Texas Department of Transportation

UNIVERSITY OF TEXAS ARLINGTON

PROJECT SUMMARY REPORT

0-7162: Quantifying the Benefits of Roadside Vegetation

Background

The Texas Department of Transportation (TxDOT) invests $36 million annually in the Green Ribbon Program, which includes roadside vegetation to create green road landscapes. According to Executive Order 1-92, "The department will maintain highway vegetation in an environmentally sensitive and uniform manner consistent with the special conditions presented by local climate, topography, vegetation, and level of urbanization." However, there is no comprehensive toolkit quantifying potential benefits of roadside vegetation in Texas. Furthermore, existing guidelines and manuals typically focus on specific aspects of roadside vegetation, such as operations and maintenance, including mowing, cutting, safety, fertilization, herbicide use, and permitted species. In addition, vegetation is highly variable across the state, and affected by climate and localized environments. Thereore, there is a needs for a comprehensive toolkit to assist TxDOT users in quantifying the benefits of proposed roadside vegetation on aspects of diverse project- and state-specific parameters.

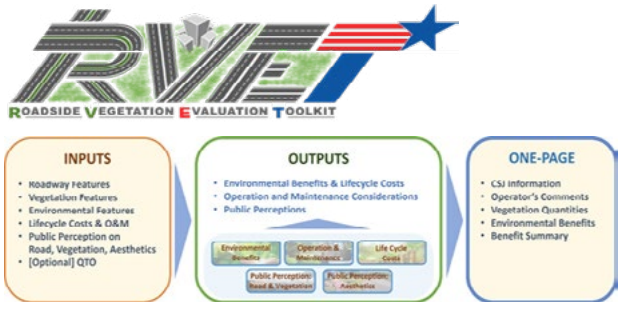

Figure 1. Overview of Roadside Vegetation Evaluation Toolkit (RVET)

What the Researchers Did

The rThe researchers developed a spreadsheet-based Roadside Vegetation Evaluation Toolkit (RVET; Figure 1) that can examine the impacts of roadside vegetation on various factors associated with not only the project but also the surrounding community and environment. The RVET is equipped with an integrated database that includes TxDOT roadway inventory, hydrological soil groups, and precipitation which enables users in roadside vegetation planning and management in Texas to systematically evaluate the following five major modules:

- **Environmental Benefits:** Measuring carbon capture, heat island mitigation, soil loss, and runoff reduction.
- **Operation and Maintenance:** Providing insights for mowing, herbicide application, seeding for erosion control, wildflower program, and litter removal.
- **Lifecycle Costs:** Offering a 20-year projection of costs and benefits of measured parameters mainly considering installation and operation and maintenance.
- **Public Perception of Roads and Vegetation:** Examining how roadside vegetation and landscape design can be perceived by the public on aspects of driver safety, visibility, and overall road experiences.

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- **Public Perception of Aesthetics:** Evaluating road users' preferences regarding the visual appeal and aesthetics of roads and vegetation.

What They Found

The RVET is a data-driven and input-oriented evaluation toolkit that effectively quantifies the benefits of roadside vegetation per roadside vegetation scenarios. It provides and displays key evaluation outputs across the five major modules, as outlined below. The environmental benefits module provides operators with a rough approximation of both the quantitative and monetary benefits of roadside vegetation from various environmental perspectives. The goal of the operations and maintenance module is to facilitate the evaluation of critical roadside vegetation tasks and activities while offering recommendations based on integrated factors for best management practices. The lifecycle cost module provides lifecycle costs and benefits for various environmental attributes over a 20-year projection, based on installation, operation, maintenance, and environmental benefit factors to make informed decisions regarding roadside vegetation projects and choose the best options for vegetation alternatives for each project. The public perception of roads and vegetation module assesses the desirability of road experiences based on different combinations of roadside vegetation from the perspective of drivers. It analyzes the overall desirability of various road and vegetation parameters. Finally, the public perception of aesthetics module focuses on evaluating the desirability and aesthetic appeal of various roadside vegetation combinations from the driver's perspective, using a range of parameters.

What This Means

The RVET and research outcomes will assist the statewide implementation of improved roadside vegetation management within the TxDOT system, enhancing the health and safety of Texans. This study delivers a comprehensive evaluation of roadside vegetation, providing valuable insights for stakeholders through detailed measurements across the five major modules including environmental benefits, operation and maintenance, lifecycle costs, public perception of roads and vegetation, and public perception of aesthetics. By integrating environmental, operational, economic, and perceptual data, the toolkit promotes a comprehensive approach to vegetation management that benefits both the environment and the public. The RVET stands as a testament to TxDOT's commitment to fostering a greener, safer, and more visually appealing transportation network.

For More Information

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