

Project Name: Treasure Valley Canopy Assessment Funding Year: 2010

## Stakeholders

<u>Forest Service Region:</u> USDA Forest Service - R1 <u>Sponsoring Organization:</u> Idaho Dept. of Lands <u>State Project Contact:</u> Margie Costa | 406-329-3539 | mewing@fs.fed.us <u>Participating Organizations:</u> <u>Grantee:</u> Idaho Dept. of Lands

Project Funding
Agreement(s): 10-DG-11010000-010

**Project Design** 



## Project Purpose

The Idaho Treasure Valley (TV) includes the capital city of Boise and suburbs spread over two counties. TV is home to 600,000 people and a significant percentage of the state's industry and business. Air quality (AQ) is one of TV's most serious issues; areas of TV are currently rated non-attainment for particulate matter (PM) and on the edge of going non-attainment for ozone (O3). Not achieving attainment standards, especially for O3, means compromised public health, diminished economic growth (non-attainment status can limit production capabilities of existing industries and preclude siting of new industries that provide job opportunities), new and costly regulations, and a potential loss of federal highway funds. Nitrogen oxide (NOx) and volatile organic compounds (VOCs) react with sunlight and high temperatures to form ground-level ozone. Trees can substantially lower O3 production by blocking sunlight and lowering temperatures on surfaces that emit NOx and VOCs (asphalt, fuel tanks, buildings, etc.). Tree canopy also very effectively intercepts and filters PM. In fact, O3 and PM are the two air pollutants research has found trees are most effective at reducing

### National Themes & Outcomes

### Enhance Public Benefits from Private Forests

- Water quality and quantity is protected and enhanced.
- Air quality is improved and energy is conserved.
- Communities plan for and reduce their risks from wildfire.
- The economic benefits and values of trees and forests are maintained and enhanced.
- Wildlife and fish habitat is protected, conserved, and enhanced.
- People are connected to trees and forests and are engaged in environmental stewardship activities.
- Trees and forests are managed and restored to help mitigate and adapt to changing conditions.



## Strategic Issues

The Idaho Department of Environmental Quality (IDEQ) notes that no single action will achieve O3 compliance with federal standards—a combination of many actions is needed. The Treasure Valley Air Quality Plan (TVAQP) lists and evaluates many actions to improve air guality, but suggests the effects of increased tree canopy are unknown due in part to a lack of information, local data and ability to quantify and measure benefits. The project partners believe inclusion of forest resources in AQ plans is a critical next step. This project will develop the data, model the impacts, establish methodologies for measuring change/success over time, and initiate action toward canopy goals. Goals: 1) Utilize urban canopy to help meet federal air quality standards in TV. 2) Develop baseline information for measuring change over time to evaluate success. 3) Develop regional AQ canopy goals across all ownerships through partnerships & assessment results. 4) Maintain and improve healthy air quality in TV. Scope: 1) Utilize two complimentary assessment tools to develop baseline information on the effects of current tree canopy on air quality, water quality, stormwater management and energy conservation over ~240 square miles of the developed and most rapidly developing areas of TV. 2) Using the tools and data developed, model how increased canopy can help TV meet federal air quality standards, and their effects on the other issues noted in 1) above. 3) Establish canopy goals targeted to improving specific air quality metrics and incorporate these into regional and local air quality plans. 4) Through meetings, workshops, presentations, publications and web-based tools, educate community leaders, resource managers and residents on the monetary and public health benefits of investments in tree canopy, and promote planting on all ownerships to meet air guality goals. 5) Initiate and implement planting projects toward meeting canopy goals.

### **Collaboration & Partners**

All partners met face-to-face to develop this proposal and each has a significant role in the project. IDL and ACHD will provide technical forestry expertise and mentor students. BSU and MTMS will provide instruction/support for student interns and apprentices in establishing permanent survey plots, and acquisition & analysis of data. IDEQ will provide air quality guidance and lead regional education and policy development. Idaho Power will provide data/information to support energy conservation analysis and co-lead regional education outreach. Cities will develop, modify and provide GIS data necessary for assessments, work interactively with contractor and students throughout the project, establish regional assessment-based canopy goals, provide education to city leaders and citizens based on results, develop actions and initiate planting projects towards meeting canopy goals. RC&D will provide local project coordination. The TV Air Quality Plan identifies many AQ actions. The project partners have identified inclusion of forest resources in this broad agenda as the critical next step. The project team anticipates existing & new partnerships will be catalyzed by this project, leading to robust investments in urban forests.



### Integrated Delivery

This project integrates forestry efforts with the non-S&PF programs of environmental quality, community planning, economic development, transportation, education and energy. It supports: • IDEQ's efforts to develop science-based, data supported, quantifiable actions that will help TV meet federal air quality (AQ) standards, • Idaho Power's desire to lower demandside energy use, leading to better AQ, • Transportation managers' need to lower the impact of transportation-related sources of NOx and VOCs (asphalt, fuel evaporation, etc.) and lower stormwater runoff, • Local governments needs to address AQ regionally, • Applied education through hands-on college internships and high school apprenticeships, mentored by local professionals. Getting non-traditional partners to recognize the functional value of urban forests has always been a challenge. But the critical need to address rising O3 levels in TV has created an opportunity for using this resource more effectively. The diverse project partners are excited by what this project will provide and in having another tool—one that is data-supported and multi-functional—with which to address AQ. The project integrates trees into the broad spectrum of AQ improvement actions in TV.

### Influence on Positive Change

The TREASURE VALLEY AND REGIONAL AIR QUALITY COUNCIL ACT defines the Treasure Valley (TV) as Ada and Canyon Counties, which make up the vast majority of the local airshed. Actions to improve air quality defined in the Council's Treasure Valley Air Quality Plan are focused in these counties, which includes about half of Idaho's urban population. This project targets ~240 square miles of developed and rapidly developing areas within TV and encompasses the urban growth boundaries of all cities in the metropolitan area of the two counties. These are the areas where sources of VOCs and NOx are greatest, and where urban tree canopy can have the greatest impact on air quality within this airshed. Population in TV is expected to increase 70% over the next 20 years (to more than a million)—and with that will come additional emission sources and an increase in the urban heat-island effect. Focusing on these areas will maximize the investments in this project yielding the greatest impact on a landscape scale.

## Accomplishments



### **Deliverables**

Action is required to meet federal air quality standards in the Treasure Valley. Completing a canopy assessment and analysis, establishing targeted canopy goals and incorporating these into action plans are the first steps in a long-term regional effort to use urban tree canopy to address air quality issues.

While air quality improvement is the driver for this study, gaining a greater understanding of tree canopy benefits toward energy conservation and stormwater reduction are also key objectives. Outcomes of the Treasure Valley study will be the incorporation of tree canopy in air quality, stormwater mitigation and energy conservation plans as cost-effective tools to help address air and water quality issues. Valuable baseline data will provide a way to measure future change. College and high school students will gain knowledge and experience in urban canopy assessment and all Treasure Valley citizens will benefit from improved air quality. Data will be collected using two assessment tools and methodologies, a field-based sampling analysis using US Forest Service i-Eco software and a GIS analysis using ArcGIS/CITYgreen software. These tools provide complimentary information that will inform canopy and air quality decisions required for this area. Deliverables include City Green reports that identify current and modeled tree canopy over different land uses (residential, commercial, etc.) and by city, 200-300 permanent sample plots; an i-Eco report describing results, regional canopy goals, methodologies for measuring change (success) over time in meeting these goals, and incorporation of trees as an action in air quality plans.

Assessment protocols and reports will be published in hard copy, electronic and online formats, through presentations to cooperators and communities, and at professional meetings. The results of this project will be marketed to other areas in the state and region to promote the practical application of assessment technologies to quantifying ecosystem benefits of trees and forests in cities.

### Accomplishments to Date

Both the plot-based field assessment using i-Tree Eco software and the geospatial analysis of tree canopy has been completed over 240 square mile in the most populated area of Idaho, which includes nine cities and parts of two counties. Data collection for the 250 1/10 acre i-Tree Eco plots were collected by two teams, each comprised of a science magnet high school student and a horticulture student from the College of SW Idaho.

I-Eco results indicate the existing tree population has a structural value of nearly \$3 billion dollars, and is most valuable at improving air quality. Annually, trees in the Treasure Valley remove 260 tons of PM10 worth \$4.1 million, 13 tons of PM2.5 worth \$2.9 million, and 276 tons of ozone worth \$752,000. The total value of tree canopy for air quality is ~\$7.7 million annually. As the tree population is generally very young—half the trees are less than six inches in diameter—benefit values will continue to grow substantially in the coming years. While information collected during this phase of the project gives a sense of the current value, it also demonstrates potential benefits from strategic increases in tree canopy, especially where it can have the greatest impact at cooling temperatures and shading impervious surfaces. Data and metrics generated from the i-Eco project informed future benefit models and formulae in the geospatial tools described below.

An RFP for the geospatial canopy assessment was advertised in early 2012 and Plan-it Geo Page 5 of 8



selected as the contractor. During the latter part of 2012, Plan-it Geo mapped existing land cover, including tree canopy (broken out by coniferous and deciduous trees), irrigated and non -irrigated turf, and impervious surfaces broken out by roads, parking lots and building footprints. They identified more than 1.1 million possible tree planting locations, and attributed each of these based on their land use, ownership, proximity to roads, buildings and other impervious surfaces, and whether they would provide a significant benefit at addressing energy, stormwater and air quality.

CITYgreen was not used in the assessment, as the software is no longer available. Instead, Plan-it Geo used an extension of ArcGIS developed specifically for planners, called CommunityViz, to create both large scale and site specific scenario tools that allow users to weight issues (i.e. air quality, energy and stormwater), and a variety of other data (land use, ownership, demographic information, etc.) and dynamically see the areas that best meet these criteria. Users can ask the software to "plant" trees in these areas based on a variety of userdefined variables, with the number of new trees and their cumulative value to a specified point in time will be returned.

The purpose is to give partners the ability to understand where and how best to direct strategic increases in tree canopy to yield the greatest value toward specific issues and other criteria, and to quantify the long-term value of increases in tree canopy in these areas. A training session for project partners on the use of these tools was given in March of 2013. IDL contracted with the Keystone Concept to serve as a liaison between project partners, IDL and Plan-it Geo to ensure the tools and data developed best fit the needs of those who will use it. The Keystone Concept will continue to facilitate communication among local partners and coordinate projects utilizing the data and tools into the future.

In addition to core team meetings held throughout the project planning and implementation stages, information and results of the study have been presented at the Idaho Chapter of the American Planning Association, the Idaho Lands Resource Coordinating Council, the Society of American Foresters National Convention, and the Idaho Horticulture Expo. Additional information is available upon request.

#### **Deliverables in Progress**

While the project deliverables are complete, a number of projects utilizing the data and tools are being implemented. In 2013, for example, Idaho Power—an investor-owned utility initiated an Energy Saving Trees pilot program in partnership with IDL, the Idaho Nursery and Landscape Association and the Arbor Day Foundation. Using the project assessment data to identify and target customers with planting spaces on the west-sides of their homes, Idaho Power offer trees at no charge to be planted in specific locations relative to the homes, and then modeled the long-term value of these investments. This pilot effort will be significantly enhanced this year with a goal of demonstrating that the cost of the program per unit energy saved is less than the cost of the generating the same level of electric capacity. If it pencils out, Idaho Power will continue to increase this program, shading our communities while reducing energy demand and long term costs.



### **Challenges**

A key challenge of the i-Eco field assessment was gaining permissions to enter private property, or even being able to reach property owners to ask the question as many no longer have "land-line" phone service.

I-Eco calculates the impact of canopy on ozone and particulate matter by species; however, the reports generated do not include this data. Partners feel this information is necessary to understand the role of canopy as contributors to ozone as well as their benefit at reducing it.

Understanding other elements of i-Eco and what the data both tells us and what they don't, and how best to use these data to inform the geospatial analysis continues to be challenging, and has required ongoing communication with Forest Service researchers and staff at Davey Tree Experts. Involving an air quality specialist from Plan-it Geo and airshed managers from the Idaho Department of Environmental Quality helped us tailor information and tools for the specific needs of partners within the study area.



## Impact Area



Information Last Updated 12/15/2015