Urban Forest Research

Fall 2003

Center for Urban Forest Research • Pacific Southwest Research Station • USDA Forest Service

The Large Tree Argument

The case for large trees vs. small trees

Why did we like elm trees so much?

Large stately elm trees once graced many communities throughout the US. But now they are gone. Why were entire communities so disappointed when they lost their elm trees to Dutch elm disease several decades ago?

People had a sense that these large trees were important to them, their family, and their community. And this was long before we quantified the benefits of trees. Now we have scientific evidence for what these people knew decades ago.

Elms planted ca. 1865 lined the plaza in Chico, CA.

Large trees pay us back

We now know that, dollar for dollar, large-stature trees deliver big savings and other benefits we can't ignore. Small-stature trees like crape myrtle deliver far fewer benefits. In fact, our research shows that their benefits are up to eight times less.

Compared to a small-stature tree, a strategically located large-stature tree has a bigger impact on conserving energy, mitigating an urban heat island, and cooling a parking lot. They do more to reduce stormwater run off; extend the life of streets; improve local air, soil and water quality; reduce atmospheric carbon dioxide; provide wildlife habitat; increase property values; enhance the attractiveness of a community; and promote human health and well being. And when we use large-stature trees, the bottom-line benefits are multiplied. When it comes to trees, size really does matter.

Don't forget the established "old guard"

We can't forget the already-established trees. These older trees provide immediate benefits. The

(continued next page)

investment that community leaders made 30, 40, 50 years ago is producing dividends today. Dr. McPherson, Director of the Center for Urban Forest Research, points out that "since up-front costs to establish these trees have already been made, keeping these trees healthy and functional is one of the best investments communities can make."

What large trees mean

More shade = more energy savings

Cleaner air = better health and fewer hospital visits

More stormwater management = lower costs for stormwater controls

More shaded streets = longer time between resurfacing

What do you lose if you don't plant large trees?

Municipal tree programs are dependent on tax-payer supported funding. Therefore, communities must ask themselves, are large trees worth the price to plant and care for? Our research has shown that benefits of large trees far outweigh the costs of for caring for them, sometimes as much as eight to one.

Urban Forest Research **is a publication of the Center for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service. For more information, contact the Center at the Department of Environmental Horticulture, University of California, 1 Shields Ave, Suite 1103, Davis, CA 95616-8587. (530) 752-7636**

Editor: Jim Geiger
Production: Laurie Litman, InfoWright

The big question communities need to ask is: can we afford not to invest in our trees? Are we willing to forego all of these benefits? Or, would we rather make a commitment to provide the best possible care and management of our tree resource and sustain these benefits for future generations.

Costs vs. benefits

In most areas of the country, communities can care for their largest trees for as little as $13 per year, per tree. And, each tree returns an average of $65 in energy savings, cleaner air, better managed stormwater, extended life of streets, and higher property values. Smaller trees do not come close to providing the same magnitude of benefits.

A hypothetical example

A few years ago, the community of Greentree was faced with a budget crisis and decided to save money by downsizing its community forest—planting a majority of small trees in favor of larger ones and even replacing large trees with smaller ones (see below). It made choice X. Unfortunately, this is not an uncommon story in communities today. But the real question is, what did they give up in return, and was downsizing a wise choice?

The big question communities need to ask is: can we afford NOT to invest in our trees?

Large Trees vs. Small Trees

The city of Greentree chose planting scenario X. By year 20 it was already a $60,000 annual mistake (see discussion above).

	CHOICE X		CHOICE Y	
	Avg Ann. Benefit Avg Ann. Cost	# Trees	Total Benefit Total Cost	# Trees	Total Benefit Total Cost
Large Trees	$65.18 $13.72	259	$16,882 $3,553	1693	$110,350 $23,228
Medium Trees	$36.04 $6.87	753	$27,138 $5,173	753	$27,138 $5,173
Small Trees	$17.96 $6.23	1693	$30,406 $10,547	259	$4,652 $1,614
Total Trees		2705		2705	
Total Benefits Total Costs			$74,426 $19,273		$142,140 $30,015
Annual Net Value to Community			**$55,153**		**$112,125**

—adapted from McPherson, E.G.; et. al. 2002. Western Washington and Oregon Community Tree Guide: Benefits, Costs, and Strategic Planting. International Society of Arboriculture, Pacific Northwest Chapter: Silverton, OR. 76p.

The future without large trees

Cities that are using small-stature trees to reduce costs may achieve some short-term savings, but over the long term, they have destined themselves to a future with fewer and fewer benefits as large trees are replaced with smaller ones.

In this case, the city decided that planting 1693 small trees and only 259 large trees would be a good budget-cutting strategy. Over the short term this may save the city a little money. But over the long term they will have decidedly fewer benefits and a decreased quality of life. City elected officials failed to consider what the city would be giving up over the life of those trees.

Will people want to live, work, recreate, do business, and shop in this community? And will the new trees provide all of the benefits that the residents seek—energy conservation, clean air, clean water, attractive surroundings, and enhanced real estate values. The answer is a resounding NO! We modeled the growth of these trees over 40 years. By year 20, the decision-makers had already made nearly a $60,000 dollar annual mistake.

Choice Y is clearly the way to go to maximize their return on budget dollars. The model shows that once the trees are mature the community will receive an annual return on investment of nearly $60,000 over choice X. Plus, the community will look quite different in the future and be a healthier and safer place to live.

Is it possible?

We may never have the arching canopies we once had with the stately elms of a few decades ago. We can still achieve large, functional canopies and reap all the benefits. It will take planting large-stature trees in as many appropriate places as possible while creating the best possible site that maximizes space and allows for adequate exchange of gases and water. And yes, it is possible!

Editor's Note

We recognize that on some restricted sites small-stature trees may be the best choice. However, let's not succumb to the limited space argument so easily. We need to continue to fight for more space for trees in every new project and every retrofit. The bigger the tree, the bigger the benefits and, ultimately, the better our quality of life.

—JRG

—this article is based on our Tree Guide research in the western U.S.

Sign up

NOTE: This newsletter is only available in electronic format

To sign up for *Urban Forest Research,* please visit our website at ***http://cufr.ucdavis.edu/newsletter.asp***

Send comments or suggestions to Jim Geiger, Center for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service, c/o Department of Environmental Horticulture, University of California, 1 Shields Avenue, Suite 1103, Davis, CA 95616-8587 or contact jgeiger@fs.fed.us.

What Are Trees Worth?

The value of tree benefits varies widely, but can be as much as $160 per tree per year for a large ash tree in Southern California. Small trees that never get very large, like the crape myrtle, provide not much more than $15 in benefits on average. In some cases they are a net loss to communities.

Our Center has studied large, medium, and small trees in a number of locations throughout the West and found that, on average, mature large trees deliver an annual net benefit two to six times greater than mature small trees:

Large Tree

- Total benefits/year = $55
- Total costs/year = $18
- Net benefits/year = $37
- Life expectancy = 120 years
- Lifetime benefits = $6,600
- Lifetime costs = $2,160
- Value to community = $4,440

Medium Tree

- Total benefits/year = $33
- Total costs/year = $17
- Net benefits/year = $16
- Life expectancy = 60 years
- Lifetime benefits = $1,980
- Lifetime costs $1,020
- Value to community = $960

Small Tree

- Total benefits/year = $23
- Total costs/year = $14
- Net benefits/year = $9
- Life expectancy = 30 years
- Lifetime benefits = $690
- Lifetime costs $420
- Value to community = $270

—hypothetical case using data for trees at year 30, projected to life expectancy from McPherson, E.G.; et. al. 2003. Northern mountain and prairie community tree guide: benefits, costs and strategic planting. Center for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service. 92p.

Marketing the urban forest: An art of persuasion

James R. Geiger
Hal Voege

Condensed version of paper presented at the 2003 National Urban Forestry Conference in San Antonio, Texas.

Imagine that trees in your community are integral to every planning process, part of every capital improvement project, and given high priority in your community's budget. What elevated trees to this level of importance?

Was your first thought, "We really had a terrific educational program?" Or did you think, "We must have done a great job of marketing the urban forest?"

When trying to make convincing arguments, we typically think of what we want people to know. We tell them what they should do, and why our perspective is correct. Have you ever noticed that this "educational" approach doesn't seem to influence behavior ?

Most people do not make decisions to change behavior on the basis of factual evidence. In fact, psychological and market research has shown just the opposite is true. Most people make decisions based on their perceptions of reality—on what they already believe to be true. When we believe something, we act as if it is true. Our perception of reality colors what we hear, how much we hear, and whether we accept and will act on what we hear.

Historical background

For the better part of 30 years we have "educated" local elected officials and key decision makers. Yet we still see our urban forests in a state of decline—tree budgets continually threatened, fewer trees planted than removed, downsizing of the urban forest, etc.

Why is this still happening? Because we have not changed behavior—ours, as well as that of the people we are trying to influence. It is less a matter of teaching than persuading. Changing our behavior to be more persuasive than educational is an important ingredient in elevating urban forestry to the next level and matching reality to our dream of fully funded urban forests.

It is in the persuasion

When we think we know what someone else believes, we run the risk of speaking to them in terms of our issues rather than theirs… and ultimately not being heard. Success comes in persuading someone to take action, rather than educating them to take action. The latter is futile. With the best of intentions, people think that simply explaining the facts will gain them support. Sadly, this is rarely true.

More important is the way that facts are presented and how they relate to the things that matter to the intended audience. It is a matter of convincing people that the cause of community forests meshes with their cause, their concerns, and their vision for the community.

In order for anyone to take action or change behavior, they have to believe two things about the results: First, they have to believe the outcomes of their actions are desirable, something they want. Second, they have to believe the outcomes are achievable, something they can do. Unless both points are true, nothing happens. There must be a relative advantage, even if it's small, for anyone to do something you want them to do.

Along with embracing the perceived advantage, the target of persuasion must feel comfortable with the new practice. It needs to blend with existing beliefs and traditions. It needs to be communicated in terms the individual grasps. And, it needs to promise results in a timeframe, with enough potential impact, to make the effort seem worthwhile.

Market research process

The question remains: "What words, messages, and images will be persuasive in our campaign to convince our intended audiences to change behavior?" In October 2001, we decided to address this question. We wanted to gain insight into specific audiences, particularly local elected officials that influence planning, care, and funding for urban and community forests. The study goals were to:

1. Develop a list of audiences that have a stake in the welfare of urban and community forests.
2. Understand their perceptions and barriers to participation, particularly for local elected officials, and gain insight to key messages that could be used to gain their awareness and support.
3. Determine outreach strategies to overcome these perceptions and barriers.

We used the focus group process to obtain our data—Fresno (1/29/02), Los Angeles (2/5/02), and Emeryville, California (2/12/02).

Research findings for local elected officials

1. What they may not know or understand:

- the "big picture" or the long-term, monetary, aesthetic, and psychological value of trees in the urban landscape.
- that their support for trees in the urban landscape can create a positive personal legacy.
- how budget cuts impact tree maintenance or urban forest health.
- what actions they can take to maximize the benefits trees offer in their communities.

- the benefits of long-term urban forest plans and standards for their community's overall livability.
- that urban trees play an important part in creating a rich urban environment, and help to transform their community into a desirable place to live, work, do business, attract business, or shop.
- that an initial perception of a community is often based on a feeling about the character of the community, and that trees create this character.

2. Where they are coming from:
- do not give urban forestry high priority and will have to be 'hooked' by the connection of trees to a desired community outcome.
- will ask "What's in it for me?" and more important…
- will want to know "Why should I care?" about this.
- will listen only if they trust the competence of the person making the presentation.
- have a desire to leave a mark on their community, a legacy such as urban beautification, increasing tax revenue, better schools, or a revitalized downtown. Urban forests can be connected to each of them.
- perceive infrastructure damage, waste removal, etc. as negative things about trees. They will have to be shown that proper planning, management, and coordination can minimize their effects.
- see trees in isolation and not in the larger context of an ecosystem. Trees must be presented in the context of the whole city environment.
- do not understand the term "urban forest." It tends to create initial negative impressions, which must be overcome before awareness-raising can take place. 'City Landscape' was a suggested alternative.

3. How they view our actions:
- a dry, detailed technical presentation will not catch their interest. Raising their awareness (reaching their hearts as well as their minds) needs to be the initial goal.
- initial presentation must be short.
- giving elected officials credit for improving the overall livability through community forest projects is a good way to win their support.
- community, voter, and media support can have an immediate impact. Publicizing widespread community support for urban forests might have benefits at several levels.
- tree advocates are often seen as impatient, critical, uninformed, and strongly biased about the ways their community deals with trees. They will continue to suffer from lack of credibility unless they can convey information in terms that are meaningful to elected officials.
- presenting the broader benefits of trees can persuade officials that trees play an important part in improving the overall 'livability' of their community.

To take action or change behavior, people have to believe two things. First, that the outcomes of their actions are desirable. Second, that the outcomes are achievable. Unless both points are true, nothing happens.

4. How they can be reached:
- presenters must be seen as trustworthy.
- presenters must learn something about elected officials' goals and concerns and develop messages that address them. One size will not fit all.
- presentations must include specific actions they can take. Answer the question "What should I be doing?"
- presentations must be graphic. Pictures and charts should be the core. Use words to emphasize major points.
- more than one presentation, in more than one format, through more than one channel, may be required to get messages across.

Market research products

Two products emerged from this research—a handbook and PowerPoint presentation. Both were developed using the results of this research and Everett Rogers' work on the art of persuasion. They can be viewed and downloaded on our website at: http://cufr.ucdavis.edu/mktresearch.html.

Conclusions

We can match reality to our dream of fully funded urban forests. But we will have to change our behavior. We must first learn the art of persuasion before we will be able to change the behavior of local elected officials. Let's stop being guilty of thinking that more education is the answer. The real answer is persuasion. Let's address elected officials' beliefs and gain their commitment to healthy and sustainable urban forests. The quality of life within our communities is at stake.

Again, imagine that trees in your community are integral to every planning process, part of every capital improvement project, and given high priority in your community's budget. What elevated trees to this level of importance?

Answer: "We must have done a great job of marketing the urban forest."

Fact Sheet #7: Making the case for large trees

Large trees need to be "marketed" as maximizing urban benefits:

- Cooling the air
- Shading the paved surfaces
- Improving air and water quality
- Preventing water runoff and soil erosion
- And enhancing residential and commercial value

Even with these well-documented benefits, the challenges for increasing the number of large trees are consistently related to construction and preservation issues, space and persuading the community. Increasing the number of larger trees requires a combination of strategies that address these obstacles.

Construction and preservation obstacles

Consider both the preservation and planting of large trees in planning and design. Preserving large trees during construction:

- Start early in the process.
- Designate which trees need to be preserved. Larger more mature trees (that are in good condition) provide more value and benefits than smaller ornamental trees.
- Advise construction management of project schedules related to season-specific activities such as root pruning, fertilization, and insect control.
- Educate construction crews and the community about their role in preserving trees:
  - Soil compaction
  - Trunk and branch damage
  - Over or under watering
  - Chemical spills
- Pay careful attention to accidental damage, utility activities, or on-site crews that may impact the root system or soil composition.
- Accommodate utility lines near the critical root zone (CRZ), especially for larger trees by:
  - Tunneling under the tree root mat to install utility lines. This does little damage compared to trenching through the roots.
  - Use a pneumatic excavating tool for excavation work that must happen inside the CRZ. This tool can remove soil around tree roots without harming them.
- At the end of construction, plan for additional care as part of a recovery phase including watering, insect and disease control, and pruning.

Finding space

Accommodating larger trees is an ongoing challenge that is complicated by the competing needs for utility lines and impervious surfaces. Here are a few suggestions to address the issue of space during the planning and design phase:

- Recommend planting large-stature trees as part of transportation corridors whenever possible.
- Tree roots generally stay in the upper 18 inches of soil; therefore, ensure that pipes such as gas, electric, communication and water are installed deeper and use the space above for trees.
- A new publication, "Reducing Infrastructure Damage by Tree Roots: a Compendium of Strategies," clearly outlines ways to install large trees in limited space so they coexist in harmony with hardscape. It is available through the Western Chapter ISA at http://www.wcisa.net.

—adapted from work by Charlotte King, president, Snowden & King Marketing Communications

Persuading the Community

You are the tree expert, and the public is looking to you for guidance and best practices that they can rely on for critical decisions related to budgeting, construction, esthetics, and long-term environmental impact. You also have an opportunity to talk with them about selection, preservation, and critical maintenance of trees, and persuade them that the benefits of larger trees far outweigh the costs:

1. Explain the benefits of the larger trees and point out the obstacles. Discuss ways to mitigate these obstacles as described above in terms of construction, preservation, or space.
2. Play an active role in the construction process to limit the damage done to trees, and identify post-construction tree care. Make sure the community understands the ongoing tree care requirements.
3. Increase your "marketing expertise" in leveraging the value of community partners, media recognition, or historic preservation status. A little recognition combined with community education can make a big difference in changing the commitment to including larger trees in community projects.

Find lots of information at our website http://cufr.ucdavis.edu