Title:

Promoting Landscape Stewardship Through Interactive Interpretation.

Project Lead:

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Abstract:

Plants create and support earth's complex ecosystems and are fundamental to our existence. Given rates of population growth and migration into urban settings (80% in Arizona), defining sustainable landscape development and management is increasingly important for mitigating environmental impacts. In urban landscapes, science-based plant selection, design, installation and management practices promote production of significant tree benefits (ecosystem services such as capture of atmospheric carbon, and production of edibles), while also minimizing the inputs of water, chemicals and labor.

The UA Campus Arboretum promotes stewardship and conservation of almost 8000 campus trees. In 2013, we partnered with more than 12 campus units and community collaborators, hosted more than 700 community visitors on guided tree tours, employed or mentored 9 undergraduates, engaged more than 50 students and staff in service-learning landscape installations, and reached more than 1200 students in formal UA courses. Since the recognition of the campus as an arboretum in 2002, more than 800 botanical signs have been installed to promote understanding of their diversity and history. The ubiquitous nature of these signs creates a compelling opportunity to leverage our expertise in urban ecological sustainability through detailed interpretation of sustainability initiative throughout all of the campus built environment. To this end, we propose to install new interpretive signs embedded with QR codes. These codes allow mobile users direct access to a wide range of content including tree benefits calculations, tips on plant selection, water harvesting and management, ethnobotanical uses, harvest guidelines, and ecological associations. Further, the signs will facilitate the development of mobile, self-guided tours and encourage collaboration with formal UA courses, and other campus units employing sustainable initiatives on the campus grounds who may be able to develop online content accessed through the new botanical signage.

Project Narrative:

The UA Campus Arboretum was formally organized in 2002, but preserves an extensive, 123 year legacy of excellence in desert horticulture begun by the UA's first faculty. We have learned a lot about what plants and practices do best in our environment, which plants consume the least and produce the most. This is our goal in promoting landscape sustainability, factoring in the environmental, economic and social impacts to determine the best overall approach to building a sustainable urban campus. Although there is tremendous science available to guide plant selection and care, there is a dizzying array of archaic practices still employed throughout the southwest that reduce plant and ecosystem health, expend resources unnecessarily, and limit the benefits the landscape is able to supply. Although, planting trees is not recognized as an innovative solution to mitigating urban climate or improving environmental health, the simple fact is that trees are fundamental to all aspects of our human and environmental health. As a society we need to adapt our landscape practices (planting more of the right species, and caring for them appropriately) to reduce resource waste, encourage longevity, and maximize production of ecosystem services needed to sustain environmental health. The Campus Arboretum was organized by faculty who recognized the opportunity to use our tree-rich campus as a living laboratory to teach the world how to build and live responsibly in a resource-limited part of the world. What we have learned about urban landscapes amid environmental extremes mirror the need for knowledge worldwide amid global climate change and intense urbanization. What we have learned and practiced on campus can be a model for urban centers in arid regions worldwide. Working with UA Campus Planning and Facilities Management, we've made great strides in ten years in organizing a campus arboretum that satisfies the UA's Land Grant Mission in bringing science to bear on practical matters of relevance to university landscape administration. The Campus Arboretum directly interfaces with many formal UA courses, and runs effective outreach programs with a growing audience. However, by replacing the existing botanical signs with interactive, QR-coded signs, a relatively minor investment in technology and materials, our expertise could reach a much wider audience. The proposed sign improvements would not only showcase what we know about urban landscaping to a broader audience, but could also be leveraged to encourage collaboration with faculty and outreach coordinators seeking to implement an interactive component to their courses or programs. To this end, and with support from potential partners listed below*, the Campus Arboretum is submitting this proposal.

Stakeholders and Future Partners:

Grant McCormick, Campus Planner UA Planning, Design, and Construction*
Email: grantmc@email.arizona.edu Phone: (520)626-4416
Mark Novak, Landscape Architect, UA Planning, Design, and Construction*
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Dr. Melanie Lenart, Project Coordinator for LEAF Campus Harvesting*
Email: mlenart@email.arizona.edu Phone: (520)465-6877
Dr. Margaret Livingston, Professor College of Architecture, Planning and Landscape*
Architecture* *Email: mlivings@email.arizona.edu Phone: (520)621-5359*
Dr. Barry Pryor, PLP305 Plant Pathology Faculty, School of Plant Sciences*
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LoriAnne Barnett Education Coordinator, National Phenology Network
Email: labarnett@email.arizona.edu Phone: (520)622-0363

**Letter of support attached*

UA Student Benefits:

Faculty teaching Plant Sciences, Plant Pathology, Microbiology, Entomology and the popular UA Heritage and Traditions class have expressed interest in using the Campus Arboretum signage to create interpretive opportunities throughout the landscape that would allow students to extend learning out of the classroom. By creating a handful of webpages, each of these faculty could link the QR code under a campus tree to a website describing the historical significance of that tree or campus location to the University, the ecological roles trees play, the pests and pathogens to watch out for with that species of tree, or the resource intensity (water and maintenance requirements) of that species. These courses actively engage more than 800 students each year. Further, collaborators from the National Phenology Network, the UA Linking Edible Arizona Forests Network, College of Architecture, Planning, and Landscape Architecture, the Visitor's Center, and Campus Planning, Design and Construction, would enjoy enhanced capacity for outreach to both students and the community members that already participate in their existing training, tours, or other campus sustainability activities.

All facets of the Campus Arboretum sign project will be led by undergraduate students under the supervision of the Campus Arboretum Director. Specifically, the project will be directed by a Campus Arboretum student worker currently employed and paid as a Federal Work Study student. This in-kind contribution will provide an Administrative Co-Leader who will direct all other project coordinators and student workers on the project. Four coordinators will be required to develop 1. signage, 2. web content, 3. educational materials, and 4. marketing with the support of additional student workers as follows:

1. **The Signage Coordinator** will work with 1 additional student worker to inventory and map existing signs (Figure 1), remove them, design, manufacture, and install new signs with a QR code (Figure 1). Design will be coordinated with UA External Relations, and installation of new signs coordinated with Campus Planning and Facilities Management. As needed, based on demand, students will also coordinate with relevant campus units to place new QR coded interpretive signs at sites featured throughout campus (For

example, The UA Community garden, the Visitor's Center Sustainable Landscapes tour, the Campus Arboretum's Sonoran Native Plants tour, the LEAF Network's Edible Landscapes tour, CALA's Underwood Garden, or the National Phenology Network's Campus Phenology tour.)

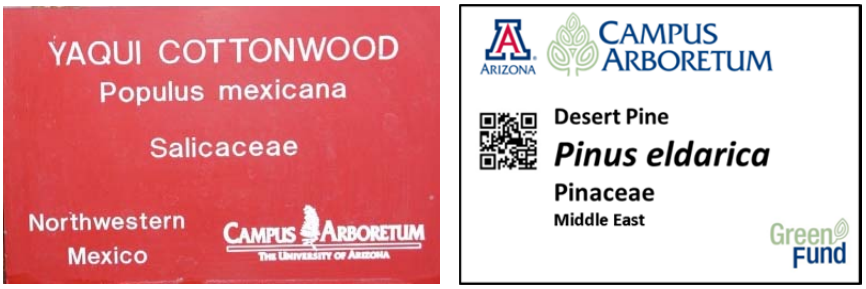


Figure 1. Existing Campus Arboretum sign (Left) and proposed new QR coded sign (Right).

2. **The Web Content Coordinator** will work with 4 additional student workers to create species descriptions for all taxa not yet described on the arboretum website. This will include documenting water use, human uses, and cultural management information to guide proper planting, installation and care of plants (Figure 2). Each species sign will also be linked to the National Tree Benefits Calculator (Figure 2) to allow users to calculate and compare environmental benefits (shade, CO_2 sequestration etc.) for any southwest tree. The web content group will build new pages to house content from existing printed tour booklets, and work with the educational coordinator to convert them to more accessible online format for self-guided tours.

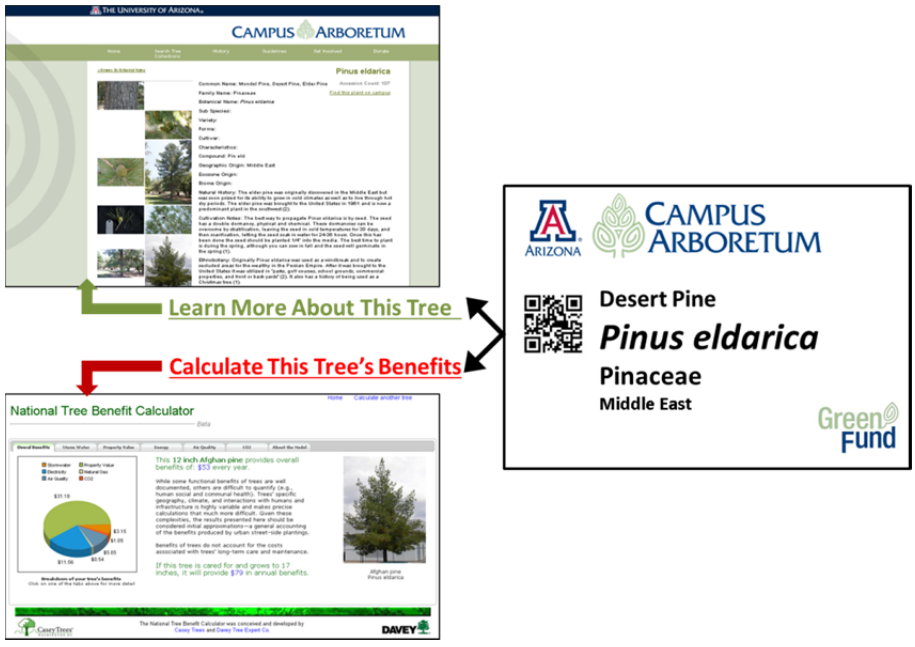
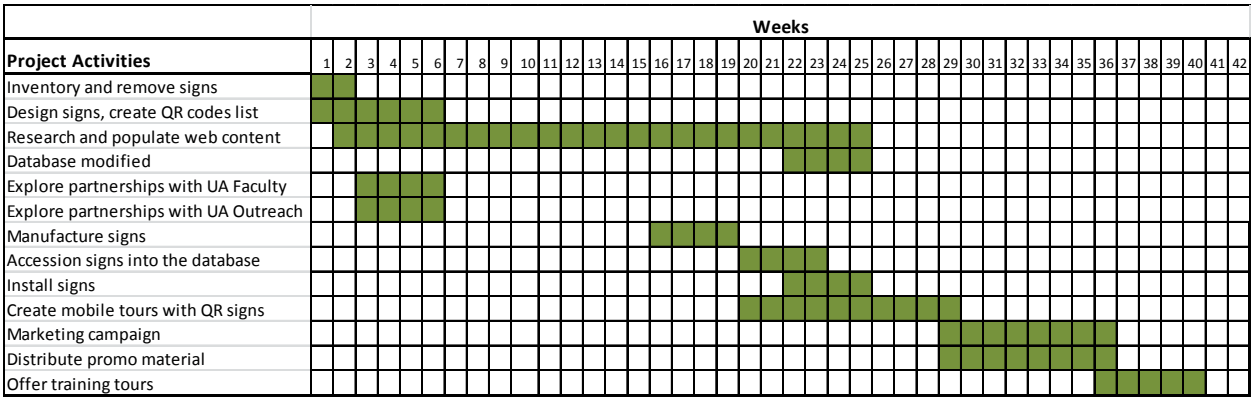


Figure 2. The QR Code will provide a choice to link to one of several pages including the UA Campus Arboretum species description page, the National Tree Benefits Calculator, or others.

3. **The Educational Coordinator** will work with 1 other student who will create interpretive tours linking groups of QR signs based on thematic content similarities (heritage trees, drought tolerant landscape trees, edible trees etc.) and produce self-guided tour booklets. They will also organize guided tours to recruit faculty and students interesting in leveraging the signage for their courses or outreach programs. Since the Campus Arboretum already has an adult volunteer training program in place, students may be integrated as volunteers to host guided tours in the future. The self-guided tours created by the students and the potential for students to work with existing tour guides, offer solutions to ensure the long-term maintenance of the program without the need for further funding.

4. **The Marketing Coordinator** will coordinate capture of botanical photography for the Web Content group, assist the Educational Coordinator in the production of materials for self-guided tour instruction, publicize and promote the new Campus Arboretum sign and web content resources, create a system to track and analyze web activity, record training and tour requests, and other assessments to guide future program improvement.

Timeline:



Projected Outcomes:

Short-term impacts:

In the immediate future, this project provides 10 student workers with intensive training in the care, ecology and human uses of more than 480 species of ornamental landscape plants. The students experience will not only nurture within them a deeper connection to the urban ecosystem they inhabit, but also enhance the understanding of the fundamental role plants play in underpinning environmental health, and articulate a variety of simple ways anyone can promote landscape stewardship and mitigate the intense environmental impact we impose through urban development. The impact of these signs will be assessed by tracking web site

activity linked to from QR coded signs, and the number of self-guided tour booklets downloaded or checked out. Immediately, formal classes in landscape architecture and plant sciences will incorporate the interpretive signage to enhance learning for more than 200 students. Many other formal classes at the UA could benefit from using the signs to extend learning out of the classroom. Further, production of interpretive tours in mobile format will improve visibility and impact of the UA Campus Arboretum outreach tours, and other campus sustainability programs (For example, CALA's Underwood Garden, Community Relations' Sustainable Landscapes tour), campus harvesting (The LEAF Network and Campus Arboretum Edible Landscapes), and phenology data collection (National Phenology Network Campus trail). Letters of support from some of these potential faculty and staff partners accompany this proposal. The existence of website analytics provides the means to track user interest, assess the success of outreach programs and direct improvements of future sustainability-related programs. Ultimately, enhancing the visibility and outreach potential of the campus landscape strengthens The University of Arizona's reputation as a champion of desert sustainability.

Summary of desired short-term impacts and metrics:

1. Student workers and students in formal UA classes will immediately gain training and understanding of sustainable landscaping practices that maximize tree health, and the ecosystem benefits they provide, while reducing resource consumption (labor, water, chemical inputs). *Metrics: classes employing the QR coded signs and student contact hours will be calculated.*
2. Campus residents and visitors have ready access to educational materials promoting use of sustainable landscape practices and measurable tree benefits contributed by hundreds of landscape species. *Metrics: web hits from QR coded links to the Campus Arboretum sites will be counted, tour booklets downloaded or checked out in paper copy will be documented.*
3. Impact and visibility of campus sustainability programs will increase through integration of interpretive information in an accessible media format. *Metrics: web hits channeled from the Campus Arboretum QR coded signs linking to other sites promoting sustainability will be counted.*

Long-term impacts:

Mobile access to species detail in the field will also enrich the educational value of the campus landscape for students, staff and visitors. However, it is also anticipated that better interpretive signage will also provide a public means of informing and acknowledging improvements in plant selection, design, and landscape management practices implemented by campus administrators. In this way, that the campus grounds will increasingly reflect our understanding of urban ecology and desert horticulture. These new signs will also provide infrastructure to

encourage collaborations among other campus sustainability initiatives wishing to provide accessible, low maintenance interpretation of their program. For example, The UA community gardens could develop a "Vegetable Garden HOW-TO Guide" accessible directly from the garden plots.

Summary of desired long-term impacts and metrics:

1. Campus education regarding landscape sustainability will improve. Collaborations will spawn additional interpretation of campus sustainability initiatives and related educational programs including new interactive tours, and mobile applications for site interpretation, and campus data collection. Metrics: *Collaborations with other campus units using the signs will be recorded 1-3 years after the project completion.*
2. Sustainability-focused outreach programs will improve. *Metrics: use of campus arboretum resources, and other links available through the QR coded interpretive signs, will be recorded as an assessment of effectiveness.*

All short term and long term impacts will be reported in the Campus Arboretum newsletter and annual report.

Budget: See the attached spreadsheet.

Marketing:

Currently, promotional materials for the Campus Arboretum are distributed across campus and throughout Tucson. These materials direct attention back to the website, which has received more than 50, 000 visitors since its inception 18 months ago. The Campus Arboretum website contains pages describing all Student Projects where a new page will be created to promote the new botanical/interpretive signs and recognize UA Green Fund support. Further, all new signs will include the Green Fund logo, and news of the project's completion will be sent to more than 700 subscribers to the Campus Arboretum e-newsletter and Facebook audience. Any news generated externally will acknowledge UA Green Fund support for signs and related promotional and educational materials. Further, 15 volunteers who provide more than 30 guided tours to approximately 1000 visitors annually can be leveraged to promote the use of QR coded signs and self-guided interpretive tours and which will recognize the UA Green Fund's support.