People, Trees, and Power: Human Dimensions of Roadside Tree Management to Reduce Power Outages

Daniel C. Hale and Anita T. Morzillo

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UCONN COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES

STORMWISE

stormwise.uconn.edu

A tree fallen on power lines in Glastonbury, central Connecticut, after the 2011 October Snowstorm.

INTRODUCTION

Stormwise is a vegetation management program aiming to reduce the risk of tree-related storm damage to power lines. Tree trimming, removal, and planting directly affects places where people live. Therefore, this study seeks to understand **public attitudes** toward the program.

Past research suggests that attitudes toward natural resources vary from urban to rural areas. At a household level, trees can have a strong effect on people's experiences. Therefore, this study will evaluate how these **landscape factors** influence attitudes toward vegetation management.

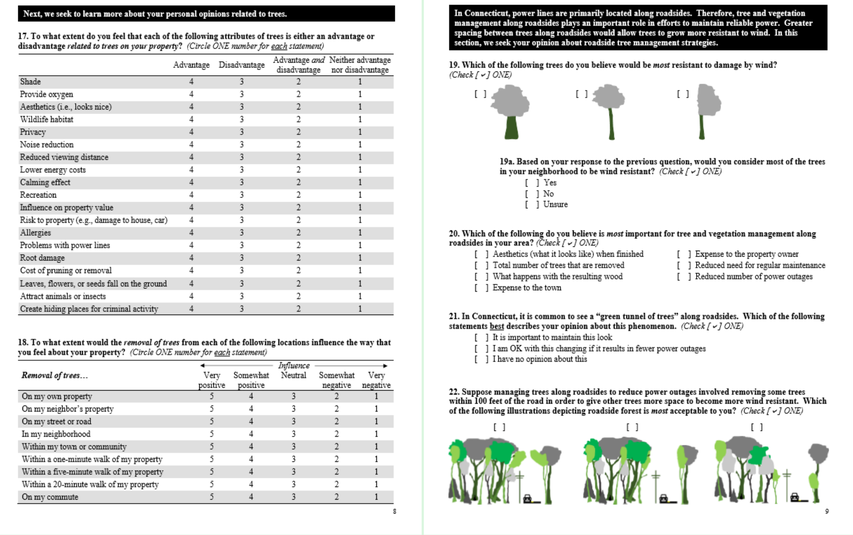
Stormwise envisions a roadside forest with widely spaced trees that can grow resistant to wind damage, reducing the risk of power outages.

SURVEY

Self-administered surveys were used to measure attitudes toward Stormwise vegetation management. In February 2017, we mailed 3,600 surveys to a random sample of Connecticut residents in two areas, and across an urban-rural gradient. Questions address:

- Experience with storms and power outages
- Attitudes toward utility vegetation management
- Ecosystem services and disservices related to trees
- New roadside tree management strategies
- Sociodemographic information

So far, more than 750 surveys have been received (21%).



Next, we seek to learn more about your personal opinions related to trees.

17. To what extent do you feel that each of the following attributes of trees is either an advantage or disadvantage *related to trees on your property*? *(Circle ONE number for each statement)*

	Advantage	Disadvantage	Advantage *and* disadvantage	Neither advantage nor disadvantage
Shade	4	3	2	1
Provide oxygen	4	3	2	1
Aesthetics (i.e., looks nice)	4	3	2	1
Wildlife habitat	4	3	2	1
Privacy	4	3	2	1
Noise reduction	4	3	2	1
Reduced viewing distance	4	3	2	1
Lower energy costs	4	3	2	1
Calming effect	4	3	2	1
Recreation	4	3	2	1
Influence on property value	4	3	2	1
Risk to property (e.g., damage to house, car)	4	3	2	1
Allergies	4	3	2	1
Problems with power lines	4	3	2	1
Root damage	4	3	2	1
Cost of pruning or removal	4	3	2	1
Leaves, flowers, or seeds fall on the ground	4	3	2	1
Attract animals or insects	4	3	2	1
Create hiding places for criminal activity	4	3	2	1

18. To what extent would the *removal of trees* from each of the following locations influence the way that you feel about your property? *(Circle ONE number for each statement)*

	Influence				
Removal of trees…	Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
On my own property	5	4	3	2	1
On my neighbor's property	5	4	3	2	1
On my street or road	5	4	3	2	1
In my neighborhood	5	4	3	2	1
Within my town or community	5	4	3	2	1
Within a one-minute walk of my property	5	4	3	2	1
Within a five-minute walk of my property	5	4	3	2	1
Within a 20-minute walk of my property	5	4	3	2	1
On my commute	5	4	3	2	1

8

In Connecticut, power lines are primarily located along roadsides. Therefore, tree and vegetation management along roadsides plays an important role in efforts to maintain reliable power. Greater spacing between trees along roadsides would allow trees to grow more resistant to wind. In this section, we seek your opinion about roadside tree management strategies.

19. Which of the following trees do you believe would be *most* resistant to damage by wind? *(Check [✓] ONE)*

[ ] [ ] [ ]

19a. Based on your response to the previous question, would you consider most of the trees in your neighborhood to be wind resistant? *(Check [✓] ONE)*

[ ] Yes
[ ] No
[ ] Unsure

20. Which of the following do you believe is *most* important for tree and vegetation management along roadsides in your area? *(Check [✓] ONE)*

[ ] Aesthetics (what it looks like) when finished
[ ] Total number of trees that are removed
[ ] What happens with the resulting wood
[ ] Expense to the town
[ ] Expense to the property owner
[ ] Reduced need for regular maintenance
[ ] Reduced number of power outages

21. In Connecticut, it is common to see a "green tunnel of trees" along roadsides. Which of the following statements best describes your opinion about this phenomenon. *(Check [✓] ONE)*

[ ] It is important to maintain this look
[ ] I am OK with this changing if it results in fewer power outages
[ ] I have no opinion about this

22. Suppose managing trees along roadsides to reduce power outages involved removing some trees within 100 feet of the road in order to give other trees more space to become more wind resistant. Which of the following illustrations depicting roadside forest is *most* acceptable to you? *(Check [✓] ONE)*

[ ] [ ] [ ]

9

An excerpt from the survey mailed to Connecticut residents.

Top: Tree cover within 35 m of road centerlines.

Bottom: Census blocks by urban-rural index. 0 = rural; 1 = urban.

SPATIAL ANALYSIS

Neighborhood characteristics will be mapped and quantified around each survey respondent's address. We will evaluate trends in resident attitudes in relation to two landscape factors:

- **Trees** contribute to neighborhood character and may be altered by vegetation management. To show the roadside forest in a household context, tree cover will be mapped within various distances of from the household and road.
- Differences exist among humans, forests, and vegetation management along an **urban-rural gradient.** An index is being developed to assess attitudes along this gradient.

MANAGEMENT IMPLICATIONS

- **Survey data** will be used to explore pathways toward adopting Stormwise tree management strategies statewide.
- Combined with survey data, **spatial analysis** will provide insight for developing management strategies targeting people in urban versus rural locations.

This project is supported by the Eversource Energy Center and the University of Connecticut. Use of human subjects was approved by the University of Connecticut Institutional Review Board (#H16-007).

Eversource Energy Center

EVERSOURCE

People, Trees, and Reliable Power

Daniel C. Hale* and Anita T. Morzillo

University of Connecticut Department of Natural Resources and the Environment, Storrs, CT, *daniel.hale@uconn.edu

A tree fallen on power lines in Glastonbury, CT, after the 2011 October Snowstorm. Stormwise aims to create a more resilient roadside forest.

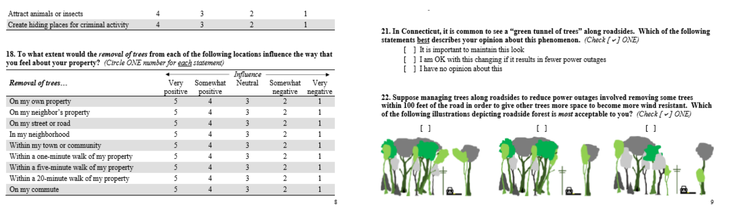
INTRODUCTION

Most power outages are weather-related, and occur when trees fall on power lines. **Stormwise** is a vegetation management program for managing the roadside forest to reduce the risk of tree-related storm damage to power lines. Long-term practices will create healthy, storm resistant, and aesthetically pleasing trees and forests. Because these practices directly affect places where people live, this study seeks to understand **public attitudes** toward the program.

Attitudes toward vegetation management vary between urban versus rural areas, or between places where trees are abundant versus scarce. Therefore, this study will evaluate **landscape factors** that are related to public attitudes toward Stormwise practices.

Stormwise envisions a roadside forest with widely spaced trees that can grow resistant to wind damage, reducing the risk of power outages.

SURVEY



Attract animals or insects 4 3 2 1
Create hiding places for criminal activity 4 3 2 1

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Removal of trees…	Influence: Very positive	Somewhat positive	Neutral	Somewhat negative	Very negative
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22. Suppose managing trees along roadsides to reduce power outages involved removing some trees within 100 feet of the road in order to give other trees more space to become more wind resistant. Which of the following illustrations depicting roadside forest is *most* acceptable to you? *(Check [✓] ONE)*

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An excerpt from the survey mailed to Connecticut residents.

SPATIAL ANALYSIS

Neighborhood characteristics are mapped and quantified around each survey respondent's address. Two landscape factors may help explain trends in resident attitudes toward proposed Stormwise management:

- **Tree cover** is mapped within specified distances from the roads, covering the area people pass by every day.
- An **urban-rural index** is calculated from land cover and population density variables.

Top: Tree cover within 35 m of road centerlines.
Bottom: Census blocks by Urban-Rural Index.
0 = most rural, 1 = most urban

MANAGEMENT IMPLICATIONS

- **Survey data** will provide information about resident perceptions of roadside trees and forests and potential management strategies in Connecticut.
- **Spatial analysis** will allow management to adapt strategies to specific locations across the state, and along the urban-rural gradient.

Funding for this project is provided by:

Eversource Energy Center
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Attitudes may depend on where people live. This study will evaluate the **landscape factors** that influence decisions about vegetation management.

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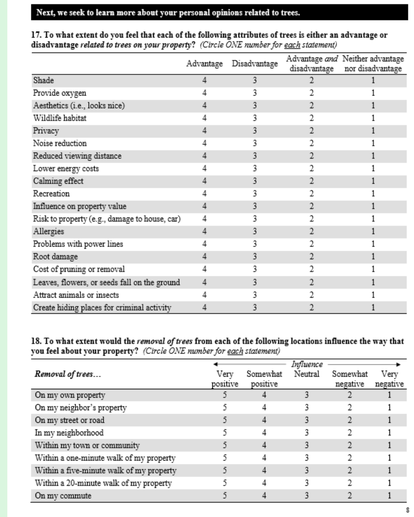
3600 surveys were mailed to Connecticut residents. Surveys are still coming in. As of 4/1/17, 730 surveys were returned (20.78 %).



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MANAGEMENT IMPLICATIONS

- **Survey data** will provide guidance in developing long-term solutions to minimize tree and power line damage.
- **Spatial analysis** will allow management to adapt to locations along the urban-rural gradient.

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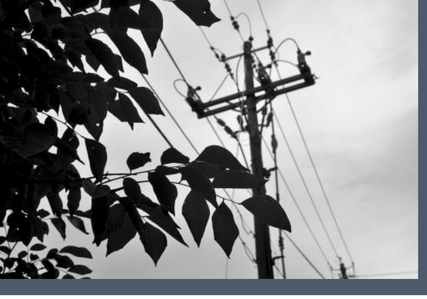

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