals increased by 21.7% with a cost reduction of 4.7%.
3. Tree planting operations increased by 52.2% at a cost per unit reduction of 30.6%.
4. The number of trees maintained increased by nearly 100% with the addition of only one man and an aerial tower. The cost per work unit dropped 11.4%.
5. Our root cutting programs increased by 19.6% at a cost reduction of 66.3%.
6. Storm damage clean-up, equipment maintenance time, and stump removal figures are currently being evaluated.

The Financial Planning, Programming System has been an integral tool in the reshaping of our organization's work format. Without it, many changes could not have been properly evaluated. Our test results will not apply in every city forestry operation because personnel, equipment types, tree sizes, and species all differ. Results also will differ from season to season. Each city should evaluate its own program. We also realize that it is

impossible to completely control the work environment and that our results are not statistically pure.

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ABSTRACTS

Haller, J.M. 1978. **Tree thief.** Am. Forets 84(12): 10-13, 30-31.

In the North and East, mistletoe may be only a botanical curiosity with seasonal romantic connotations, but in the southern, southwestern, and Rocky Mountain states it is neither a curiosity nor an object of affection. The parasite is a ruthless killer that yearly destroys thousands of fine trees in pastures, woodlots, forests, parks, and at private homes. There are more than 900 known species of mistletoe in the world. In the United States there are only two principal kinds, *Arceuthobium,* commonly called dwarf mistletoe, and *Phoradendron,* commonly known as true mistletoe. This insatiable thief often takes so much that the portion of branch beyond the point of attack starves and dries up. Even if a tree manages to survive despite infection, its beauty is marred and its usefulness impaired. Best control is prevention by selective planting. For trees already infected, the only practical control measure is removal of the growths mechanically.

Sartoretto, P.A. 1979. **Professional applicator must know mixing basics.** Weeds, Trees, and Turf 18(3): 26, 29, 31-32, 34.

A professional must know that the pesticides he mixes in water will retain their own identity and not react with each other. The following four rules and exceptions are helpful in determining tank mixes. Rule #1: Never tank mix emulsifiable insecticide concentrates. Rule #2: All insolubles can be tank mixed without incurring phytotoxicity provided the products are sprayed at recommended rates. Rule #3: Only one soluble chemical can be tank mixed with any number of insolubles. If two soluble chemicals are tank mixed with or without insolubles, the rate of each soluble should be cut in half to avoid phytotoxicity. Rule #4: Soluble fertilizers and trace elements can be added individually or mixed, provided the amount will not exceed one ounce solid per gallon tank spray mix.

Taylor, G.S. and R.E.B. Moore. 1978. **Egg laying of a tree cricket leads to canker on red maple.** Frontiers of Plant Science 31(1): 4-5. (Conn. Agr. Exp. Sta.)

In May 1977, hundreds of grafted red maples growing in a Hartford county nursery were killed by cankers that girdle the bark. The first sign of the disease was a running, wet spot on the bark. The tissue beneath was soft and leaked a liquid when pressed. Even trees that were not girdled had many cankers on the bark. We found that branches of red maple became diseased when inoculated in the laboratory with the *Cryptosporiopsis* fungus that we had isolated from the Connecticut cankers. We also found wounds made by the narrow-winged tree cricket (*Oecanthus angustipennis*), as it laid eggs in red maples throughout the affected nursery and in wild red maples nearby. Many wounds made by the cricket did not cause a canker, but 90% of the cankers we observed were associated with an egg laying wound. Tree crickets and cankers are not a new combination. The cankers tend to heal in one or two seasons, leaving a deformed area.