



Transportation Consortium of South Central States

Key Points

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Principal Investigator(s):
Vikram Kapoor
University of Texas at San Antonio
vikram.kapoor@utsa.edu
Jeffrey Hutchinson
University of Texas at San Antonio
jeffrey.hutchinson@utsa.edu
Samer Dessouky
University of Texas at San Antonio
samer.dessouky@utsa.edu

Lead Institution:
University of Texas at San Antonio

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\$50,000

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Tran-SET
University of Texas at San Antonio
City of San Antonio

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\$100,000

Evaluation and Enhancement of Carbon Sequestration Potential, Bioenergy Production and Ecosystem Services of Existing Vegetation along Roadsides

Brief Project Description

This study aims to conduct a baseline assessment of carbon sequestration potential of existing vegetation along a Texas highway (as a model Region 6 road network) and evaluating different management techniques to take remedial measures for improving carbon sequestration capability along existing roadside infrastructure.

Problem Statement

There is a growing realization that anthropogenic greenhouse gases (GHG) emissions are contributing to global climate change. Therefore, it is critical to identify and leverage appropriate avenues to mitigate this problem. With the transportation sector being one of the main sources of GHG emissions globally, it is incumbent on the transportation sector to address issues leading to this state, given its direct impact on environment, health and climate. Road transport contribution to GHG emissions should be mitigated to reduce atmospheric CO₂ concentrations thereby alleviating the harmful effects of changing climate and global warming. Policies and strategies suggest several preventive mitigation options, but have paid little attention to compensatory mitigation such as through carbon sequestration along highway rights-of-way (ROWs). Interest has recently been increasing in the potential for roadside vegetation and soils to capture and store carbon to reduce GHG emissions as well as to use this approach to generate revenue by pursuing market-based strategies for trading carbon credits or carbon offsets. In addition, biomass production during carbon storage has the potential to provide biofuel through plantation of bioenergy crops in degraded ROW soils. Other ecological advantages of roadside vegetation include improved water quality, and erosion control, which is particularly important during flooding events as seen in the recent case of Hurricane Harvey.

Objectives

The main objective of this project is to evaluate and enhance the carbon sequestration potential and other ecosystem service provided by roadside



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vegetation. This study is especially important for roadsides in highly polluted zones such as those affected by heavy vehicular traffic and industries. Therefore, this study will evaluate carbon sequestration along Interstate-35 (I-35) within Bexar County. Specific objectives are to:

- Conduct a literature review on existing methodologies for carbon sequestration assessment along roadside in order to establish a scientific methodology for assessing carbon sequestration potential of existing vegetation and soils along Texas highways.
- Perform baseline assessment of the current carbon being captured along I-35 roadside using multiple parameters such as roadside acreage, current plantation practices (grasses, shrubs, and trees), and soil and plant carbon content.
- Evaluate the potential of existing roadside infrastructure for increasing carbon sequestration by assessing available roadside acreage, optimizing plant choices for maximum carbon storage and biofuel production, and evaluating holistic land management practices.

Intended Implementation of Research

The findings obtained from the proposed research will be shared with the scientific community in the form of publications, reviews or brief reports in peer-reviewed scientific journals. As part of the proposed project, the research team will conduct educational and outreach activities to the public about GHG emission sources and steps that can be taken to mitigate road transport emissions through improved management programs and enforcement mechanisms that will benefit the ecosystem and public health.

The study will also aid in developing student's professional skills through research presentations at regional transportation conferences and Alamo Colleges in San Antonio. Underrepresented students participation will be encouraged in an effort to enhance participation of underrepresented groups. Outreach to target student groups will be conducted by coordinating with minority student programs at Region 6 universities.

Anticipated Impacts/Benefits of Implementation

This study will produce a baseline assessment for the carbon captured and stored along a roadside in an arid Region 6 state (Texas). This study will result in refinements of additional steps towards establishing simple, reliable, and replicable methodology for assessing the carbon stocks in vegetation along federal highways of USA and eventually developing strategies for registering carbon credits. The information gained in this study will also assist transportation engineers in taking remedial measures for improving carbon sequestration along roadside, thereby contributing significantly towards the reduction of GHG emissions. This study will also assess how the transportation sector can effectively reduce pollution in highly polluted zones of Texas like chemical/refinery plants by the use of active management practices related to roadside plantations in these areas.

Weblinks:

- [Tran-SET's website \(http://transet.lsu.edu/research-in-progress/\)](http://transet.lsu.edu/research-in-progress/)
- [TBR's Research in Progress \(RIP\) database \(https://rip.trb.org/View/1505509\)](https://rip.trb.org/View/1505509)