

## CAMPUS ARBORETUM 2023-33 STRATEGIC PLAN

**Program Purpose:** to provide global leadership through university research, education and outreach promoting conservation and stewardship of urban trees as solutions for global challenges of climate change, and urbanization in arid lands.

**Program Context:** The world's population is growing, and humanity has largely adopted urban areas as its primary choice of habitat. This process of urbanization concentrates the impacts of population growth and creates profound environmental, economic, and social implications for the world's future. For example, urbanization contributes to catastrophic loss of biodiversity, ecosystem degradation, landscape fragmentation, local climate perturbation and fosters a cultural disconnect between environmental health and the human population being supported. Research has established that trees are among the most efficient strategies for both climate change mitigation<sup>1</sup>, as they are essential to ecosystem function, and for climate adaptation as they provide cultural, social, and therapeutic benefits for humans while we work to eliminate atmospheric greenhouse gases. Although science supports the profound role of urban forests for environmental and human health, current landscape development and management practices are largely out of sync with natural systems and often result in compromised plant performance, longevity and capacity to restore ecosystem services lost during urban development. Continued unwillingness or inability to see, understand, select, cultivate, and manage urban trees destroys the potential to secure our future comfort and the stability of earth's systems.

The main UA campus location in Tucson, AZ affords a unique opportunity to address the need to study and inform tree selection and management practices. The campus tree collection consists of plants from around the world selected for their tolerance to arid climates. These trees are sited in a city that is consistently among the fastest warming cities in the US<sup>2</sup> and located in a state that is experiencing faster population growth and rate of urbanization compared to other US cities. Collectively the historical and physical context can be leveraged to develop research, extend education, and model best practices for tree selection and care that will optimize the role of trees in combatting climate change and supporting urban resilience broadly. Our expertise as a Tier I **research** school, the focus on environmental **education**, and the **outreach** stemming from the UA's land grant origins, can be coordinated, and leveraged to solve some of the greatest challenges of modern times. We have greatest potential to discover genetic and evolutionary underpinnings of plant stress adaptations, to assess tree selection, to catalog and expand tree biodiversity suitable for various climate prediction models, to educate and train scientifically and socially literate citizens, and to display innovation, and sustainable management practices on the campus grounds as a model for arid cities worldwide.

1. "The global tree restoration potential" Jean-Francois Bastin, Yelena Finegold, Claude Garcia, Danilo Mollicone, Marcelo Rezende, Devin Routh, Constantin M. Zohner, Thomas W. Crowther Science 05 Jul 2019: Vol. 365, Issue 6448, pp. 76-79.
2. "American Warming: The Fastest-Warming Cities and States in the U.S." Research brief by Climate Central Published April 17, 2019. <https://www.climatecentral.org/news/report-american-warming-us-heats-up-earth-day> Accessed July 12, 2019.

**Mission:** The UA Campus Arboretum is a living laboratory promoting stewardship and conservation of urban trees through research, education and outreach.

To fulfill this mission we will:

1. Strengthen connections to **research** programs on and off campus to advance the science of tree in supporting human and environmental health through conservation and climate adaptation.
2. **Educate** and empower students through participation in research experiences, and service-learning projects so they may contribute as future scientists, civic leaders and land managers.
3. Extend university research discoveries and practical applications to communities beyond the main campus through expanded **outreach** (informal, public education) programs.
4. Integrate arboretum programs and goals with campus **operations**, to create sustainable landscape construction and management standards and processes.

**2033 Vision:**

The University of Arizona Campus Arboretum aims to be a global scientific and educational leader informing and directing the optimal use of trees in urban landscape development as a response to climate change. To achieve this vision, the Campus Arboretum will create partnerships with UA researchers, develop programs that engage students and citizens in formal and outreach education, and work with UA operations to develop standards and processes that facilitate the addition of an academic overlay in landscape development. In this way, the Campus Arboretum can function as a living laboratory, participating in discovery and education while also translating science within the physical development of campus landscapes, and transforming the grounds into an immersive experience of the UA commitment to environmental, social and economic sustainability.

- **Research** will assess performance of campus trees, generate discovery relating to woody plant adaptations to environmental stress, and application of this findings to tree selection and management recommendations.
- **Educational** programs will train and involve both students in creation of outreach and interpretive content, participation in laboratory and field research, and service learning projects aimed at applying classroom learning to develop solutions for community challenges.
- **Outreach** programs will be expanded consciously to translate and extend university research findings and educational programming in-person and on-line audience interested in urban resilience in arid climates.
- To create a cohesive loop between, research, education and outreach, the Campus Arboretum will also work with university **operations** to facilitate the creation of mission-driven landscapes. In this way, the science-based practices incorporated into the physical grounds will present unequivocal evidence of our expertise and model operational integrity.

**Summary:**

This plan outlines four strategic goals with supporting actions that will position the UA Campus Arboretum to:

1. build research programs that capitalize the value of the campus living collections,
2. enhance and complement student education and professional development,
3. expand outreach programming for campus and global communities, and
4. provide leadership for mission-driven campus landscape development initiatives.

## STRATEGIC GOAL ONE:

### **Build research programs that capitalize the value of the campus living collections**

#### **A. Current situation and gap between current situation and desired situation**

The Campus Arboretum was formally established in 2002 to preserve the historic specimens on campus and to perpetuate the legacy of using the grounds as an experiment station and interpretive site. This relative newness of the program necessitated initial emphasis on advocacy, and outreach relating to the living collections while the program established. Additionally, the position of a 0.20 FTE Director housed within an academic unit (the School of Plant Sciences) has facilitated student engagement and professional development (which is aligned with the Director's primary instructional responsibilities) but precluded exploration of research potential. To close this gap and integrate the program in all three of the UA's missions, the Campus Arboretum aims to facilitate the use of living collections for impactful research of the highest level.

#### **B. Strategies to achieve goal**

- a. Identify research collaborators with greatest potential to study of arid-adapted campus trees.
- b. Collaborate with Cooperative Extension research specialists to develop and fund applied research programs utilizing the campus trees and living collections.
- c. Establish a scientific advisory board to identify and define research potential of the collection in the life, physical, and social sciences.
- d. Establish a Center for Urban and Wild Plant, Insect and Fungal Diversity.

#### **C. Actions**

	<b>Time Period</b>
1. Convene university faculty and extension researchers to explore current or future research projects that utilize the campus living collections.	FY23
2. Create plant lists for future climate using the BGCI Climate Assessment Risk tool	FY23
3. Provide plant material for genomic sequencing with Arizona Genomics Institute	FY23
4. Supervise student research supporting arboretum collaborators	FY23-33
5. Convene public gardens and practitioners to industry and community survey needs	FY24
6. Catalog and define collection diversity and develop a campus tree succession plan	FY25
7. Apply for grant funding of new research	FY24-26
8. Connect undergraduate and graduate students with research opportunities	FY26-33
9. Publish basic and applied research findings in peer-reviewed journals	FY27-33
10. Populate arboretum webpages with research summaries and publication links	FY27-33

#### **D. Inputs needed to achieve the goal**

- ✓ In person and online meeting spaces.
- ✓ Financial and business support for grants and reporting.
- Grant and donor funding for research supplies, and wages for students/technicians.
- Research liaison and coordinator to initiate and administer research programs or center(s).

#### **E. Objective metrics that will be used to track progress towards attaining goals**

- Research and industry collaborations
- Grant funding
- Sponsorships and giving.
- Projects completed and published
- Access to online resource use (ie. web hits for research)

## STRATEGIC GOAL TWO:

### Enhance and complement student education and professional development

#### A. Current situation and gap between current situation and desired situation.

The Campus Arboretum is directed by a faculty in the School of Plant Sciences with primary (0.70 FTE) responsibility for instruction. The nature of this position facilitates student engagement with the arboretum both in the classroom, and through internships and experiential learning courses and student employment. Between 2010 and 2022, 157 students participated in projects with the arboretum as interns, and student workers. Most of these students completed literature reviews for species reports published on the arboretum website or completed service-learning projects in which they applied formal course learning to create solutions community and campus needs. To build upon this pattern of student training, the Campus Arboretum aims to formalize student professional development and work to connect trained students with off-campus internships, specialized training, and employment at public gardens and green industry nationwide.

#### B. Strategies to achieve goal

- a. Create an arboretum workshop course to formalize undergraduate training
- b. Establish an archive of professional development opportunities from past years
- c. Collect and distribute recurring position descriptions with the green industry
- d. Build connections with community partners and monitor industry needs

#### C. Actions

	Time Period
1. Submit a course proposal for an arboretum workshop	FY22
2. Actively recruit candidate projects and internship on and off-campus	FY23-33
3. Provide training and mentor campus interns and student workers	FY23-33
4. Populate the SPLS D2L course sites with archived and potential opportunities	FY23-24
5. Circulate internship and project opportunities among university advisors	FY23-33

#### D. Inputs needed to achieve the goal

- ✓ Course approval for PLS497 Workshop
- ✓ D2L course site access
- ✓ Academic advisors to promote opportunities and facilitate participation
- Funding to support student worker and internship wages
- Funding to support project materials as needed

#### E. Objective metrics that will be used to track progress towards attaining goal

- Students enrolling in and successfully completing PLS497 Arboretum Workshop
- Quantity and diversity of internships and opportunities in the D2L site
- Number of community partners
- Successful internships and projects completed
- Funding for student wages, equipment and materials.

## STRATEGIC GOAL THREE:

### Expand outreach programming for campus audience and global communities

#### A. Current situation and gap between current situation and desired situation

As a garden situated in the heart of a desert city, and integrated into the main campus landscape, the Campus Arboretum provides great opportunity for connecting the campus and surrounding community with university science relating to sustainable landscapes. Every square inch of greenspace offers potential to educate and to inspire. The urban context, as well as the diversity and maturity of the collection define a highly relevant focus on the necessity of trees for urban resilience. Outreach programming is limited to in person and online tours of the collection. In person tours are coordinated and hosted by Pima Co. Master Gardener volunteers and online virtual and mobile tours have been created by students. Tours as well as online tools and resources are accessed by ~65,000 people each year but promotion is usually passive. Likewise, invitations to participate in support of community partners or to host outreach events on campus are routinely passed up. Additionally, donor relations, engagement and a significant portion of fundraising responsibility (that which falls below the threshold of major gifts) are challenging to address within the Director's 0.20FTE appointment. To correct this situation, the Campus Arboretum aims to expand staffing support to increase the visibility and utility of existing arboretum resources for a broader regional and global audience, enhance educational programs, and nurture community and donor engagement.

#### B. Strategies to achieve goal

- a. Define a pathway and process to connect research discovery and applications to outreach
- b. Promote existing outreach opportunities, seek out and schedule others
- c. Develop marketing, media, and other materials to support donor engagement.

#### C. Actions

	Time Period
1. Publish a newsletter monthly, expand promotion of web resources, tours and events.	FY23-33
2. Host an Annual Arizona Plant Festival to communicate research and build community	FY23-33
3. Table at community outreach events (Science City, Million Trees, etc.)	FY23-30
4. Provide volunteer training and coordination	FY24
5. Update the arboretum website	FY24
a. integrate the Desert Landscape site	
b. modify structure to increase visibility of outreach tools and opportunities	
6. Add kiosks in Herring Hall, and improved interpretive signage at key garden locations	FY24-25
7. Develop targeted sponsorship campaigns.	FY23-28
a. 20 <sup>th</sup> Anniversary Commemorative Garden	FY23
b. Campus Health Fragrance Garden	FY23-24
c. The President's Pond	FY24-25
d. Main Gate	FY25-27
e. The UA corners and other entry points to campus.	FY27-28

#### D. Inputs needed to achieve the goal

- ✓ CALS or UITS support and web development.
- ☐ Communications, marketing and development support.
- ☐ Educational program leader, and volunteer coordinator.

#### E. Objective metrics that will be used to track progress towards attaining goal

- Sponsorships and giving.
- Online resource use. (web hits)
- Tour participation.
- Talks, workshops and attendees.
- Volunteer hours.

## STRATEGIC GOAL FOUR:

### Provide leadership for mission-driven landscape development

#### A. Current situation and gap between current situation and desired situation

The Campus Arboretum is currently housed as a 0.20 FTE appointment in Cooperative Extension. This placement within the university structure is suited for the research, and outreach functions of the program but creates considerable challenges for building and maintaining the campus tree collection to ensure its value to university missions (research, education, and outreach). Challenges primarily result from limitations in operational processes that obfuscate communication both within operations as well as between stewards in campus operations and those in academic programs who aim to build and protect the intellectual value of the collection. Disconnection is experienced at the planning, approval, maintenance, and direction of internal funding toward landscape development misaligned with the function of campus greenspace as a living laboratory. Efforts to track, collect, share data, generate reports, set and implement goals and standards of care, prioritize funds for educational initiatives, correctly calculate claims for lost trees, or apply national standards in the care of campus trees and shrub are among the ways the institutional structure and process inhibit the university from leveraging the value of the living collections. To improve this situation, the Campus Arboretum aims to provide leadership in creating widespread advocacy for conscious campus development that strengthens the reputation of the university as a responsible steward and champion for progressive landscape practices suited for future climate and on-going urbanization.

#### B. Strategies to achieve goal

- a. Establish processes to prioritize and coordinate campus landscape changes.
- b. Participate in campus planning and management decisions.
- c. Develop goals, standards, policies and processes for sustainable landscape development.
- d. Facilitate training and professional development for grounds maintenance staff.
- e. Establish funding mechanism to support landscape improvement that align with university missions.

#### C. Actions

	Time Period
1. Organize a Landscape Advisory committee representing diverse stakeholders.	FY23
2. Establish goals, standards, policies and processes for campus development.	FY23-25
a. Revise the campus collections policy	FY24
1. set goals for plant biodiversity	
2. refine criteria for plant water use, and environmental adaptations.	
b. Create a plan for succession to integrate climate-ready campus trees	FY25
3. Identify funding sources to support sustainable development of greenspace.	FY26
a. Fund top proposals selected for greenspace improvements.	FY27
4. Leverage E-GIS to connect and improve communication among landscape stewards.	FY24
5. Expand web-based tools for grounds maintenance decisions support.	FY25
6. Complete the arboretum inventory and keep current records of accessions.	FY26
7. Revise the Tree Care Plan to clarify plant installation and maintenance standards.	FY27

#### D. Inputs needed to achieve the goal

- Institutional appointment of a Landscape Advisory committee lead.
- Restructuring the Campus Arboretum reporting within the institution.
- Leadership from operational units to develop, train staff, and implement standards.
- Allocation of funds to support sustainable landscape improvement awardees.

#### E. Objective metrics that will be used to track progress towards attaining goal

- Increase in collection accession count.
- Change in collection diversity, composition, and condition.
- Number of research, educational and interpretive gardens installed on time and within budget.