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ESTIMATION OF TREE PRESERVATION COSTS

on Urban Residential Lots
in Metropolitan Atlanta

by Andrew F. Seila and L. M. Anderson



RESEARCH DIVISION
GEORGIA FORESTRY COMMISSION

ABOUT THE AUTHORS



ANDREW F. SEILA
Associate Professor
Department of Quantitative Business
Analysis
College of Business Administration
University of Georgia
Athens, Georgia



L. M. ANDERSON
Research Social Scientist
USDA Forest Service
Forestry Sciences Lab
Carlton Street
Athens, Georgia

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ABSTRACT. This report presents the results of a study of tree removal costs on a sample of houses built by metropolitan Atlanta builders between 1979 and 1982. Interviews with 22 builders supplied information on their professional experience, and characteristics of their share of the 85 houses in the sample, including details on the house and lot, and on the tree removal policies and costs incurred during construction of each house. The builders

reported that the costs of tree removal increase with the size of the lot and of the house, the density of trees on the lot, the percentage of hardwood trees in the existing stand, and the type of development, with custom and small development units costing more than speculative and large development units. Builders reported that clearing the lot usually costs more than thinning or preserving trees during construction. However, because builders

more often chose to preserve trees on the more difficult sites in this study, the costs for tree removal with maximum preservation were somewhat higher than for clearing. In most cases the cost for tree removal policy was well under \$1,000 regardless of the tree policy followed by the builder. In addition, the builders reported that houses on wooded lots brought higher prices, usually a difference of \$5,000 or more for the average house.

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In cities and suburbs much of the urban forest is located on residential property. In the growing cities of Georgia, development at the edge of a city often takes place on forested land. Developers and builders therefore wield great influence on the urban forest, for they make decisions concerning tree removal for new houses constructed on wooded lots. The decision to preserve, thin, or remove all existing trees has consequences for the builder, affecting both the costs and the price of the builder's product. The builder's tree policy also has important consequences for residents because builders alone often determine the nature of the urban forest in the new residential areas.

In this study the builders of a sample of recently constructed homes in Atlanta, Georgia were asked their perceptions of the costs involved in preserving or removing trees on residential lots. The study addresses issues that have implications for the future of Atlanta's urban forest, and perhaps also for other urban centers. The objectives of this research were to determine

- (1) the extent to which developers are interested in preserving trees on residential lots, and the reasons for their interest;
- (2) the costs developers associate with various tree removal policies; and
- (3) the relationship between costs for tree removal policies and other physical and economic factors.

Today Americans generally consider a healthy and mature urban forest desirable, not only because of the pleasing aesthetic value that trees contribute, but also for the privacy, reduced noise, and increased value and salability of properties landscaped with trees. For example,

Payne and Strom (4) found that the appraised value of forested residential property was significantly higher than that of unforested property. Payne (3) has also shown that landscaping with trees significantly improves sales prices of single family dwellings. These perceptions are known among developers, realtors, and home buyers, and this knowledge clearly influences developers' decisions concerning tree removal.

Economic factors and the physical environment also influence builders' costs for different tree policies. Seila and others (5,6) studied the costs of tree removal in the city of Athens, Georgia (Clarke and Oconee Counties). In this study builders perceived costs to be lower when as many trees as possible were left on the lot during construction. Clearing the lot or thinning the existing stand increased costs. In Athens, costs were influenced by the size of the lot, percentage of hardwoods on the lot, density of trees, type of development, and year of construction. In an earlier study, Lash (2) investigated builders' perceptions of costs for tree removal in Amherst, Massachusetts, and found that tree preservation cost an average of \$1,700, compared to only \$1,000 for clearing the lot. However, no effort was made to relate these cost estimates to the physical and economic factors involved in construction. Both Athens and Amherst are relatively rural areas. One could argue that their results might not be applicable to a more urbanized area where builders must deal with different economic and urban forest conditions.

To assess the costs for tree preservation in an urban setting, we chose a sample of houses built in the Atlanta metro-

politan area. We interviewed the builders of these houses to ascertain their perception of the costs associated with different tree removal policies, and how physical characteristics of the building site influence these costs.

PROCEDURE

Using a catalog of recently sold metropolitan Atlanta homes, we selected a sample of 85 houses built between 1979 and 1982, by a total of 22 Atlanta builders. Interview forms were prepared which included a set of 9 questions asked of each builder, and sets of 11 questions asked for each house. Each builder was asked the following questions:

- (a) years of experience in building;
- (b) current average price of houses being built by the builder;
- (c) current average size of developments being built (e.g., custom, individual speculative, or small or large subdivisions;
- (d) how the builder usually arranged to have any trees removed;
- (e) whether steps were taken to preserve trees during construction;
- (f) whether the builder considered it more difficult to build on a wooded lot than on a cleared lot;
- (g) the builder's estimate of the costs for clearing, thinning, and preserving all trees on an average size lot ($\frac{1}{4}$ acre) with moderate tree density;
- (h) whether the builder considered it easier or more difficult to sell a house on a wooded lot; and
- (i) the builder's estimate of the average price difference between identical houses on wooded versus unwooded lots.

The 22 builders also answered specific questions about the houses selected for the study. For each house in the sample, builders provided the following information:

- (a) whether the house was custom, individual speculative, or part of a small or large development tract;
- (b) the size of the lot;
- (c) the finished square footage of the house;
- (d) the selling price of the house;

- (e) the year the house was built;
- (f) the density of the original tree stand (from very light to very dense (over 81 trees per acre);
- (g) the percentage of the original stand consisting of hardwood trees;
- (h) what tree removal policy was followed on the lot (clearing, thinning, or preserving trees on the front rear, or both sides of house),
- (i) whether any trees were planted following construction;

- (j) what costs were incurred for necessary removal of trees (from foundation, drive, and septic tank area);
- (k) whether any additional trees were removed, either at builder's discretion or on request of buyer, and the cost of this additional removal.

Georgia Forestry Commission personnel in the DeKalb County Forestry Unit, Stone Mountain, conducted the interviews in the summer of 1982.

TABLE 1. SUMMARY OF BUILDER CHARACTERISTICS

Question	n	Average	Standard Error	Minimum	Maximum
Years of experience	22	13.5	1.7	<2	>20
Selling price, average	22	\$122,045	\$16,663	\$45,000	\$380,000
<i>Costs for different tree removal policies:</i>					
Average cost to clear lot	15	\$860	\$237	\$30	\$3,500
Average cost to thin trees	16	\$431	\$80	\$40	\$1,000
Average cost to preserve trees	15	\$547	\$131	\$50	\$2,000
<i>Selling price differential with trees:</i>					
In dollars	20	5,704	1,050	0	18,125
As a percentage of total price	20	7	1	0	15

RESULTS

A summary of the builders' characteristics is shown in Table 1. The builders were experienced in their business--15 of the 22 had ten or more years of experience. The houses they built in the years covered in this survey were expensive--the average selling price was \$122,045. Perhaps the high prices reflect the economic recession occurring in the study period, which generally allowed homebuying only by more affluent families. The builders indicated that in their experience wooded lots are more difficult to build on, but that trees enhance the salability of the property, and increase the sales price by an average of 7 percent, or about \$5,000 for a \$72,000 house. In comparison to the price gain, the costs to clear, thin, or preserve the maximum number of trees on a residential lot average under \$1,000, with thinning, at \$431, and clearing the minimum number of trees necessary for house and drive, at \$547, significantly less costly than complete clearing, at \$860 per lot.



If the trees near the house die now, they will be expensive to remove.

House Characteristics

Most of the 85 Atlanta homes in our sample were built on either a custom or individual speculative basis. Most of the lots in the sample were small (75 percent were less than $\frac{3}{4}$ acre in size), although the houses were large (average 2,814 square feet) and at \$138,111, slightly more expensive than the builders' average selling price of \$122,045. Over 85 percent of the sample houses were built in 1981 or 1982. Tree density and percentage of hardwood were evenly distributed across categories ranging from light to heavy, with most of the lots (69 percent) having at least moderate tree density. Trees had to be removed for building purposes from 75 percent of the lots (such necessary removal took place on the foundation, drive, and septic tank areas). Table 2 shows other characteristics of the 85 houses in the Atlanta sample, as well as the costs for tree removal encountered by their builders.

The significance of the data on the Atlanta houses is that whatever the tree removal policy, costs to the builder are quite small relative to the ultimate sales price. On the average it costs less than \$1,000 regardless of the tree removal policy followed by the builder--on only 7 of the 85 houses in our sample (8 percent) did tree removal costs exceed \$1,000, even though a majority of lots in the sample were moderately to heavily wooded.

Although the Atlanta builders reported that they usually had lower costs when preserving trees, they reported that for the particular sample of lots in this study, costs when trees were preserved were higher than costs when all trees were cleared. This apparent contradiction is largely a result of the fact that builders chose more often to preserve trees on lots where tree removal was going to be more expensive. If the builders had decided to clear on such lots, they would have experienced even higher costs than they encountered for preserving trees.



The owner of this house will have a headstart on landscaping with trees preserved.

Tree Removal Policies, Costs, and Physical and Economic Factors

The range of costs associated with the various tree removal policies is large--for necessary tree removal on the 85 lots in our sample, costs ranged from \$60 to \$2,500. Characteristics of the individual house and lot help to determine which tree removal policy will be selected, and how much it will cost. Our results indicate that the following factors affect the builders choice of tree removal policy:

- (1) Builders were more likely to preserve trees if the job involved custom-built versus speculative or tract development construction.
- (2) Builders were more likely to preserve trees on larger lots.
- (3) Builders were more likely to preserve trees when tree density was higher, while clearing was used more often when tree density was light.
- (4) Builders were more likely to clear if

the proportion of pines was high, and less likely to clear if hardwoods predominated in the initial stand.

Cost of tree removal was also related to characteristics of the house and lot, with the following relationships evident:

- (1) Custom built houses involve larger costs for tree removal than the other types of development in our study--individual speculative and large and small developments.
- (2) Costs for tree removal increase only slightly as lots increase in size--although small lots were usually less expensive to clear, large lots were not uniformly more expensive to clear. Builders were more likely to preserve trees on larger lots, so that after the minimum area for the foundation and drive was cleared, the fact that the rest of the lot was larger than usual had no effect on the cost of tree removal.
- (3) Costs increase with increasing tree density.

TABLE 2. SUMMARY OF HOUSE/LOT CHARACTERISTICS

Question	n	Average	Standard Error	Minimum	Maximum
Square footage of house	85	2,814	138	1,300	7,000
Selling price	84	\$138,111	\$9,949	\$41,900	\$410,000
Cost to preserve trees	27	\$687	\$147	\$0	\$2,500
Cost to thin trees	25	\$382	\$74	\$0	\$1,500
Cost to clear all trees	20	\$373	\$39	\$0	\$1,500

- (4) Costs increase as the percentage of hardwoods in the stand increases.
- (5) Costs tend to increase with increasing size of house.
- (6) Costs dropped slightly in 1982.
- (7) The greatest costs incurred for any tree policy were for preserving the maximum number of trees, although for over 60% of preservation cases, costs were still under \$500. Builders are more likely to leave trees on lots where tree removal will be more difficult and expensive. On such difficult lots, the builder must pay more even for the minimum clearing for the foundation and drive, raising the costs for such lots because of the higher price for clearing the minimum area. Thus, lots where trees are preserved may show higher costs than lots cleared before construction. If the difficult lots had been equally likely to be cleared, the average price of clearing would have been much higher.

Our survey results were analyzed by linear regression to develop an equation which could predict the costs builders experience using different tree removal policies (1). Because of our small sample size, we were limited to equations which use only two factors at a time. The models indicated that lot size and tree density were the two strongest determinants of the builders' cost for tree removal. However, both variables accounted for only about ¼ of the variance, which is weak prediction ability. With a larger sample of houses, better statistical models could have been developed. However, the costs for any tree removal policy are generally so low that a predictive model would not be of great importance for the typical Atlanta lot in our study.

Relationships to Previous Studies

The Atlanta results can be compared to results from two earlier studies, one by Seila and others (5,6) in Athens, Georgia, and another by Lash (2) in Amherst, Massachusetts. In Athens as in Atlanta, builders experience lower costs for preserving trees than for clearing lots. In Athens, the sample of houses studied included mostly smaller houses (average size 1,655 square feet), fewer than half of which were built on moderately to densely wooded lots. In general, therefore costs for tree removal policy were lower in Athens than in Atlanta. In both cities, however, average costs for tree removal and lot clearing were low, averaging under \$1,000.

The Amherst data differed from both Athens and Atlanta results, for the Amherst builders reported average costs of \$1,700 for tree preservation and \$1,000 for clearing. The higher costs resulted from a more expensive effort to select and protect trees to be preserved during construction, with some builders hiring consultants to make the selection of trees

to be preserved, and building physical barricades to protect selected trees from damage by heavy equipment and other work crews on the lot. In Athens and Atlanta, builders tended not to select particular trees for preservation, instead just removing trees from the foundation and drive areas, and leaving all other trees unprotected on the lot. Most of the remaining trees survived the events of the construction process, although the builders did not usually provide barricades or extra supervision on the site to protect trees.

In all three cases builders agreed that trees help houses sell sooner, and that any costs involved in protecting trees can be recovered at a profit when the finished unit is sold. As long as the home buyer is willing to pay a higher price for a home on a wooded lot, builders will continue to preserve trees on the lots.

Before concluding this paper we should point out one weakness in the current approach to tree preservation. As a general rule, "preservation of trees" during construction was interpreted by the builders in this survey to mean leaving the trees, that is, simply not cutting them down. More active preservation efforts, such as construction of barricades around trees to protect them from damage, were rarely employed by the builders, and then only for custom construction.

This passive preservation keeps costs down for the builder, and so benefits the urban forest in the long run. However, there is an increased risk of tree mortality in the years immediately following construction. The greater risk of tree loss is due in part to damage directly caused by the construction process, such as scraping of bark by equipment, burial of roots under fill dirt, severing of roots as trenches for utilities are laid in, exposure to poisonous solvents, and even heat damage if construction debris is burned on the site too near trees. Another cause of tree loss comes from abrupt changes in the trees' environment, such as exposure to full sun or to altered drainage.

Dead or dying trees which have been left very close to new houses can be quite expensive to remove. If, instead of just leaving trees, builders would practice more active preservation, including seeking professional advice about which species will be best able to survive changes in the site and which trees should be removed from close proximity to the structure; minimizing the number of trenches laid in to the house; protecting both the stem and roots of trees to be saved; and keeping fire and toxins away from desirable trees, homeowners will stand a much smaller chance of losing the very trees they have paid extra for. Such extra effort by builders will increase construction costs. However, as the Amherst study indicates, builders will still recover those costs, and a higher profit besides, from houses on wooded lots.

SUMMARY AND CONCLUSIONS

Atlanta homebuilders' policies on tree removal, and the perceived costs incurred for such removal, were statistically related to both the physical and the economic environment. Larger lot and house sizes, higher tree density, and larger percentages of hardwoods in existing stands on the lot are all factors which cause the costs of tree removal to rise, and encourage builders to preserve trees. The role of the economic environment was shown through the significance of the year of construction--as the housing industry continued to be depressed, prices for construction-related work fell.

The 22 builders in our study perceive the costs for preserving trees to be lower than the costs of clearing the lots, other things being equal. However, builders' decisions about whether to preserve or clear are not equally likely--builders tended to preserve trees more often on lots that were expensive to clear. Thus, their costs for the minimum necessary clearing for foundation and drive often ran higher on lots where trees were preserved than on lots they chose to clear.

During the period of this study, prices for hardwoods were depressed somewhat due to the recession. Therefore the price that a builder could get for the wood on a small lot would not compensate for the increase in price of the property. If, in the future, prices for wood increase substantially while demand for wooded lots decreases, builders could find it more profitable to clear the lot before building. While this may seem unlikely, the possibility that solar power technology may become widely adopted might lead to reduced demand for wooded lots, which would affect the market situation significantly.

The old attitude that land being prepared for home development must first be cleared of existing vegetation is disappearing. In Atlanta and in Athens, builders indicate that wooded lots are desirable, easier to sell, and more profitable, even though they may also be more difficult to work on. Builders must still contend with treeless property when they acquire old fields, and an occasional developer may make the mistake of clearing prior to subdividing, but awareness of the desirability of tree cover seems to be widespread in the Athens and Atlanta homebuilding community.

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John W. Mixon, Director
J. Fred Allen, Chief of Research

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