Awards issued prior to January 20, 2025, were funded under previous Administrations and may not reflect the priorities and policies of the current Administration.

United States Department of Agriculture
Project Initiation

Project Data for Accession Number 1032911

Project Title

Working Trees: Scaling Agroforestry Carbon Projects Across Agricultural Supply Chains

Project Details

Sponsoring Institution National Institute of Food and Agriculture	**Project Status** ACTIVE
Funding Source NIFA Non Formula	**Grant Year** 2024
Grant No. 2024-33610-43219	**Cumulative Award Amt.** $598,827.00
Proposal No. 2024-04752	**Multistate No.** (N/A)
Project Start Date Sep 15, 2024	**Project End Date** Sep 14, 2027
Program Code [8.6] Rural & Community Development	

Project Director

Gonzales-Kramer, L.

Recipient Organization

WORKING TREES, INC
104 DIVISADERO ST
SAN FRANCISCO, CALIFORNIA 941173202

Performing Department

(N/A)

Non Technical Summary

Working Trees (WT) is a climate-tech startup enabling pasture owners to generate revenue via carbon markets by integrating productive trees into their land, a practice known as silvopasture. Silvopasture enhances pastureland profitability, carbon sequestration, and environmental health, but is currently adopted on <1% of US farmland.WT has deployed the first silvopasture carbon project in the US, generating 300,000 acres of interest from pastureland owners, with 12 pilot farms across eight states. A critical technological component of this program is WT's mobile app, which accurately verifies silvopasture carbon stocks using a phone's camera, enabling small-holder farms to participate in carbon markets.Working Trees' SBIR Phase II project goal as part of SBIR's Rural and Community Development topic area is to advance and deploy the technical infrastructure needed to facilitate widespread farmer adoption of silvopasture through supply-chain carbon removal (i.e. insetting) partnerships with agricultural Consumer Packaged Goods (CPGs) companies. Working Trees' technology can catalyze silvopasture deployment by addressing

the challenges faced both CPG and farmers: CPGs can share costs with supply chain partners and track the climate impact of silvopasture in their supply chains; farmers receive silvopasture design support and compensation for sequestered carbon.WT has launched the first three silvopasture insetting carbon projects in the US in partnership with Organic Valley, Lactalis, and Neutral. With SBIR Phase II funding, WT aims to continue developing technology to drive impact, scaling silvopasture adoption across agricultural supply chains, improving the economic and environmental resilience of family farms, and combating climate change.

Animal Health Component

Animal Health Component: 0%

Research Effort Categories

Basic	0%
Applied	50%
Developmental	50%

Classification

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
125	0120	1060	100%

Knowledge Area

[125] Agroforestry

Subject Of Investigation

[0120] Land

Field Of Science

[1060] Biology (whole systems)

Keywords

carbon markets, silvopasture, Rural and community development, tech development agroforestry

Goals / Objectives

Working Trees (WT) is a climate-tech startup enabling pasture owners to generate revenue via carbon markets by integrating productive trees into their land, a practice known as silvopasture. Silvopasture enhances pastureland profitability, carbon sequestration, and environmental health, but is currently adopted on <1% of US farmland.WT has deployed the first silvopasture carbon project in the US, generating 300,000 acres of interest from pastureland owners, with 12 pilot farms across eight states. A critical technological component of this program is WT's mobile app, which accurately verifies silvopasture carbon stocks using a phone's camera, enabling small-holder farms to participate in carbon markets.Working Trees' SBIR Phase II project goal as part of SBIR's Rural and Community Development topic area is to advance and deploy the technical infrastructure needed to facilitate widespread farmer adoption of silvopasture through supply-chain carbon removal (i.e. insetting) partnerships with agricultural Consumer

Packaged Goods (CPGs) companies. Working Trees' technology can catalyze silvopasture deployment by addressing the challenges faced both CPG and farmers: CPGs can share costs with supply chain partners and track the climate impact of silvopasture in their supply chains; farmers receive silvopasture design support and compensation for sequestered carbon.WT has launched the first three silvopasture insetting carbon projects in the US in partnership with Organic Valley, Lactalis, and Neutral. With SBIR Phase II funding, WT aims to continue developing technology to drive impact, scaling silvopasture adoption across agricultural supply chains, improving the economic and environmental resilience of family farms, and combating climate change.

Project Methods

Tree inventories are the cornerstone of forest science and management, essential for understanding growth rates, biomass and carbon stocks, species diversity, and assessing impacts of management and climate change. Inventories have traditionally been cumbersome and costly due to reliance on manual measurement techniques (tape measures to estimate diameter; clinometers and rangefinders to estimate height).In addition to being costly, current solutions to estimate carbon sequestration in trees and forests have significant limitations. The traditional, field inventory-based approaches are expensive, opaque, and inefficient, which prevents adoption of incentive schemes in smaller tracts. Other monitoring solutions rely on satellite-based data, which has been shown to be very uncertain, missing ~50% of small and medium trees (Reiner et al., 2023), and still requiring ground-based data in order to calibrate and validate satellite-based models. These approaches are not suitable for accurately tracking trees in disjointed and disparate supply chains. Recent advances in digital sensing technologies present opportunities for simpler, faster, and more-auditable tree inventories, without sacrificing accuracy. Working Trees is pioneering the use of this technology on smartphones as an accurate and cost effective alternative to replace manual measurements, reducing time and cost in the field. Moreover, widespread smartphone ownership enables data collection by non-experts (with proper quality control).In 2023, Working Trees published a peer-reviewed research paper, Measuring Tree Diameter with Photogrammetry Using Mobile Phone Cameras (Ahamed et al., 2023), which showed that smartphone-based tools, using simultaneous localization and mapping (SLAM) photogrammetry, are >90% accurate compared to tape measurements, even across different phone users and tree species. While initial results have been promising due to high accuracy, low uncertainty, and substantial time savings, the current version of the smartphone application has two important limitations: 1) it requires user input to set the edges of the tree's trunk, and 2) is still subject to use of allometric equations, which make simplifying assumptions about a given tree species. Working Trees aims to address these limitations through 1) development of an automatic and app-based estimate of tree diameter through image segmentation and depth estimation, and 2) development of 3D models of trees from photographs and video, noting tradeoffs in processing and acquisition time with accuracy. These advancements would solve current limitations, and permit rapid and robust tree carbon monitoring at scale. The technology to carry out these advancements are already widely studied in other fields - Working Trees is focused on implementing these solutions in a user-friendly platform, and rigorously testing their application through field trials with research partners. Accuracy will be tested through multiple field trials, in which a number of trees will be measured using: (1) the Working Trees application, (2) tape measures and clinometers (traditional tools), (3) drone-based lidar or photogrammetric data to recover height, diameter, and biomass, and (4) destructive harvesting, when/if available. Results will be compared across each of these data acquisition techniques, and error will be assessed using traditional metrics (e.g. mean absolute error, root mean square error).