FINAL REPORT
FOREST SERVICE GRANT NO. WAUF-97-003

Period covered by this report: August 1, 1997 through December 31, 2001

NOTE: Please review the following information and revise/complete as necessary.

Issued to: University of Washington
Address: College of Forest Resources, Box 352100, Seattle, WA 98195-2100

Congressional District Number: 7

Project Name: The View from the Road: Costs and Benefits of Roadside Urban Forests for Business Districts.

Contact Person/Principal Investigator:

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Your Organization's internet home page address: www.cfr.washington.edu
e-cv: www.cfr.washington.edu/~~faculty/wolf~~
Research Outreach: www.cfr.washington.edu/research.envmind/

Date of Award: August 1, 1997

Grant Modifications: Mod. 1: No-cost time extension from June 30, 1999 to March 31, 2000
Mod. 2: No-cost time extension from March 31, 2000 to December 31, 2001

Date of Expiration: December 31, 2001

Funding: Federal Share: $77,749 plus **Grantee Share:** $77,861 = **Total Project:** $155,610

FS Grant Manager: Barbara Hollenbeck, Cooperative Programs
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Please provide an abstract on your project and its results. This abstract will be posted on the NUCFAC internet site. (approximately 200 words or less).

A national survey was conducted to learn more about public preferences and perceptions regarding trees and vegetation in urban freeway roadsides. In response to images depicting a visual array of landscape management treatments, both drivers and business people most preferred settings having tree plantings that screen adjacent commercial land uses. The research also investigated public attitudes about roadside functions, uses and public willingness to support roadside management expenditures. Generally, drivers prefer more trees in urban roadsides. The public values roadsides that provide ecological benefits. Large signs are not preferred. Drivers also attribute more positive characteristics to communities that are greener. Despite favoring more vegetation in the roadside, drivers were neutral in their support of greater fiscal resources for roadside management. Increasingly, transportation agencies are planning and managing urban roadsides to achieve multiple objectives and perform multiple functions. These research results suggest landscape practices that can create visual quality for drivers and provide visibility for commercial properties adjacent to freeway roadsides. Outcomes offer insights on how to more effectively incorporate urban forestry into the planning and management of high-speed urban transportation corridors.

Project objectives:

The goal of this study was to assess the perceived costs and benefits of the urban forest in freeway roadsides and rights-of-way, with attention to the interests of adjacent businesses and commerce. Many studies have documented the multiple benefits and satisfactions of urban vegetation. Most have focused on parks and residential settings, overlooking the importance of the urban forest to transportation systems and private enterprise. In a study on roadside perceptions Schauman and others (1992) found "no body of research ... on the relationships between the driver and the landscape beyond the paved area of the road." This study addressed that void.

Four issues were proposed for investigation:

1) Drivers' attitudes and values regarding the urban forest
   visual preferences - amenity values - patronage behavior - willingness to pay
2) Business owners' knowledge and understanding of the urban forest
   visual preferences — values and attitudes toward trees
3) Assessment of roadside urban forest benefits and satisfactions
   community perceptions (image, identity) - economic vitality - environmental quality
4) Appraisal of alternatives for fiscal support of roadside urban forests
   driver and business willingness-to-pay — attitudes about indirect and direct support of roadside landscape

Objectives met successfully:

Both qualitative and quantitative social science methods were used to assess the above issues in a comprehensive approach. The research was conducted in two phases. Phase I was a qualitative interview process intended to scope out an array of perceived costs and benefits. It was conducted in the Pacific Northwest. Phase II entailed pencil-and-paper surveys (distributed both in the Pacific Northwest region and nationally), using standardized photoquestionnaires constructed from response themes of Phase I and literature review.

Each of the issues listed above was addressed in the research design and data collection. Logistically, specifying and accessing the respondent sample for the study was difficult, but was facilitated by Forest Service staff, state urban and community forestry coordinators and state transportation agencies. A total of 5000 surveys (4000 to licensed drivers, 1000 to business people) were distributed by mail in the Seattle, Minneapolis, Detroit, and Baltimore metropolitan areas.

In both phases established measurement techniques, of proven reliability and validity, were used. Data entry and analysis was conducted according to accepted theory and methods of social science. All procedures were intended to evaluate the practical, specific benefits of trees in roadside settings.

Objectives not met:

All phases of the research procedures have been completed.

Technology transfer of the results has been completed (described later).

Research results are being communicated on an ongoing basis to urban forestry, community development and transportation oriented audiences.

List the major research or policy findings of your project?

Interview and survey responses were analyzed. Highlights of significant results include:

1) trees are associated with better visual quality of freeway roadsides; public preference ratings were consistently higher with increased presence of trees in urban transportation corridors

2) drivers favor roadside management practices that enhance ecological functions and eliminate large signs, yet are ambivalent about committing more fiscal resources to support roadside greening

3) the public judges communities having more landscaping and urban forestry to have greater Consumer Appeal and to have a better Business Environment

4) respondents indicated that they would be willing-to-pay more for products and services in a community that included more trees and landscaping in its planning (10 to 20% higher)

How did the project increase the knowledge we have about urban forestry? How will the public benefit?

Design standards have been developed to enhance visual quality of freeway roadsides and rights-of-way. The standards address issues of traffic safety, aesthetic and ecological issues. Yet in commercial and retail business zones around the United States the recommended treatments are perceived to be inappropriate. "Commercial windows" are created by both sanctioned and illegal vegetation removals. Consequences are not well understood. Are forest benefits sacrificed? These issues are significant to both transportation agencies and businesses throughout the nation.

This study is a first step in understanding the value of roadside urban forests to the general public. It provides an empirical understanding of public values that can be balanced against claims or actions of interest groups that would limit trees in roadsides.

Nationally, millions of dollars are spent each year on landscape and urban forest improvements in freeway roadsides. Literature review has turned up surprisingly little information about driver preferences and perceptions for roadside environments. This project has produced information about urban forestry in roadside settings that is based on public perceptions of value and visual quality. It has generated recommendations for vegetation planning and management practices that meet multiple goals and are cost-effective.

What recommendations might you make for community foresters or others who might benefit from your project?

Across the nation transportation agencies are exploring and adopting the concept of "context sensitive design." Generally, this concept promotes collaboration and partnership with local communities to meet local needs in transportation planning and construction. It varies from past transportation planning practices that tended to override local interests to achieve regional or national standards of engineering and traffic volume.

Community foresters and tree advocacy groups in communities across the United States can use the data from this research to demonstrate the public values of trees in roadsides. Research results can be used to establish the need for trees in urban transportation settings as local communities partner and negotiate with state or regional transportation agencies.

The results also offer insights on how to reach transportation planning and management solutions - compromises that satisfy the values and attitudes of commercial landowners, transportation engineers and the driving public.

Attach copies of reports, publications or videos. If your work has been published (journals, popular press, etc.) provide where they have been published or reported and how copies can be obtained.

See Appendix A

How were your results disseminated to the public?

While the study is based in the Pacific NW, the outcomes have national significance. Multiple products have been developed and distributed to share research outcomes with professionals and communities. Examples of each of the results products can be found in Appendix A.

First, a web site was developed to distribute information about outcomes of this study, as well as prior studies about urban forest benefits and other human dimensions topics in urban forestry. The College of Forest Resources at U of WA supports the site. The link is: www.cfr.washington.edu/research.envmind.

Secondly, a series of fact sheets have been developed to report on social science research in urban forestry to the general public. Four fact sheets about this project were produced, based on the research and partner review. All fact sheets were distributed to research partners, are mailed in response to information requests, are downloadable from the web site as PDF files and are strategically shared with interest groups.

Often, the fact sheets are converted to articles in newsletters and professional publications.

In addition, the project outcomes are being shared at regional, national and international meetings.

Finally, a manuscript has been submitted to the Journal of Arboriculture and is being reviewed.

List the active partners (key individuals or organizations) involved in the project:

The project partners include professionals from urban forestry, urban resources and roadside design organizations and agencies. Partners now representing each of these areas include:

1) Roadside Design - a) Washington State Department of Transportation (WSDOT) design and engineering professionals including Mark Maurer, John Milton, Sally Anderson and Raymond Willard; b) Barb Koth of the Resource Center of the National Scenic Byways Program.

2) Urban Natural Resources - Nancy Keith, Executive Director of the non-profit Mountains to Sound Greenway

3) Urban Forestry - University of Washington, Center for Urban Horticulture; Kevin LeClair of the WA Department of Natural Resources Urban and Community Forestry Program

Photo or Illustration: If possible, please provide a photo or illustration for our use that summarizes or represents the project. Indicate how this illustration should be credited.

See Appendix B for photographs. Credit: Washington State Department of Transportation for base image. Kathleen L. Wolf for digital editing

Images from any of the Fact Sheets are also available in digital format. Credit Kathleen L. Wolf

If a no-cost time extension was granted for this project, why was it needed?

A no-cost extension was requested because of circumstances associated with research results communications and outreach.

Technology transfer products were designed for diverse audiences - transportation and urban forestry professionals, business audiences and the general public. A mail and e-mail campaign announced the results of the studies and availability of the fact sheets. Manuscripts were submitted to various publications. In this way the products of the study were widely distributed.

Based on our experiences with prior outreach campaigns there is great public interest in data on the public perceptions and economic benefits of trees in association with business and commerce. Interest in transportation systems and urban ecology is also on the rise. Once distributed the information trickles out into the media and other organizations report about the research. This "pyramid scheme" involving numerous national partners takes time and an extension allowed us to include the valuation of partners' communications products as cost-share match.

How would you evaluate the grant process? What changes, if any, would you recommend?

The RFP process seems to be an effective way to encourage innovative research and project ideas to surface, followed by more thoughtful development of invited proposals.

Grant administration by the regional USFS offices has been an efficient process.

I have no recommendations for changes.

Comments considered of importance but not covered above:

People want trees at the edge of our nation's freeways! Unfortunately, many of the states' transportation agencies do not have positive policies about trees, reputedly removing them for the sake of driver safety and visibility.

As this project has progressed I have come to learn that there is surprisingly little intersection between the professional realms of urban forestry and transportation systems. While roadside designers have always been interested in the role of trees in roadside function and aesthetic, considerations of urban forestry have not traditionally been a formal part of transportation system planning and design.

This research may be a window of opportunity to involve a significant new partner in America's urban forestry efforts. The research outcomes provide a starting point for discussion about roadside design priorities, including urban forestry.

This report was prepared by:
Name: Kathleen L. Wolf, Ph.D.
Title: Research Assistant Professor
Phone Number: (206) 616-5758 or (206) 780-3619
Date: January 11, 2002

APPENDIX A: PUBLICATIONS, REPORTS AND PRESENTATIONS

Grant No. WAUF-97-003 – Final Report – The View from the Road

Kathleen L. Wolf, Ph.D. – kwolf @ u.washington.edu

TECHNOLOGY TRANSFER FACT SHEETS – copies attached

More than 300 copies of each sheet have been distributed around the U.S. All are available as hard copy from Kathleen Wolf or are downloadable from:

www.cfr.washington.edu/research.envmind

7: Transportation Studies: Social Science Approaches and Contributions
8: The Calming Effect of Green: Roadside Landscape and Driver Stress
9: The Freeway Roadside Environment: Testing Visual Quality at the Road Edge
10: Community Image: Roadside Settings and Public Perceptions

NEWSLETTERS AND PROFESSIONAL PUBLICATIONS – copies attached

Wolf, K. L. 2001. *The View from the Road: The Urban Forest and Our Freeways.* In TreeLink, newsletter of the Washington Department of Natural Resources Community Forestry Program, No. 18, Summer. Available at 1-800-523-TREE

Keith, N. 2000. Trees in Town: Local Researcher Tests Consumer Appeal. In Mountains to Sound, newsletter of the Mountains to Sound Greenway Trust. Available from MTS, 206-382-5565

Wolf, K.L. 2001. Trees in Business Districts: Testing Visual Quality at the Roadside Edge. In Vistas, publication of the National Scenic Byways Program, March.

Wolf, K. L. 1999. The Nature of Driving: Roadsides Have Positive Effects and Benefits. In Ex-Press, publication of the Washington State Department of Transportation, August.

JOURNAL ARTICLES – abstract attached

Manuscript submitted to Journal of Arboriculture, reviewed and resubmitted in January 2002.

CONFERENCE AND MEETING PRESENTATIONS:

2001. *Nature and Commerce: Survey Research Results and Conclusions.* Presented at, A Decade of Progress in Our Community Forests: 10th Annual Pennsylvania Community Forestry Conference. Pennsylvania State University (State College).

2001. *The Ribbon Across the Landscape.* Presented at, America's Byways: Celebrating the Journey. National Scenic Byways Conference. Portland, OR.

2001. *Trees Make Good Cities Better! The Benefits of Green Space in Our Cities and Towns.* Presented at, Citizens and Cities: Conversation, Collaboration, Creativity. Association of Washington Cities Annual Conference. Bellevue, WA.

2001. *Cognitive Kaleidoscopes: Public Perceptions of Urban Nature Functions and Benefits.* Presented at Taking Nature Seriously: Citizens, Science and Environment – sponsored by University of Oregon (Eugene).

2001. *Human Dimensions of Urban Open Spaces: Integrating Research and Action.* Presented at Social Issues and the Environment: A Green Approach to Improving Our Communities. The National Arbor Day Foundation, Nebraska City, Nebraska.

2000. *The View from the Road: Public Perceptions of the Roadside Landscape.* Presented at WA DOT Roadside Conference. Port Orchard, WA.

2000. *The Ribbon Across the Landscape: Public Perception of Freeway Roadside Management.* Presented at Transcending Boundaries: Natural Resource Management from Summit to Sea, the 8th International Symposium on Society and Resource Management. Bellingham, WA.

2000. *Transportation Workshop.* Presented at Georgia's Urban Forest: Our Heritage and Our Future, the Georgia Urban Forest Council annual conference. Savannah, GA.

2000. *Nature and Commerce: The Value of the Urban Forest in Business Districts.* Presented at The Human Element: Discovering the Value of Trees to People in Urban Settings, the Oklahoma Urban and Community Forestry Council annual meeting. Stillwater, OK.

Urban & Community Forestry

A Partnership for Livable Cities & Communities

What is Urban & Community Forestry?

Do you live in a forest?

Chances are, you are among the 80% of all Americans who currently live in some of the most valuable forests in existence, the urban and community forests.

Urban and community forests are dynamic ecosystems which occur when trees, shrubs, grass, wildlife, and streams interact with a populated environment.

The trees in your yard, along your street, beside rivers and streams, in parks and greenspaces, and near the building where you work all help to make up the urban forest.

The management of these trees and related vegetation in neighborhoods, communities, and cities is called Urban and Community Forestry.

Benefits of a Healthy Urban Forest

Properly managed urban forests create livable cities and communities by continuously modifying the urban environment in ways that are beneficial to mental and physical health.

Urban forests perform millions of dollars in services annually, some of which include:

- aiding in salmon recovery by shading and cooling streams and filtering contamination;
- increasing economic stability by attracting businesses and customers to communities;
- saving energy costs by reducing cooling and heating needs;
- enhancing tourism by adding beauty and softening the harsh lines of urban environments;
- reducing storm water run-off and erosion management costs by intercepting, storing, and using rainfall; and
- providing habitat for many species of birds, fish, and mammals—large and small.

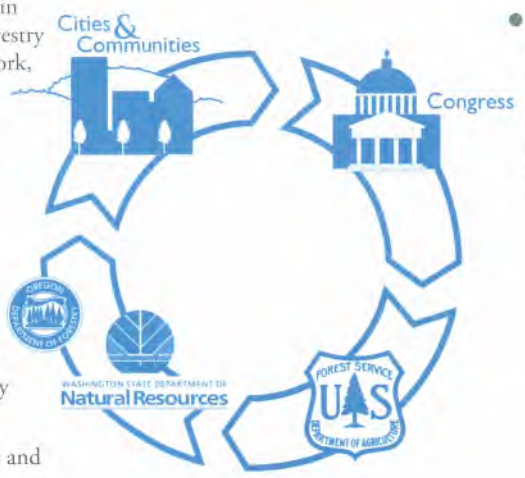
Partners for Green Communities

Volunteers, neighborhoods, cities, states, the USDA Forest Service, and Congress come together to create greener, more livable communities.

Congressional authorization enables the Forest Service to support states with the financial and technical assistance necessary to promote urban and community forestry programs.

This authorization, along with expertise in ecosystem management and restoration, makes the Forest Service one of the vital links in the urban and community forestry network. Through this network, the Forest Service:

- provides national leadership, strategies, and coordination among agencies and other national groups;
- assists states in developing community forestry management programs;
- delivers federal funds to state urban and community forestry programs;
- funds urban forestry research; and
- communicates research, technology, and state financial needs to Congress.



The Forest Service & State Partnership

The urban and community forestry programs of the Washington Department of Natural Resources and the Oregon Department of Forestry provide technical, financial, and program management assistance to cities, communities, public agencies, and volunteer and non-profit organizations for the Forest Service.

The Forest Service and your state's natural resource and forestry agencies cooperate to produce urban and community forestry programs that:

- restore and maintain your community's forest ecosystem;
- help you understand the importance of community forest resources;
- increase the success of local, state, and private sector programs;
- encourage volunteer participation in efforts to manage and protect natural resources in communities; and
- analyze and distribute scientific information about trees and natural resources.

Through this collaborative federal-state effort, the goals of a healthy and beneficial urban forest become a reality.

The Role of the States

The Oregon and Washington urban and community forestry programs provide leadership and a state-wide linkage for local urban forestry efforts. State urban foresters inform residents of the contributions urban forests make to their community's quality of life and economic well-being.

Grant Programs

Grants are provided on an annual basis to partially fund activities such as educational programs, tree inventories, planning, program development, and more.

Technical & Educational Assistance

Advice is available on a full range of sustainable urban forestry aspects, including the development of management plans, natural resource assessments, tree ordinances, volunteer projects, tree inventories, and tree protection.

Tree City USA

Tree City USA is a recognition given to cities and communities when they establish the basic foundation of a self-sustaining urban forestry program. The Tree City USA designation is awarded by State urban and community forestry coordinators.

Six ways to Get Involved

1. Inquire locally! Check with your local City Hall — find out who deals with local tree issues and get involved.
2. Attend your local tree board or tree commission meetings and express your interests!
3. Organize tree plantings or other urban forestry activities in your neighborhood.
4. Contact your State urban and community forestry program offices for information — increase your knowledge!
5. Join and participate on your State urban and community forestry council!
6. Support urban forestry programs through person-to-person conversations, volunteering, media coverage — even thank-you letters to decision makers can make a difference.

Congress, the USDA Forest Service, and your State urban and community forestry programs are working to create more enjoyable, livable communities for you, your children, and future generations. Your involvement and participation is vital to the success of this effort.

To Get Involved Contact

Oregon Department of Forestry
Urban and Community Forestry
2600 State Street
Salem, OR 97310
www.odf.state.or.us/fa/UF/uf.htm
503.945.7391

Washington State Department of Natural Resources
Urban and Community Forestry
1111 Washington Street SE
P.O. Box 47037
Olympia, WA 98504-7037
www.wa.gov/dnr/htdocs/rp/urban/urban.htm
1.800.523.TREE

USDA Forest Service
Pacific Northwest Region
Urban and Community Forestry
333 SW First Ave.
P.O. Box 3623
Portland, OR 97208-3623
www.fs.fed/us/r6/coop
503.808.2351

R6-CP-UP-01-99

RECYCLED & RECYCLABLE PAPER

WAUF - 97-003

featuring research on peoples' perceptions and behaviors regarding nature in cities

human dimensions of Urban & Community Forestry

Center for Urban Horticulture, College of Forest Resources, University of Washington

~~~ Social scientists have been investigating how people respond to and interact with nature in cities for decades ~~ Our behavior, values and quality of life are all influenced by urban outdoor environments ~~ In addition, effective management of urban natural resources depends on understanding the values and perceptions that people have regarding the natural world ~~~

Table of contents linked to reviews of prior studies and current research regarding the human dimensions of urban nature

Fact Sheets and text links

presentations

for more information contact:
kwolf@u.washington.edu

web site supported by:
USDA Forest Service
National Urban and Community Forestry Advisory Council
College of Forest Resources, University of Washington

updated August 2001
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Hello, Suzy, Here is the package I'm sending out to study participants who wished to find out the results. Includes final versions of fact sheets. New web site is also up!
Kathy

CENTER for URBAN HORTICULTURE
University of Washington, College of Forest Resources

September 2000

Hello,

Trees and scenic roads - they seem to go hand-in-hand. Some time ago you completed a survey that was part of a research project intended to learn more about the role of landscaping and trees along freeway roadsides in cities. We're sharing the results with you, since you requested a final report.

Businesses and residents were surveyed in four metro areas of the United States - Seattle, Baltimore, Detroit and Minneapolis. Study participants were asked a series of questions about their opinions and attitudes regarding different landscape treatments of freeway edges in semi-urban areas. Comparisons of responses were made between business people and consumers.

Enclosed are four fact sheets that explain the research outcomes and describe related studies. Fact Sheet 7 outlines contributions that social science can make to transportation planning. Number 8 describes research on roadside landscape and driving stress.

Fact Sheet 9 reports the preference results of the survey you completed. Not surprisingly, as the amount of vegetation increases in the roadside judgments of visual quality also rise. A key question of the study was how to balance visibility of commercial properties with the values of vegetation in the roadside. The results suggest that a blend of green and commercial can best serve all public interests.

Finally, Fact Sheet 10 describes a companion study, conducted in Washington State, to evaluate how the urban forest can contribute to the image of a community.

We appreciate the time you took to share your thoughts and ideas with us! The study results will influence future planning and management of trees and roadsides in American cities.

Please contact us if you have questions or comments - phone: (206) 616-5758, or e-mail: kwolf@u.washington.edu. Results are also on the internet: http://www.cfr.washington.edu/enviro-mind

Thanks again!

Kathleen L. Wolf, Ph. D.
Project Director

Center for Urban Horticulture, Box 354115, University of Washington, Seattle 98195-4115
(206) 616-5758; FAX (206) 685-2692; email kwolf@u.washington.edu

CENTER for URBAN HORTICULTURE
University of Washington, College of Forest Resources

HUMAN DIMENSIONS OF THE URBAN FOREST

FACT SHEET # 7

Transportation Studies: Social Science Approaches and Contributions

Historically, the study of transportation has been the domain of engineers, who are primarily concerned with the physical design and construction of transportation systems. They have been joined by the legal and economic professions, which address such issues as the pricing and regulation of transportation services. More recently social scientists - sociologists, geographers, psychologists and marketing specialists - have begun to examine transportation topics. Transportation issues span many aspects of contemporary life, including land use, employment, pollution, economic vitality and overall quality of life. As transportation issues become more complex, social scientists help us to understand which options and strategies are compatible with individuals, neighborhoods and entire communities.

Problem-Solving Research

Many state and local highway systems are being used at full capacity. New, innovative approaches are needed to solve traffic congestion problems. Social science studies have contributed to transportation planning in the past, and can suggest useful strategies for the future.

ATTITUDES AND BEHAVIOR— Surveys or observations of drivers attitudes and behavior reveal drivers' travel practices, travel demand and willingness to accept alternatives. Behavior-change principles have been used to encourage more use of public transit to relieve traffic congestion and reduce energy use.

HUMAN FACTORS — Design of physical systems includes human factors analysis, which concentrates on person-machine interaction, and relationships of body to space, including vehicle layout and accessibility. Psychologists explore how signage, lane striping and auto interior layout can ease driver decision-making, reducing risks while driving. This, in turn, can relieve traffic congestion as drivers are less likely to be involved in accidents.

INFORMATION PROCESSING — Emerging geographic location and information technologies are being built into vehicles. Such information tools will make route and destination decisions subject to road and traffic conditions. Cognitive psychologists are interested in how well drivers are able to acknowledge, process and respond to rapidly changing navigation information.

SOCIAL IMPACT ASSESSMENT — Siting of new transportation systems, such as roads or rail lines, can have adverse effects on homes, neighborhoods, and businesses. Displacement and relocation of land uses for new transportation routes can cause psychological and sociological consequences. Social science analyses can suggest routes and procedures to minimize impacts.

Visual Quality and the Roadside - One focus area of transportation social science is roadside visual quality. Federal transportation agencies have developed methods for evaluating roadside scenery, though most applications are in rural or wildland areas. Meanwhile, there are more than

836 thousand miles of urban roads in America's cities (I 997, FHA). Given the ever-increasing amount of time that drivers spend on urban roads, more social science research can help to determine the links between roadside visual quality and driving behavior. Several studies are able to tell us what drivers prefer and perceive in the roadside environment.

ROADSIDE IMPRESSIONS — Public opinion about a scenic corridor in California is an example of how social science can be used in highway planning. People judged simulations of proposed roadside residential development for scenic quality. Not surprisingly, people notice increases in built structures in their judgments of roadsides. Values were expressed for the changes. "Cluttered" and "ugly" were terms drivers used to describe roadside development. In contrast, the terms "pleasant" and "beautiful" were descriptions of highway corridors having mostly vegetation.

VISUAL QUALITY AND ROUTE CHOICE

Another study tested route choices made by people for shopping trips to a nearby shopping center. Two parallel roads provided access to the shopping destination - one was a scenic Parkway route, another a faster and nonscenic Expressway route. Despite the Parkway route taking more time and having more stops, study participants chose the scenic route over the faster route more than half the time. Drivers reported feelings of relaxation and enjoyed views of nature on the Parkway route. This study suggests positive affects of naturalistic roadways on drivers. The research indicates one strategy for traffic routing in transportation planning.

ROADSIDE COMPLEXITY —A number of studies suggest that complexity in a scene, often expressed as visual clutter, degrades visual quality. Complexity in scenes - created by roadside objects, building density, utility poles, overhead wires and signage - is associated with greater negative response to scenes. Billboards, in particular, are detrimental to visual quality. Research shows that as the density of billboards increases within a section of road there is a corresponding decrease in public opinion of visual quality.

REFERENCES AND RESOURCES

Altman, I., J. F. Wohlwill, & P. B. Everett. 1981. Transportation and Behavior. New York: Plenum Press.

Evans, G. W. & K. W. Wood. 1980. Assessment of Environmental Aesthetics in Scenic Highway Corridors. *Environment and Behavior*, 12, 2, 255-273.

Parsons, R., L. G. Tassinary, R. S. Ulrich, M. R. Hebl & M. Grossman-Alexander. 1998. The View from the Road: Implications for Stress Recovery and Immunization. *Journal of Environmental Psychology*, 18, 113-140.

Schaumann, S., J. Heerwagen, A. Vernez-Moudon, B. Witherspoon, S. James & J. Mundee. 1992. *Visual Perception of the Roadway and Roadside Elements by the Observer in Motion.* Washington State Department of Transportation, Olympia WA.

For more information, contact...
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CENTER for URBAN HORTICULTURE
University of Washington, College of Forest Resources
HUMAN DIMENSIONS OF THE URBAN FOREST
FACT SHEET #8

The Calming Effect of Green: Roadside Landscape and Driver Stress

Americans spend more time in their cars each year. In recent decades each American's average miles of yearly travel, number of trips and mileage per trip have increased 60 to 85 percent.

As we spend more time on the road and face more traffic congestion each year, driving stress becomes a public health issue.

Scientists have studied how human bodies and minds cope with stressful situations, including driving conditions. Can the driving environment mitigate the factors that cause stress?

Professional wisdom and folklore have long endorsed the idea that experiences of nature contribute to our well-being. Recent research confirms that the roadside landscape can positively affect some dimensions of stress response.

Stress and Driving

GENERAL STRESS RESPONSE -"Fight or flight" is our coping response to high threat stressors. Other low-level, constant stressors (such as crowding or work pressures) trigger less perceptible responses. Physiologically, we respond to both types of stressors on many levels - cardiovascular, skeletomuscular, and neuroendocrine - mobilizing the body and mind to deal with a demanding situation. Mobilization uses our body's energy and resources, leading to fatigue if the stress is a long-term influence. Psychologically, stress causes feelings of fear, anger, or sadness. Psychological and physiological stress response can, in turn, trigger negative behavior. Studies show that stress aftereffects include greater substance abuse, decline in frustration tolerance, and lower ability to perfom work-related tasks.

DRIVING STRESS - The degree of stress response while driving depends on road and traffic conditions. Changes in mind and body are documented for all driving experiences. For instance, heart rate variability and blood pressure all increase when a person is driving compared to non-activity situations. Demanding driving conditions, such as on-ramps, off-ramps and roundabouts, tend to increase stress response.

COMMUTING EFFECTS — Commuting may be one of the most stressful experiences of urban life. Increased blood pressure is associated with longer or more difficult commutes. Lowered job satisfaction, higher illness rates, absenteeism and lower performance on various cognitive tasks have also been found to be related to longer or more difficult commutes.

Natural Environment Benefits

STRESS CAUSING ENVIRONMENTS — Research has often focused on environment as the source of stress. Environmental stressors (community noise, air pollution) are an ever-present reality of urban life. In addition, specific environments (e.g. urban highways) demand our attention and reaction.

NATURE AND STRESS REDUCTION — Might certain environments mitigate or alleviate stress response? Studies prove that contact with natural settings can aid in stress recovery and restoration of mental performance in many situations. Positive changes in both physiological and psychological function have been demonstrated in people when nature is used as a stress antidote. Studies confirm that experiences of nearby nature, such as brief contact with a small garden or a stroll in a park, produce beneficial affects.

In addition, views and contact with outdoor environments have helped people to heal faster in hospitals, do more productive work, be less violent during domestic conflict and recover better from life-threatening illness. There also seems to be an "immunization effect" - prior contact with a natural setting diminishes stress response as one enters a stressful situation.

THE ROADSIDE AND STRESS REDUCTION

While the stresses of driving and commuting are documented, surprisingly few studies have looked at what sorts of mitigating factors in the driving environment might ease stress response.

In one recent study a team of social scientists at Texas A&M University (Parsons et al.) conducted an extensive study of the effects of roadside character on stress response. Using physiological stress indicators such as heart rate, blood pressure and skin conductance the investigators discovered several response patterns.

First, drivers' viewing of built-up, strip mall style roadside environments both slowed down and impeded recovery from stressful situations.

Study participants exposed to roadside nature scenes (forests or golf courses) returned to "normal" baseline measures faster and had a greater ability to cope with introduced stressors.

The "immunization effect" was confirmed. Exposure to a natural roadside setting decreased the magnitude of response to a later stressful task. This suggests that an "inoculation" of nature experience enhances a driver's ability to cope with the demands of driving.

Views of nature may be an antidote to stressful driving situations.

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AUGUST 2000

CENTER for URBAN HORTICULTURE
University of Washington, College of Forest Resources
HUMAN DIMENSIONS OF THE URBAN FOREST
FACT SHEET # 9

The Freeway Roadside Environment: TestingVisual Quality at the Road Edge

Scenic highways and byways are prized segments of the American highway system. Transportation planners preserve and conserve scenic corridors, primarily in rural areas and countrysides. Yet Americans travel about about 2.3 billion miles per day on urban freeways and highways (I 998, FHA). The quality and character of freeway roadsides in cities may have significant affects on our driving behavior, and can also impact our quality of life.

What is the preferred view from the road? A University of Washington study provides scientific insights about what visual environments people value as they travel urban highways. Why is this information important? Many urban freeways have become commercial corridors. Research outcomes can help us develop roadside design practices that meet the needs of both the business community and freeway users while managing a public resource.

Public Preferences

Measuring preference is a way to evaluate the public value of a natural resource. We are not always conscious of our response to visual input. People respond physiologically to visual information that they encounter for less than 0.3 seconds. Therefore, understanding driver preferences can help us isolate elements of roadside views that may be important to driver aesthetics, and influence driver performance and safety.

PREFERENCE STUDY — Six base images were digitally edited to show freeway roadsides with different amounts and arrangements of vegetation. 400 drivers and I 15 business people completed surveys and rated each of the images for how much they liked the roadside scenes (scale of I =not at all to 5=very much).

LOW AND HIGH RATINGS — Ratings were averaged for each of the 36 scenes. Scenes with the lowest and highest mean ratings differ significantly in visual content. While both depict commercial corridors, trees effectively screen views of buildings and products from drivers in the highest rated scenes. A three point preference difference (on a scale of 5) indicates how much trees and reduced views of built settings contribute to public perceptions of roadside visual quality.

Highest rated scene
Mean 4.54

Lowest rated scene
Mean 1.43

Category A:
Harsh Edge
Driver Mean: 1.53
Business Mean: 1.67

Category B:
Prominent Buildings
Driver Mean: 1.74
Business Mean: 1.80

Category C:
Ornamental Frame
Driver Mean: 2.78
Business Mean: 2.96
(t-test, sig p<.05)

Category D:
Tree Buffer
Driver Mean: 2.87
Business Mean: 2.95

Category E:
Tree Screen
Driver Mean: 3.87
Business Mean: 3.85

Roadside Perceptions

Image ratings were also analyzed to reveal the clusters or categories of scenes that people respond to in similar ways. Five visual categories were identified.

MEAN RATINGS — Generally, preference ratings for categories increase with the presence of vegetation in the roadside setting. Categories A and B were rated the lowest. In these, adjacent commercial land uses are fully visible. Categories C and D were rated similarly, at about the middle of the scale. In C and D vegetation interrupts the visual prominence of urban build-up and frames the views beyond the road. Category E, rated highest by far, depicts scenes with background buildings that are screened by trees, though one can still see glimpses of commercial settings beyond. While the presence of plants boosts preference, their configuration or composition in the roadside setting also appears to be important. Roadside viewers are sensitive to the relative balance of natural content to built content-preferring a blended arrangement of plants and buildings.

COMPARING DRIVERS AND BUSINESS — Business owners often pay premium real estate prices for highly visible land adjacent to high volume roadways. In this study business people and drivers varied little in their judgments of visual quality. The only significant difference in ratings between the two groups was for Category C. Freeway frontage owners should consider how to incorporate these shared preferences into the roadside presentation of their businesses.

Roadside Planning & Design

People value trees and other vegetation in the roadside environment! Drivers react negatively when roadside vegetation is completely removed to enhance visibility of adjacent businesses. The results of this study suggest other approaches are preferred by the public. First, well maintained vegetation can serve as a green "frame" to momentarily focus the driver's eye on roadside commerce. Also, driving is a demanding activity, requiring that drivers respond to large quantities of information. Carefully presenting businesses and their products using vegetation frames may help drivers to more easily distinguish individual businesses within an unceasing stream of complex roadside information.

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AUGUST 2000

Community Image: Roadside Settings and Public Perceptions

Social scientists often study the relationship of people to place. The form and character of a place can shape the moods, attitudes and responses of the people who spend time in them. More recently communities have begun to consider the effect of character of place on both residents and visitors. Business communities, in particular, take an interest in the image that their community projects to consumers.

Community 1 - Little planning for landscape or green space has occurred

We all rely on environmental cues to inform our judgments about new situations or people. We attribute certain characteristics to places based on impressions. A pilot study, conducted at the University of Washington, was an attempt to test the judgments that people make about an unfamiliar place based on its appearance from a freeway or highway.

While driving, people consider where to stop, shop, or return to explore later. Does the view from the road influence these decisions? This research offers preliminary answers to this question, and offers suggestions for both transportation and community planning.

What can the view from the road tell us about a community?

Community 2 - Planning for quality landscape and green space has occurred

A mail survey of licensed drivers in Washington State was used to evaluate the perceptions of place that people may associate with roadside landscape. As people drive from place to place, a freeway or highway roadside is the first introduction to a community that many people experience. Can the amount of green space and vegetation along the road and in a community influence what people think of that place? While study results should be considered preliminary, they do suggest that visual character influences the image of a community. Research outcomes are below:

Consumer Appeal

Each survey participant viewed one of two comm unity settings and rated how much they agreed with a series of statements about the consumer en vironment of the place. The statements contained information about merchants, products and ser vices. Statistical analysis produced three categories based on response patterns:

Business Quality
Appealing Character
Shopping Convenience

Furthermore, mean ratings on each category differed significantly ($p<.00$ I), with the commu nity images containing more green space having higher values. Ratings of Appealing Character were 50% higher for the more landscaped setting. Potential consumers pr obably infer other characteristics of a comm unity based on visual cues. Ratings of both Business Quality and Shopping Convenience were 13-20% higher in the comm unity having more green space and vegetation.

Business Environment

Those surveyed were also asked how much they agreed with a list of statements about how businesses inter-acted with the comm unity in the two settings. Two statistical categories were identified:

Civic Commerce
Community Health

Civic Commerce included statements such as "merchants care about the comm unity" and "public and private organizations work together:' Higher levels of agreement for this category was associated with the green setting. Issues of **Community Health** (e.g. financial condition, crime rate) were also judged to be better in the greener comm unity.

Pricing Patterns

Contingent valuation is a method economists use to value things that can not be bought and sold on the market. In this study people w ere asked to specify what they would pay for a collection of g oods and ser vices. Resulting pricing patterns are indirect indicators of the value of gr een space to communities. Do trees influence how much people are willing to pay for goods? The answer from this study is "yes!" For all 8 listed items, higher stated prices were given for goods in the green community. For instance ,sports shoes were priced 7% higher in the green setting, while a sit-down dinner or a fl ower bouquet were assigned 10% higher prices. Green makes a difference! The presence of tr ees and green space may positively influence both consumers' attitudes about the character of a place and the prices that shoppers are willing to pay as they shop there.

Acknowledgements:
RESEARCH FUNDING: National Urban and Community Forestry Advisory Council, USDA Forest Service and the Washington State Department of Transportation
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WASHINGTON STATE DEPARTMENT OF
Natural Resources

TreeLink

DNR COMMUNITY FORESTRY PROGRAM ✦ NUMBER 18 ✦ SUMMER 2001

The View from the Road

The Urban Forest and Our Freeways

By Kathleen L. Wolf, Ph.D.
Center for Urban Horticulture
College of Forest Resources
University of Washington

Every year Americans spend more time in their cars. In recent decades, trips and mileage have increased by up to 85 percent. Today Americans travel 2.3 billion miles daily on urban freeways and highways.

They pass slices of landscape — called freeway roadsides — which are valuable land resources beyond the white lines.

This issue of TreeLink examines the peace of mind and other benefits that these roadsides and rest areas — 97,500 acres in Washington alone — offer stressed motorists.

Transportation Systems — Quantity and Quality

Historically, the study of transportation has been the domain of engineers, who are primarily concerned with the physical design and construction of transportation systems. They have been joined by the legal and economic professions, which address issues such as the pricing and regulation of transportation services. More recently social scientists—sociologists, geographers, psychologists and marketing specialists—have examined transportation topics.

Transportation issues span many aspects of contemporary life, including land use, employment, pollution, economic vitality and the overall quality of life. The quality and character of freeway roadsides may have significant effects on driving behavior and also can impact other aspects of daily life. As transportation issues become more complex, social scientists are discovering options and strategies that are compatible with individuals, neighborhoods and entire communities.

The Roadside and Driver Stress

Social sciences can contribute to a better understanding of driving and stress. Many state and local highway systems are being used

at full capacity. As Americans spend more time on the road and face greater traffic congestion each year, driving stress becomes a public health issue.

Scientists have studied how human bodies and minds cope with stressful situations, including driving conditions. "Fight or flight" is our coping response to high threat stressors. Other low-level, constant stressors (such as crowding or work pressures) trigger less perceptible responses. Physiologically, people respond to stress on many levels—cardiovascular, skeletomuscular and neuroendocrine-mobilizing the body and mind to deal with demanding situations. This mobilization of the body and mind's resources can lead to fatigue if the stress is long-term. Psychologically, stress causes feelings of fear, anger or sadness.

Psychological and physiological stress responses can trigger negative behavior. Studies show that stress aftereffects include substance abuse, decline in frustration tolerance and lower ability to perform work-related tasks.

The degree of stress response while driving depends on road and traffic conditions. Changes in mind and body are documented for all driving experiences. For instance, heart rate variability and blood pressure increase when a person is driving when compared to non-activity situations. Demanding driving conditions, such as on-ramps, off-ramps and roundabouts, tend to increase stress response. Commuting may be one of the most stressful experiences of urban life. Increased blood pressure is associated with longer or more difficult commutes. Lowered job satisfaction, higher illness rates, absenteeism and lower performance on various cognitive tasks also are related to longer or more difficult commutes.

While the stresses of driving and commuting are documented, surprisingly few studies have studied the effectiveness of mitigating factors in the driving environment for easing stress response.

One recent study by a team of social scientists at Texas A&M University (Parsons, et al.), found the effects of roadside character on stress response. Using physiological stress indicators such as heart rate, blood pressure and skin conductance, the investigators discovered several response patterns.

Drivers viewing built-up, strip mall style roadside environments were slower to recover from stressful situations.

Study participants who were exposed to roadside nature scenes (forests or golf courses) returned to "normal" baseline measures faster with a greater ability to cope with other introduced stressors.

An "immunization effect" was confirmed. Exposure to a natural roadside setting decreased the magnitude of response to a later stressful task. This suggests that an "inoculation" of nature enhances a driver's ability to cope with the demands of driving.

Can the driving environment mitigate stress? Professional wisdom and folklore have long endorsed the idea that experiences of nature contribute to well-being. Recent research confirms that the roadside landscape positively affects some dimensions of stress response.

Visual Quality and the Roadside

"Roadside visual quality" is another focus area of transportation social science. Federal transportation agencies have developed methods for evaluating roadside scenery, though most

applications are in rural or wildland areas. Meanwhile, there are more than 836,000 miles of American urban roads (1997, FHA). Since drivers spend an ever-increasing amount of time on urban roads, sights and responses are important.

A University of Washington study quantified preferences for visual highway environments. This is important because many urban freeways are commercial corridors. Research can indicate successful roadside design practices for both the business community and freeway users while managing public land resources.

One study suggests that an "inoculation" of nature enhances a driver's ability to cope with the demands of driving.

Public Preferences and the Roadside Urban Forest

Six base images were digitally edited to show freeway roadsides with different levels and arrangements of vegetation. The survey was completed by 400 drivers and 115 business people who rated each roadside image.

Roadside Preferences: An average rating was calculated for all 36 scenes. Scenes with the lowest and highest mean ratings (Figures 1, 2) differ significantly (see top right photos). While both depict commercial corridors, trees effectively screen views of buildings and products in the highest-rated scenes. A three-point preference difference (on a scale of 5) indicates how much trees and reduced views of buildings improve perceptions of roadside quality.

Roadside Perceptions: Image ratings also were analyzed for the clusters or categories which elicit common responses. Five visual categories were identified (see photos above).

Generally, preference ratings for categories increase with the presence of vegetation in the roadside setting. Categories "A" and "B"—the lowest—showed adjacent commercial land uses. Categories "C" and "D"—also rated low—showed vegetation interrupting the visual prominence of urban areas and framing views beyond the road. Category "E"—rated highest—depicts scenes with background buildings screened by trees, with only distant glimpses of commercial settings. Roadside viewers are sensitive to the relative balance of natural and built content—preferring blended arrangements of plants and buildings.

Comparing Business and Public

Business owners often pay premium real estate prices for highly visible land adjacent to high volume roadways. In this study business people and drivers varied little in their judgments of visual quality. Freeway frontage owners should consider incorporating these shared preferences into their businesses. Strategically placed trees and vegetation may draw attention to signs or products, without creating dangerous visual distractions.

What can the view from the road tell us about a community? COMMUNITY 1 (below left): Little planning for landscape or green space. COMMUNITY 2 (below right): Planning for quality landscape and green space has occurred.

The Roadside Forest and Community Image

Freeway or highway roadsides are often the introductions to communities. Drivers consider places to stop, shop or return. Does the view from the road influence these decisions?

Environmental cues help form judgments about new situations or people. Certain visual characteristics create impressions about places. Another University of Washington study attempted to test the judgments that people make about unfamiliar places based on freeway or highway appearances.

Social scientists often study the relationships of people to places. The form and character of a place can shape moods, attitudes, and responses of residents. Recently communities are considering the effects of character of place on residents and visitors. Business communities, in particular, take an interest in the image that the community projects to consumers.

A mail survey of licensed drivers in Washington State evaluated the perceptions of place that people sometimes associate with roadside landscape. Study participants viewed one of two community settings (see bottom large photos in previous pages) and rated a series of statements about the place.

Consumer Appeal: One set of statements contained information about merchants, products and services. Based on statistical analysis, three categories of response patterns arose:

- Business Quality
- Appealing Character
- Shopping Convenience

Furthermore, mean ratings on each category differed significantly ($p<.001$), with the community images containing more green space having higher values. Ratings of Appealing Character were 50% higher for the more landscaped setting. Potential consumers probably infer other characteristics of a community based on visual cues. Ratings of both Business Quality and Shopping Convenience were 13-20% higher in the communities with more green space and vegetation.

Business Environment: They were also asked to rate a list of statements about business' interaction in the simulated setting. Two statistical categories were identified:

- Civic Commerce
- Community Health

"Civic Commerce" included statements, such as "merchants care about the community" and "public and private organizations work together." Higher levels of agreement for this category were associated with the green setting. Issues of "Community Health" (such as economic condition and crime rate) were also rated higher in the greener community.

Product Pricing: Contingent valuation is also used by economists to value things that cannot be bought and sold. In this study, people were asked to specify what they would pay for a collection of goods and services. Resulting pricing patterns are indirect indicators of green space value to communities. Do trees influence how much people are willing to pay for goods? The answer from this study is "yes!" For the eight listed items, higher prices were given for goods in the green community. For instance, sports shoes were priced 7% higher in the green setting, while sit-down dinners or floral bouquets were assigned 10% higher prices.

Urban Forestry Research and Roadside Management

People value trees and other vegetation along roads. Drivers react negatively when roadsides are stripped of vegetation. This study suggests that the public prefers other approaches.

First, well-maintained vegetation can serve as a green "frame" to focus the driver's eye on roadside commerce. Also, drivers are exposed to large amounts of information. Carefully framing businesses and their products with vegetation may help drivers distinguish individual businesses within a stream of complex roadside information.

Finally, communities shouldn't ignore the messages or cues from trees. A community forest that greets potential visitors will provide many benefits. Trees and green space may positively influence both consumers' attitudes about a place's character and the prices that shoppers are willing to pay. Green makes a difference!

Acknowledgements

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Washington Community Forestry Council

The Washington Community Forestry Council was organized by the Washington State Department of Natural Resources (DNR) in 1991. Its goal is to provide leadership and vision to help citizens preserve, plant and maintain community trees and forests. The Council consists of a general membership and an Executive Advisory Committee to the State Forester. Join by calling **1-800-523-TREE.**

"TreeLink" is a quarterly publication of the DNR Community Forestry Program. The program's purpose is to educate citizens and decision-makers about the economic, environmental, psychological and aesthetic benefits of trees and to assist local governments, citizen groups and volunteers in planting and sustaining healthy trees and vegetation wherever people live and work in Washington State.

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WASHINGTON STATE DEPARTMENT OF
Natural Resources

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MOUNTAINS TO Sound

Volume 7, Number 4 November, 2000

This streetscape, with no vegetation, was ranked lowest in a national survey of visitors and business owners.

Visitors and business owners ranked this streetscape highest.

Photos courtesy of Kathy Wolf

Do business people and shoppers share an appreciation for trees? This was one of several questions in a recent national survey about the urban forest in business districts. See story on page 3.

TREES IN TOWN:

Local Researcher Tests Consumer Appeal

People seem more interested in shopping in commercial districts having trees and vegetation than in districts without those elements. What's more, they say they infer greater quality and value in business districts with greenscape and are willing to pay an average of 11% more for goods and services.

These preferences emerge from studies conducted by University of Washington researcher, Dr. Kathy Wolf. "We've used visual preference surveys to tap into people's reactions to various environments," she explains. She surveyed business people and consumers in eight business districts around the United States.

Trees and Bushes Score Highest

Each person surveyed is asked to rate 32 different photo scenes that show retail settings with different amounts and quality of vegetation. How much did they like the scene? In a separate study, they were asked to rate each place for amenities and comforts. Would they travel farther and spend more time in some districts than in others? What would they expect things to cost in the various districts? The districts with trees and significant landscaping scored higher on almost all preferences responses.

People said they would be willing to pay more for parking in a well-landscaped business district. "This suggests to me that greater revenues from shaded parking would offset the costs of parking space loss, a frequent objection to trees by merchants," Wolf says. Amenity and Comfort ratings were about 80% higher for a tree-lined sidewalk compared to a non-shaded street.

Costs for Businesses

Both business and customer survey groups gave higher ratings to scenes with trees, but customers consistently rated scenes with trees higher than business owners. "There are costs for business owners," Wolf says, "and those are very important in a competitive retail environment. Businesses may not want trees to block the visibility of their store, they may be concerned about trees damaging the sidewalks or trees taking up space for parking and, of course, flowers, twigs and leaves require constant clean-up."

In another study of business owners, Wolf found a number of people who think trees are good for business. "Plantings and landscaping draw a lot of people," according to a retail mall manager. "The benefits are huge," said a realtor.

Wolf also reports other studies on the role of trees and landscaping in patronage and land values. "Weyerhaeuser surveyed real estate appraisers and 86% of them agreed that landscaping added to the dollar value of commercial real estate. Another study, looking at all the design variables in marketing attractive office space, showed that the highest occupancy rates occurred when there were landscape amenities, showing trees as even more attractive than direct access to main roads.

First Impressions of the Roadside

Kathy Wolf has recently completed a study to see what judgments people make about an unfamiliar community or business district based on its appearance from a highway. "While driving, people consider where to stop, shop or return to explore later. We know that people respond psychologically to visual information in less than 0.3 seconds. So I wanted to tease out the perceptions people have about a place based on its greenscape. Also, what do they infer about the business quality of the place based on the view from the road." She surveyed drivers in selected cities across the United States using six basic images, digitally altered, to show different amounts and arrangements of vegetation.

Green Screen Most Popular

Among all five photographs showing an increasing amount of vegetation between the roadway and adjacent commercial land uses, the highest rated ones, by far, says Wolf, were highways where background buildings were screened by trees, though one could still see glimpses of commercial settings beyond. Business owners favored that view almost as much as consumers.

She describes other studies including a test of which of two routes people would choose to get to a nearby shopping center. One was a scenic parkway, the other was a faster, non-scenic expressway. Even though the scenic route took more time and required more stops, study participants picked it over half the time.

"We are beginning to document a variety of links between travelers and the green edge of the roadway," Kathy Wolf says. "The links are not only related to attractive-looking business communities and prices in the shops, but also to potential ways to reduce the stress that is increasingly part of driving. Trees and other vegetation are valued in the highway environment."

Detailed fact sheets about Wolf's studies can be found on the Internet at <http://www.cfr.washington.edu/enviro-mind>. Wolf's studies are funded by a variety of sources including the US Forest Service and the National Urban and Community Forestry Council.

A New Park in Easton

Volunteers in the small Kittitas County town of Easton have created a new park. A large gravel pit owned by the Washington State Department of Transportation located just north of I-90 at exit 71 has been changed into a park with fishing ponds and green space.

About two years ago, residents of Easton decided their town needed a park, explains Lynne Thomas, Easton resident. The WSDOT gravel pits and ponds at exit 71 were already attracting people. Because the Department of Fish and Wildlife stocks the ponds with trout, people were fishing or stopping for a rest off the freeway. But there was no parking, bathroom or garbage can. Litter was everywhere, says Thomas.

Continued on Page 5

Fishing at Easton Ponds

Photo Northern Kittitas County Tribune

AMERICA'S BYWAYS

March 2001
News from the
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Inside this Issue

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Vistas

HISTORIC ROADS

Our historic roads are in danger. Across the United States, these historic resources are being lost at an alarming rate. Whether the proposed straightening of a parkway, the removal of ancient trees shading a country lane, or the destruction of remaining sections of early transcontinental highways, our historic roads are at a critical point in time. – Paul Daniel Marriott, author of "Saving Historic Roads: Design and Policy Guidelines"

Dan Marriott, a landscape architect and planner with the Rural Heritage Program at the National Trust for Historic Preservation, recently discussed the subject of historic roads during a conference call with National Scenic Byway Leaders. Marriott directs the National Task Force for Historic Roads and has chaired two national conferences on historic roads. Under contract with the National Scenic Byways Resource Center, he is currently working on a publication that addresses historic resources along scenic byways.

Is your byway a historic resource?

"As I talk with people across the country, I try to help them understand what makes a road historic. If you're involved with the scenic byways program, you may have wrestled with the six intrinsic qualities in trying to define whether a resource is cultural, historic, archeological, scenic, natural, or recreational," explained Marriott. "If your byway is based on history, it's important to understand what makes that road a historic resource."

(1) A road may be significant because it links historic resources, such as historic plantations, farms and ranches, or communities. In this case, the historic resources are the elements and structures that are located along the byway. A relatively new road may pass by historic resources.
(2) The road itself may be historic. The byway may have a rich legacy of history and development, even though it passes by modern structures, such as a Burger King or a Wal-Mart.
(3) *Both* the adjacent environment and the road itself may be historic resources.

Defining history more broadly

Historic resources are more than buildings and structures. Land patterns, land grants, orchard patterns, and lot lines can have a rich history as well. Landscapes can be historic. The view from an intact Mississippi River bluff town looking across agricultural fields is historic. Those distant agricultural fields are as much a historic resource as a courthouse tower in Main Square.

Many historic resources and opportunities are overlooked because they are not "built" structures. For example, a scenic byway may connect a number of historic farm villages in a rural area. Historically, villages were based on a pattern of settlements with large open spaces and agricultural areas between them. If the open space between villages is lost and eroded due to sprawl and development, some of the overall character and the historic story are lost as well.

The Ashley River Road in South Carolina is an example of a byway with cultural origins. Native American inhabitants of the area originally engineered the alignment of the road by coaxing a route through the forest and over or around the marshlands along the river. today visitors will drive past historic plantation entry gates like these at Drayton Hall.
Photo by Paul Dan Marriott

What makes a road historic?

A road can be significant for a number of reasons, such as:

- A famous designer. An example is a parkway designed by Frederick Law Olmstead, famous designer of New York's Central Park and many other American parks and parkways.
- An event. An example is the Selma to Montgomery March Byway in Alabama, site of a three-day civil rights march that captured the attention of the nation and the world.

(Continued on page 5)

Research Corner

Trees in Business Districts: Positive Effects on Consumer Behavior Testing Visual Quality at the Roadside Edge

Studies undertaken by the Center for Urban Horticulture, University of Washington, College of Forest Resources (Seattle)
Dr. Kathleen Wolf, Project Director

www.cfr.washington.edu/research.envmind

Do business people and shoppers share an appreciation for trees? Are trees good for business? The answer seems to be a resounding "yes." A national study, conducted by the University of Washington, used survey questionnaires to investigate public perceptions about the role of trees, and their value, in revitalizing business districts. Visual preference surveys – i.e. 32 photographs evaluated by respondents according to how well they were liked - were sent to selected districts in major cities. Some findings follow:

- Preference ratings increase with the presence of trees in the streetscape. On a 5-point scale, there was a major difference (3 points) between a grim, hard-featured district with little or no vegetation, and a commercial setting with larger trees and more formal plantings. Business owners always ranked the scenes significantly lower than visitors, but in the same order.
- Ratings of consumer *perceptions* of the following attributes also differed based on whether a business areas had street trees and other landscape improvements, or not –
  - ➢ Amenity and comfort (80% higher if shaded)
  - ➢ Quality of products sold (30% where trees exist, compared with bare sidewalks)
  - ➢ Interaction with merchants and customer service quality (11 % higher with trees)
  - ➢ Maintenance and upkeep (32% higher with trees)
- Respondents were hypothetically willing to travel longer and a greater distance, stay longer, visit more often, and pay more for parking in shopping districts with trees and accessory vegetation
- Survey participants consistently priced goods significantly higher in landscaped districts, indicating they were willing to pay, on average, 11% more as compared to the no-tree district

The research indicates that consumers receive cues and messages from the visual environment that go beyond aesthetics and beauty provided by trees. Commercial areas containing a quality urban forest send messages that may translate into greater consumer satisfaction and level of expenditures. Research results suggest that trees are good for the business' bottom line. American Forests, a national tree non-profit, suggests a goal of 15% tree canopy cover in business districts, whereas most U.S. retail environments have 5% percent or less.

Project Director, Dr. Kathleen Wolf, is now expanding this study to include communities with a population of 10,000 to 20,000 residents. The National Scenic Byway Resource Center has suggested including several communities along nationally designated byways that meet this criterion for inclusion in the next round of research. To understand traveler decision making, tourist perceptions would also be studied, as well as residents and business owners. **Please contact Barb Koth (bkoth@byways.org) if your byway might be interested in participating.**

The same research team also tested visual quality of freeway roadsides, focusing on retail areas found in semi-urban and suburban areas. Using a similar visual preference approach, six base images were digitally edited to show road edges with different amounts and arrangements of vegetation. Again, preference ratings increase with the presence of vegetation. In the lowest rated scenes, adjacent commercial uses are fully visible and a harsh edge dominates. In middle-rated images, vegetation interrupts the visual prominence of urban build-up and frames the view beyond the road. The highest rated category includes scenes where trees screen background buildings, although one can still see glimpses of commercial settings beyond.

In this study, there was little difference in preferences between the 400 drivers and 115 business people. A similar pattern of increased willingness to pay based on the positive effect of trees was observed. The Mountains-to-Sound Greenway was a partner on this study.

Full results of these studies and extensive additional information website.
Dr. Kathleen Wolf can be reached at (206) 616-6758 or kwolf@u.washington.edu

WELCOME!
Delaware Enters Scenic Byway Program

The State of Delaware has joined the National Scenic Byway Program with the passage of legislation by their General Assembly in late summer 2000. With this passage, the state began the process of determining its future role as a byway state. First tasks included defining a committee, determining responsibilities and gaining public support for a process of nominating byways within the state.

According to Joe Cantalupo, the newly designated State Coordinator and an employee of the Department of Transportation, the state has already named a Scenic and Historic Highway Program Advisory Board made up of state, county and local government officials, environmental organizations, chambers of commerce and outdoor advertising firms. Their primary job has been to establish a vision and goal statement for the program and to define a nomination process for the first designated state byways.

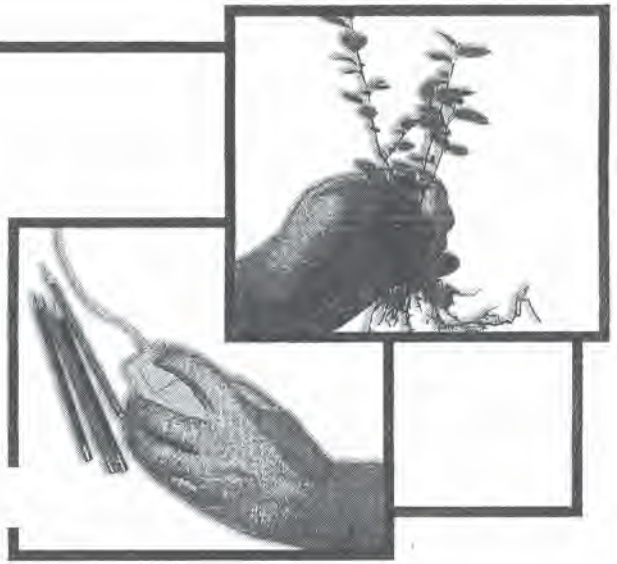
The first nomination process will take place this summer, according to Cantalupo. "We have already had a few inquiries from groups along potential byway routes. "Specific segments mentioned include Route 9 from Wilmington to Dover, Kennett Pike and Route 15."

The nomination process will be completed by late summer and state scenic byways could be named by fall. The general public will be informed and the process will include public input and news releases from the committee. We welcome the State of Delaware into the byway program and wish them success in their future.

For more information about the Delaware Scenic Byway Program, contact Joe Cantalupo, State Coordinator at (302) 760-2121 or email jantalupo@mail.dot.state.de.us

Washington Roadsides

A good slice of our state



Seeds for Thought

Did you know?

The Washington State Department of Transportation (WSDOT) is responsible for the stewardship of approximately 97,500 acres of roadsides along state roadways, including hundreds of auxiliary facilities.

Roadsides include...

The *roadside* is "the area outside the traveled way." As far as WSDOT's

'Green lanes' add to Washington's natural beauty

Roadsides don't just happen

Washington State is indeed fortunate to have a wealth of natural beauty - but it also has a richness of planned beauty.

We see special slices of this planned beauty (or, it might be called recreated nature) often and it affects us more than most of us realize.

It's the terrain along our state highways - Washington's roadsides.

These roadside environments don't just happen. A great deal of thought and effort by a relatively small corps of experts goes into planning the personality of these "green lanes" on either side - the department's landscape architects work from site designs that need to meet important requirements.

- Would the proposed plan create or restore a mini-environment that sits well in natural Washington - and protects the local resources, including fish populations?
- If the construction project harms a natural setting, such as a wetland - what specific plan does the department have for balancing that out?
- Would the proposed landscape take care of itself or require a minimum of tax dollar-paid upkeep?

Photo by Grace Eubanks

Discussing the elements of an Interstate 5 wetlands project that is a good example of their "other responsibilities" are the members of the Olympia Service Center's Roadside and Site Development team (left-right): Roadside Design Specialist

The nature of driving: roadsides have positive effects and benefits

By Kathleen L. Wolf

Is the "green lane" beyond the concrete merely leftover land?

Or it is a valuable resource to be carefully planned and protected?

What do we gain from the experience of nature in roadways? The answer to this question is surprisingly complex - but drawing on scientific research, a number of interesting findings stand out.. For example

- the influence on route choices
- the reduction of traffic-related stress and
- the cues about a city or state

We now know that the presence of quality vegetation in our everyday world can have profound effects on our emotions and behavior, affecting our health and well-being.

Studies by social scientists at the University of Illinois have linked contact with nature to less violence during domestic conflict and to enhanced creativity in children's play.[1]

As for motorists, two studies have established that the character and quality of roadside landscape influences drivers' route choices. Aesthetically pleasing roads can focus road use and travel patterns. Quality roadside plantings could be a strategic tool for planning road use levels.

In addition, a team of psychologists at Texas A&M have learned that nature in the roadside reduces traffic-related stress.[2]

People driving through nature-dominated settings after a stressful incident exhibit fewer stress indicators (such as blood pressure and brain activity levels) than those driving through built environments.

Might landscaped roadsides be an antidote for road rage? The Texas researchers also found that an immunizing effect can come into play. They learned that when a person enters an emotionally challenging situation, a prior experience of nature appears to calm stress responses.

The quality of a roadside view also affects the driver's perceptions and sends environmental messages. The visual character of a roadway landscape sends many cues to drivers about the city, town, region or even the state they are driving through - and about the people and places they will experience during their stay.

It's good to note that many Washington state visitors comment on the beautiful appearance of our state's freeway roadsides.

Investigating the urban roadside environment, a University of Washington-WSDOT partnership research project is currently underway to learn more about how drivers respond to the roadsides in commercial and retail zones.

Businesses want a high degree of visibility for their buildings, products and signs. Drivers, however, can be overwhelmed by visual clutter that may even impact their driving behavior and safety.

The UW-WSDOT study will examine how both business needs and public aesthetics can be satisfied using smart design.

There also is national interest in roadside quality. The Federal Highway Administration is sponsoring national assessment programs that provide tools to analyze and then conserve or create visual resources.

In addition, there are the federally-supported programs to designate Scenic Highways and Byways, nationally significant driving corridors that offer unique natural and/or cultural character.

Looking to the future, the benefits of roadsides could become even more important. Cities and towns in Washington face tremendous population growth pressures. Eighty percent of the US population will live in urban areas by the year 2000.

Add to this the realization that millions of people experience road corridors during work commutes and daily business.

Green space and nature, then, could be an essential part of urban living. The visual resources of roadsides should be renewing, satisfying environments that contribute to the mental health of the public.

Considering all of the above findings, it's not surprising that roadside design professionals continue to promote the importance of visual quality and its benefits to society.

Kathleen L. Wolf is a Professor at the Center for Urban Horticulture, University of Washington.

[1]Faber Taylor, A., A. Wiley, F.E. Kuo & W.C. Sullivan. 1998. Growing Up in the Inner City: Green Spaces as Places to Grow. Environment and Behavior, 30, 1, 3-27.

[2]Parsons, R., L.G. Tassinary, R.S. Ulrich, M.R. Hebl & M. Grossman-Alexander. 1998. The View from the Road: Implications for Stress Recovery and Immunization. Journal of Environmental Psychology, 18, 2, 113-140.

Roadsid structure

A quality team on a long-wanted advancement in th of WSDOT 's arra roadside properti

The basic goa Roadside Quality establish universa recognition that th department needs coordinated struc design and care c properties - and b strengthening the department-wide policies and proce roadside manage

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Someda

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Submitted to Journal of Arboriculture
Reviewed and resubmitted with revisions January 2002

FREEWAY ROADSIDE MANAGEMENT:
The Urban Forest Beyond the White Line

by Kathleen L. Wolf, Ph.D.
kwolf@u.washington.edu

ABSTRACT — A national survey was conducted to learn more about public preferences and perceptions regarding forest and vegetation planning and management in urban freeway roadsides. In response to images depicting a visual continuum of landscape management treatments, drivers most preferred settings having tree plantings that screen adjacent commercial land uses. Preference results suggest solutions for landscape practices that create visual quality for drivers and provide visibility for commercial properties adjacent to freeway roadsides. The research also investigated public attitudes about roadside functions, uses and public willingness to support roadside management expenditures. Increasingly, transportation agencies are planning and managing urban roadsides to achieve multiple objectives and perform multiple functions. This research offers insights on how to incorporate urban forestry into the planning and management of high-speed urban transportation corridors.

KEY WORDS: urban forestry, public perceptions, transportation, social science

APPENDIX B

Grant No. WAUF-97-003 - Final Report: Project Illustration
The View from the Road:
Costs and Benefits of Roadside Urban Forests for Business Districts

The project used a photo-based survey to collect data on public preferences and perceptions for communities exhibiting different levels of public green and urban forests. Contact Kathy Wolf at 206.780.3619 or kwolf©u.washington.edu for digital versions of the image files.

In one part of the survey a base image (obtained from Washington State Department of Transportation) was digitally edited (by the project scientist, Kathleen **L.** Wolf, Ph.D.) to depict two different hypothetical communities. Surveys were mailed to licensed drivers in the Pacific Northwest. Each survey participant received one version. Statistical analysis of response data support these outcomes (significance at alpha<.05):

- statements about the Consumer Appeal of the places were rated higher for the setting having more vegetation
- judgments about the Business Environment (e.g. merchant caring, crime rate) were more positive in the green setting
- respondents reported being willing-to-pay more for items on a list of products and services in the forested community, with values ranging from 10 to 20 percent higher than the less green community