COLLEGE OF AGRICULTURE & LIFE SCIENCES

CAMPUS ARBORETUM



Urban Desert Landscapes –
Creating Climate Resilience One Tree at a Time!

Tanya Quist, PhD
University of Arizona School of Plant Sciences

What Would Life Be Like Without Trees?

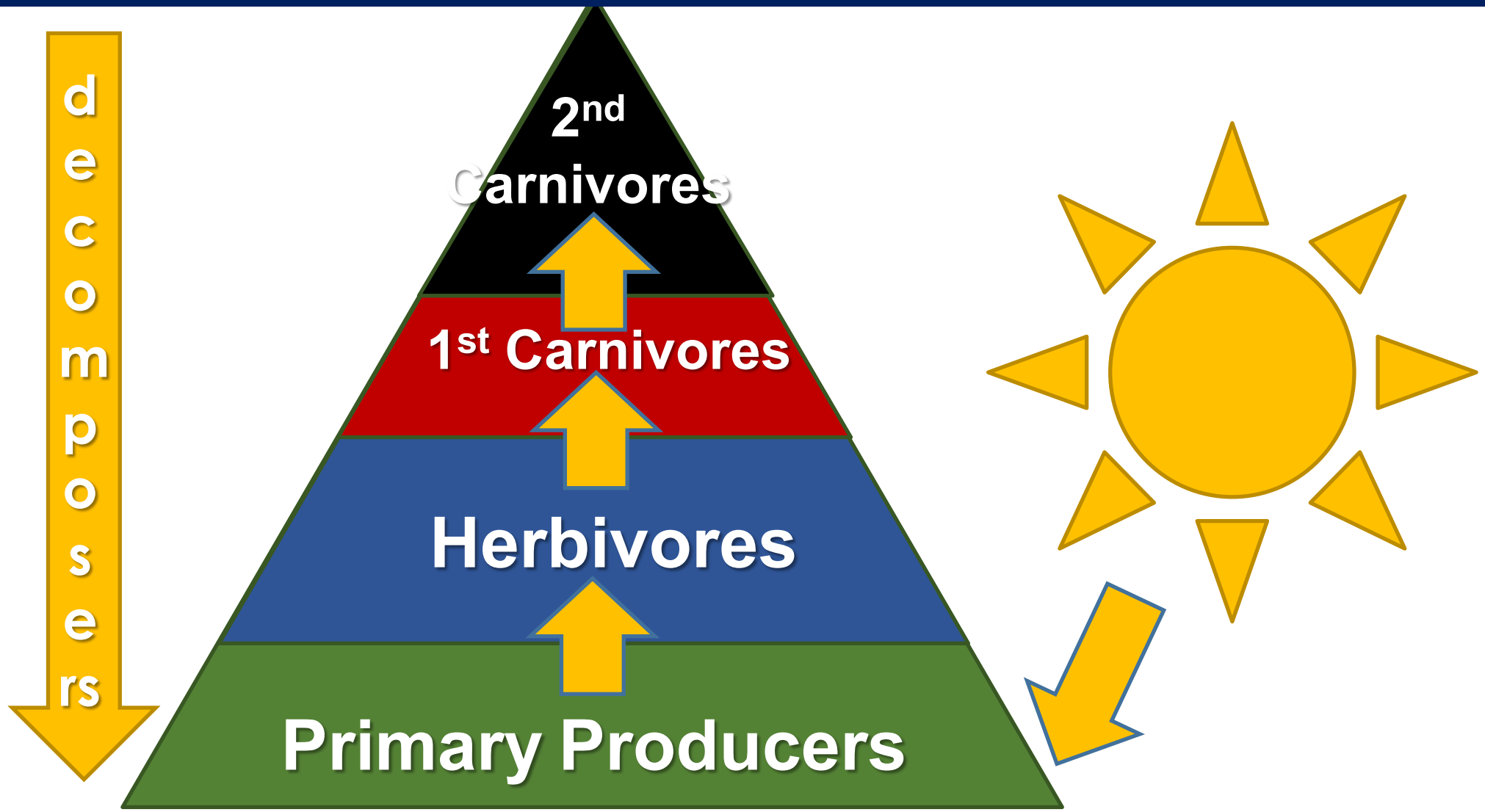
Herring Hall

Old Main

Outline

- Guiding principles relating to urban landscapes.
  - Ecosystem services plants provide.
- Role and challenges of trees in Arizona cities.
- 3 things you can do to for resilient urban landscapes.
  - Revised Desert Landscape site.

Plants are Foundational to Life on Earth



Ecosystem Services

Trees are foundation species in terrestrial ecosystems. Foundation species: tree species that define and structure ecosystems through their influences on associated organisms and modulation of ecosystem processes. (Ellison et. al, 2005)

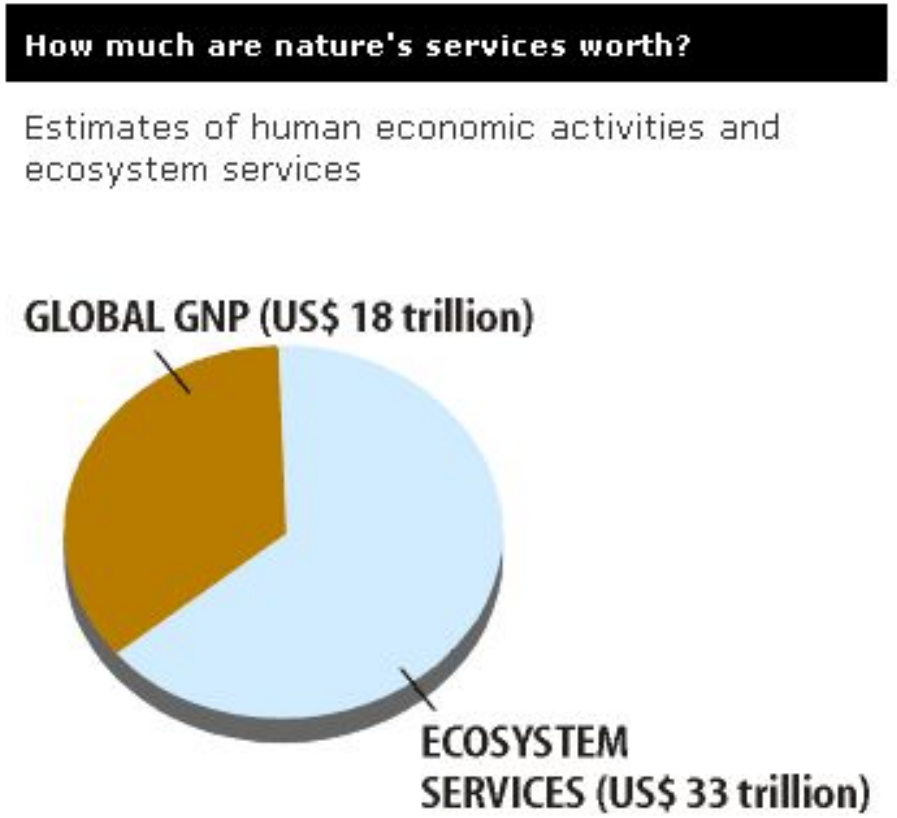
Ecosystem: *an interdependent community of living and non-living things.*

Ecosystem Services:

The goods and services produced natural processes as living and nonliving elements interact.

Ecosystem Services = Natural Capital

The value of the world's natural capital ~ $33 Trillion/Year ~ 2x world's combined GNP.



Source: Adapted from R. Costanza *et al.*, "The Value of the World's Ecosystem Services and Natural Capital," *Nature* Vol. 387 (1997), p. 256, Table 2.

Ecosystem Services = Natural Capital

Urban Ecosystem Services = Green Infrastructure

Low cost, natural solutions for urban problems.

ie. water harvesting, green roofs, low impact development

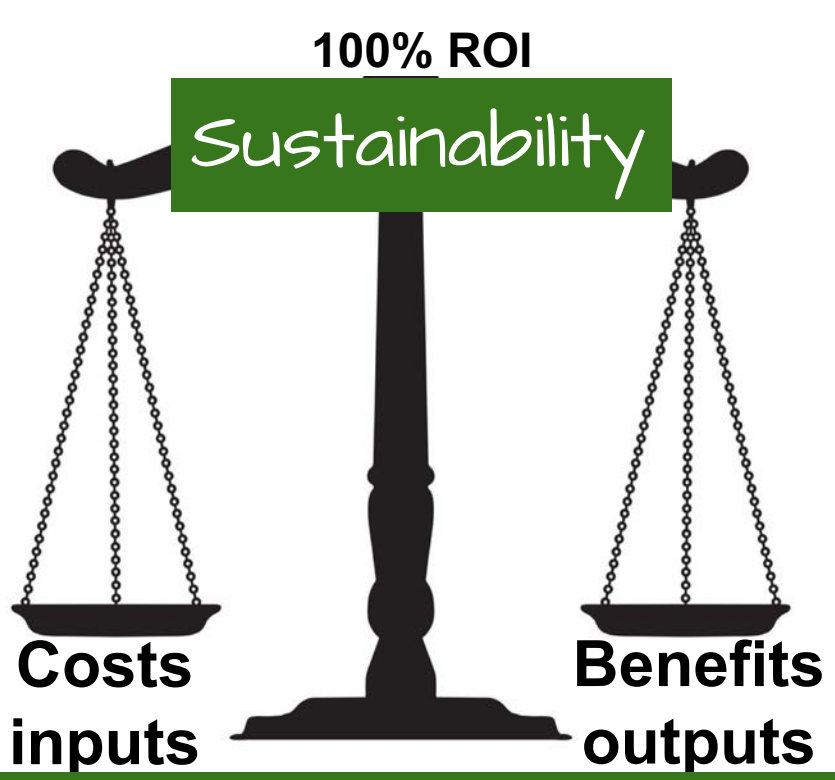
Trees Benefit Cities

Increase property values
Increase retail foot traffic
Conserve energy
Reduce utility demands
Mitigate urban flooding
Reduce repaving interval

Expand opportunities for recreation and community gathering
Promote health
Reduce crime
Calm traffic
Support urban wayfinding
Preserve culture/heritage

Provide food
Generate oxygen
Capture CO_2 /GHG
Support wildlife
Improve air quality
Protect water quality
Reduce soil erosion
Combat drought.

Trees Pay Us Back



Tree provide benefits with real value and excellent return on investment for humans and the planet in natural and built environments.

For every $1 invested in US urban trees, there is an average of $3.50 of (environmental and economic) goods and services provided to the municipality

Campus Arboretum Green Infrastructure Value

Replacement…… $28,217,339

Services…….. $272,997 / yr

$44.95/tree

Energy Savings……. $55,065 / yr

CO_2 Sequestration… $29,180

3,890,698lbs of CO_2 stored

708,010lbs of CO_2 avoided

Stormwater…….. $13,766 municipal savings

2,867,671 G trapped and filtered

Air quality…….. $13,675

474 lbs of pollutants removed.

Arizona Needs Trees

Urbanization Concentrates Environmental Impacts

Urbanization, industrialization, population growth has led to loss of natural environments in urban areas. Lost too are the benefits of green spaces.

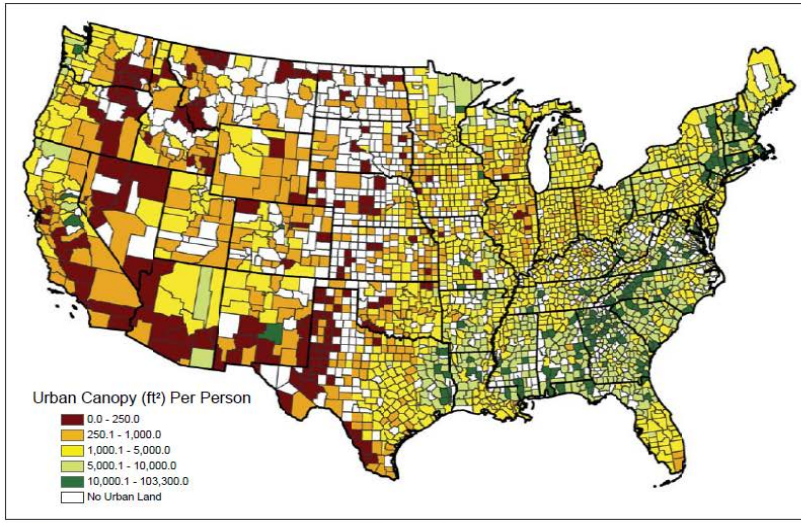
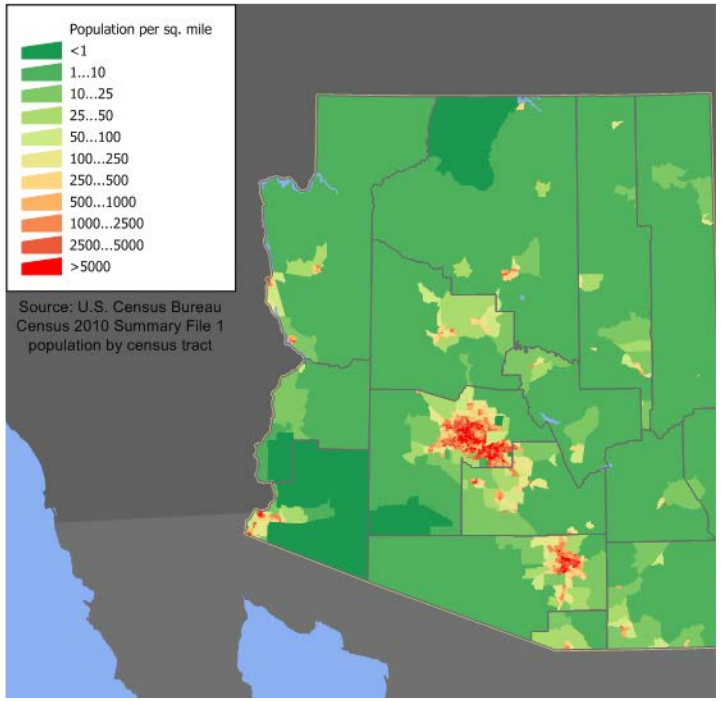


Figure 3—Urban canopy (ft²) per person (urban canopy / urban population).

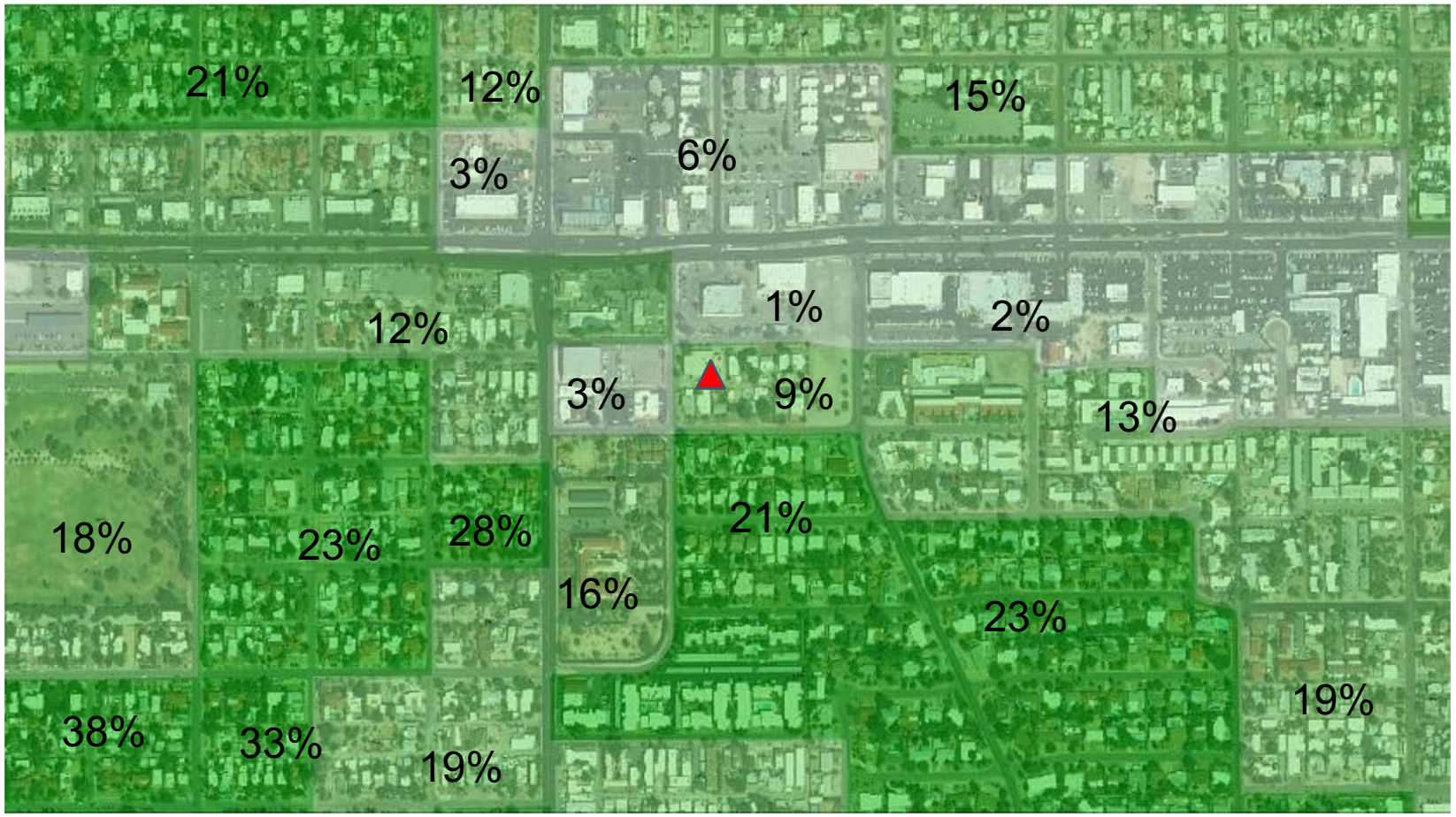


The Southwest is one of the most rapidly urbanizing regions in the United States.

80% of Arizona's population lives in 1 of 3 major metropolitan areas.

Nowak et al. (2010) Sustaining America's Urban Trees and Forests USDA NRS-62 Techinical Report.

Tucson Canopy Cover

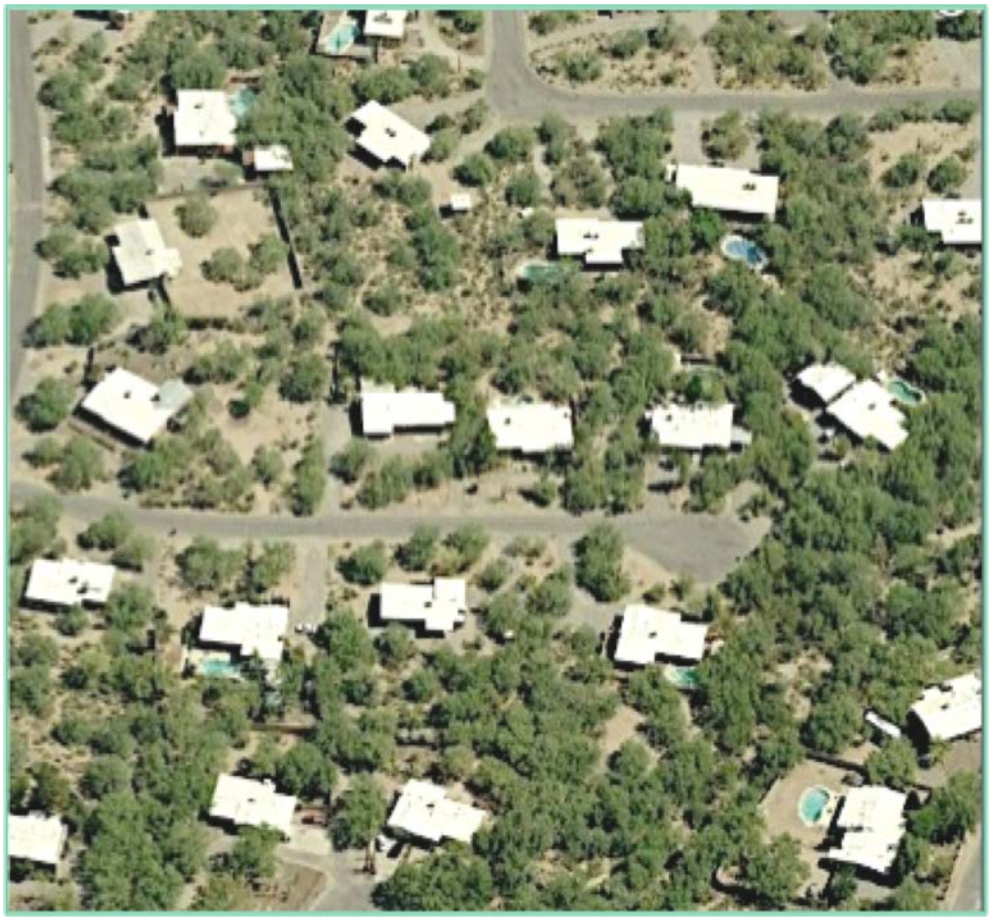


PAG – Planning and Green Infrastructure Prioritization Tool
https://gismaps.pagnet.org/PAG-GIMap/Map.aspx

American Forests and the USFS recommends 15-20% baseline target canopy cover for desert cities. The ideal is **26%**

The average canopy cover in Tucson is **~8%**

Tucson Canopy Cover



Canopy disparity correlates with heat vulnerability

Conservation in Your Backyard!

AMWUA.ORG

- The largest use of potable water in Arizona is for landscaping.
- As much as 70 percent of residential water use is outdoors.
- Water use in all landscapes can be significantly reduced by using efficient and regionally-appropriate designs, plant selection, and irrigation practices.

AZ Department of Water Resources

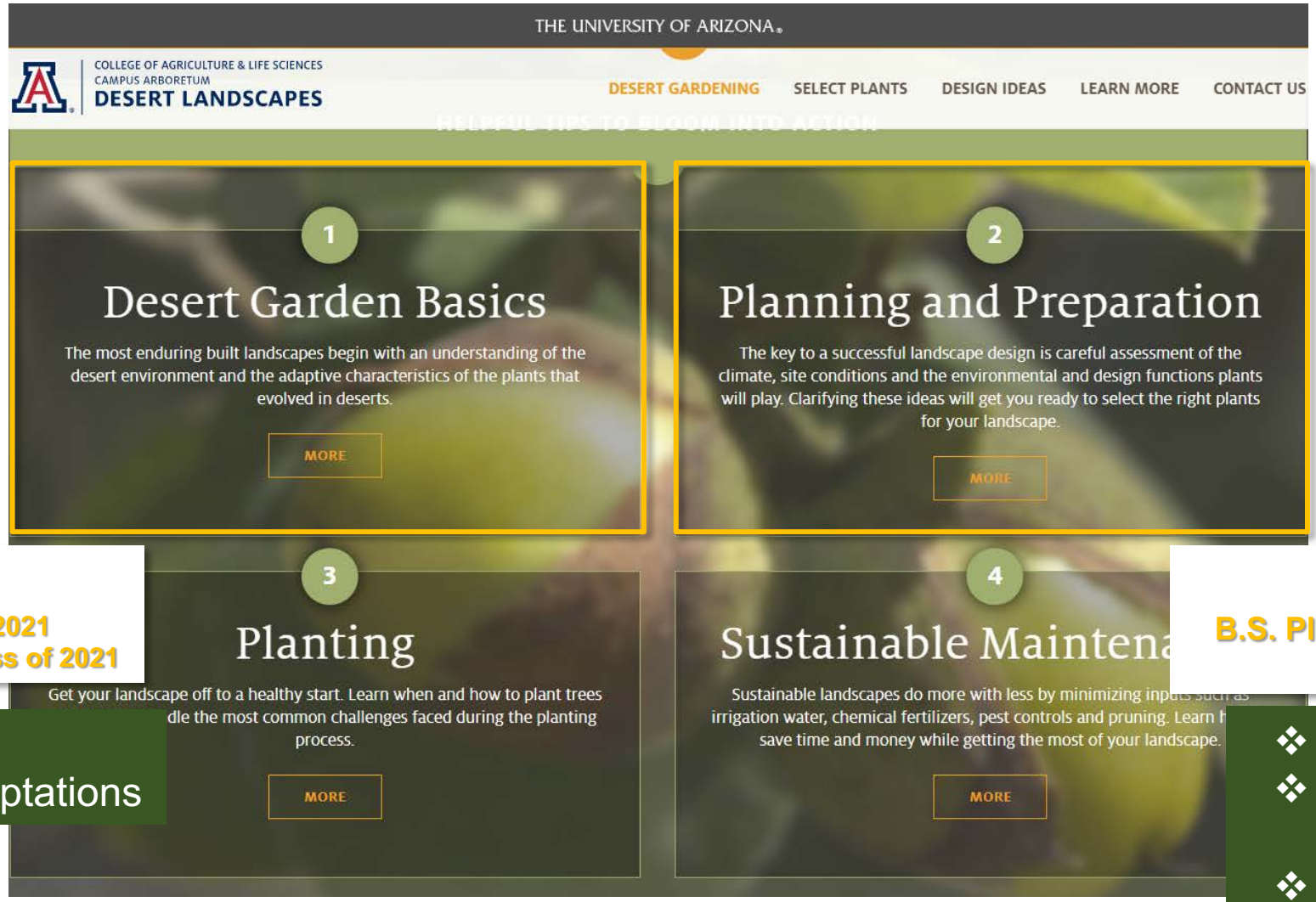
Three Things YOU Can Do.

1. Plan thoughtfully.
2. Plant properly
3. Manage sustainably

Plan Thoughtfully

Alex Peck
B.S. Plant Sciences, Class of 2021
B.S. Biology, Biomedical, Class of 2021

- Desert Biomes
- Desert Plant Adaptations



Adam Leon
B.S. Plant Sciences, Class of 2020

- Healthy Ecosystems
- Urban Landscape Considerations
- Responsible Design

Plan Thoughtfully

Design Gallery

Germinate ideas for your desert landscaping project with this handy plant gallery.

1. 
   Trailing Indigo Bush
   Dalea greggii
   TYPE: GROUNDCOVER

2. 
   Bougainvillea
   Bougainvillea species
   TYPE: VINE

3. 
   Brittlebush
   Encelia farinosa
   TYPE: SHRUB

4. 
   Engelmann's Prickly Pear
   Opuntia engelmannii
   TYPE: CACTUS

5. 
   Century Plant
   Agave americana
   TYPE: ACCENT

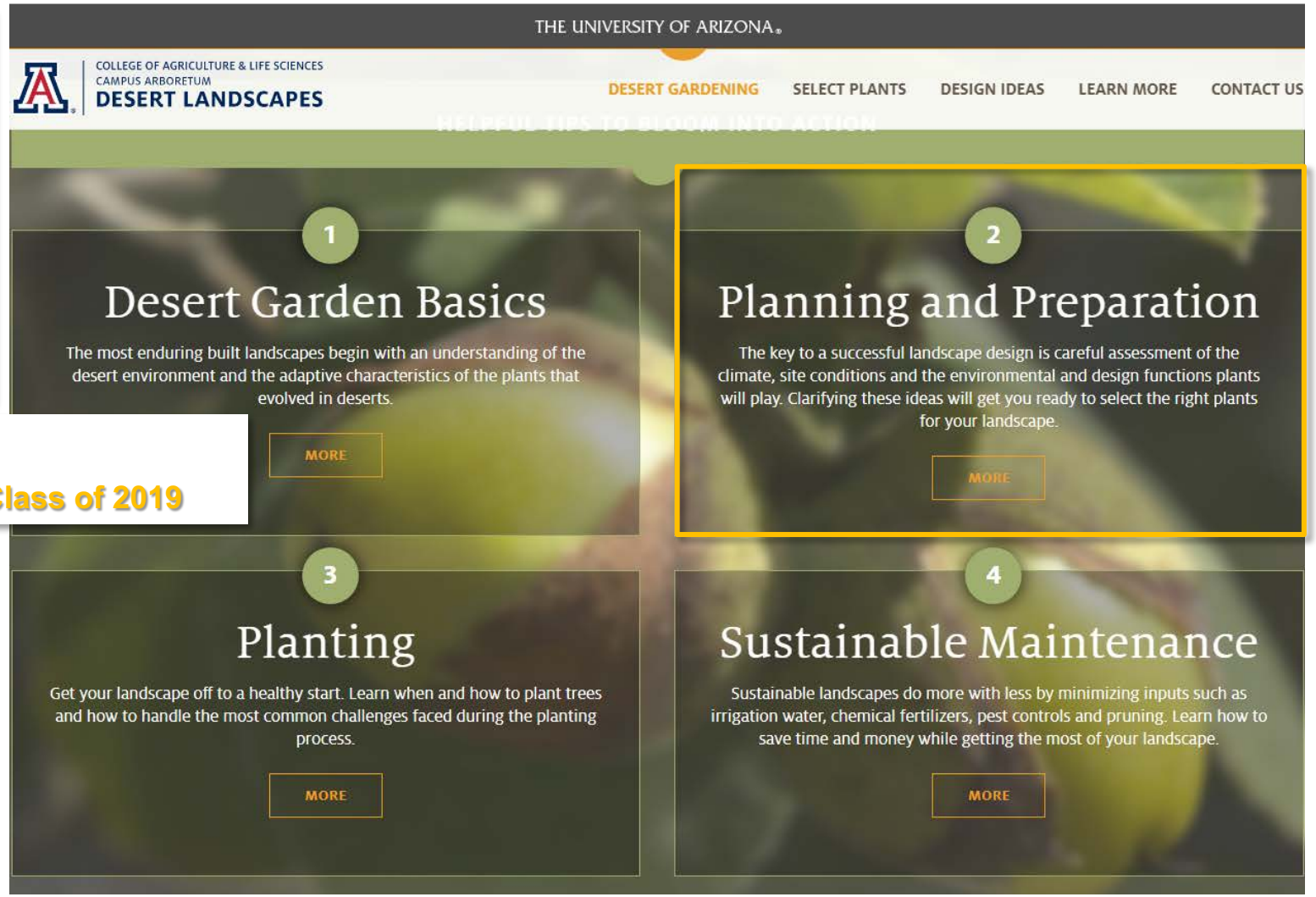
6. 
   Green Desert Spoon
   Dasylirion acrotriche
   TYPE: ACCENT

7. 
   Saguaro
   Carnegiea gigantea
   TYPE: CACTUS

Plan Thoughtfully

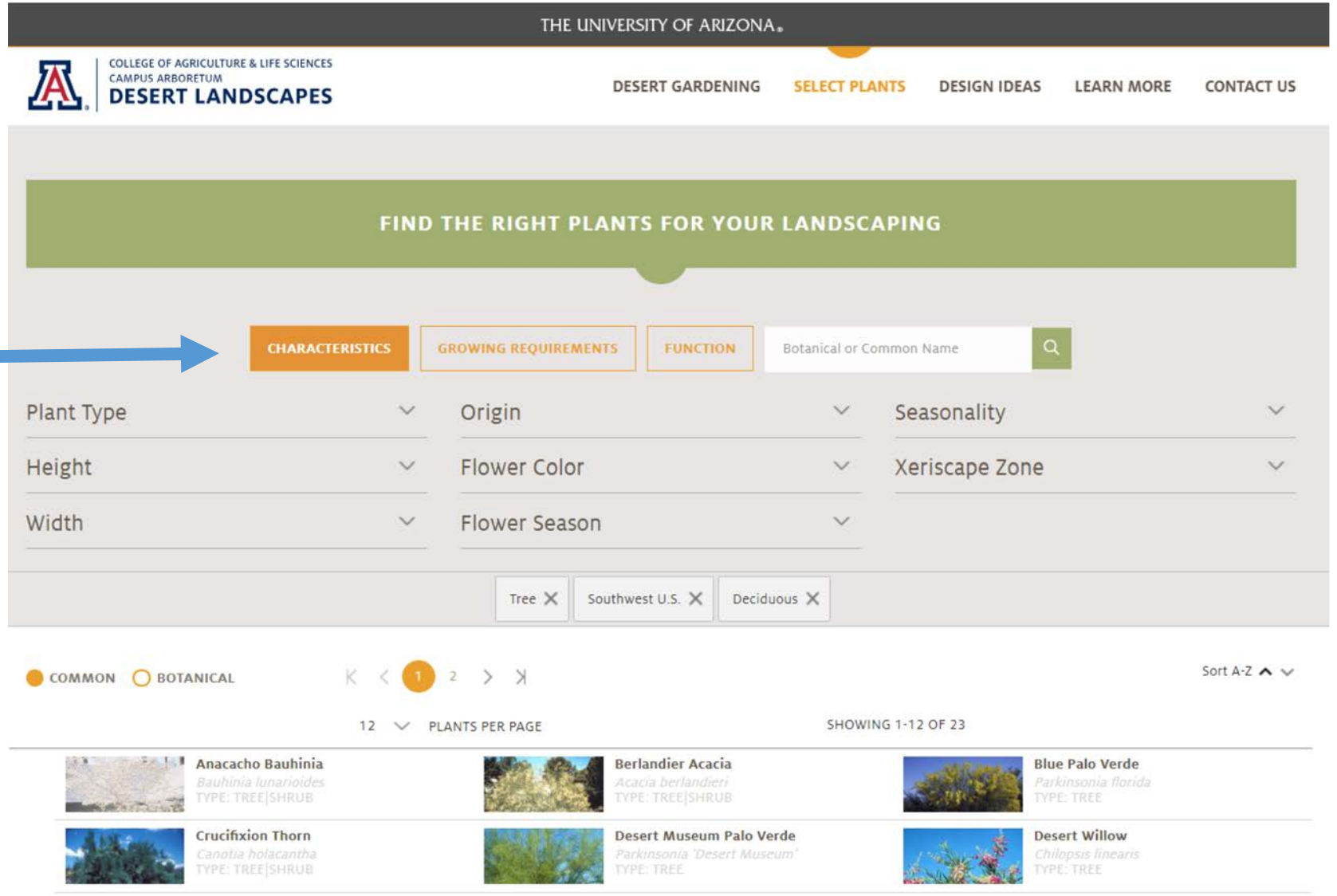
Daniel Harmon
B. S. Sustainable Plant Systems, Class of 2019

- Plant Selection Criteria
- Ecologically Sensitive Design

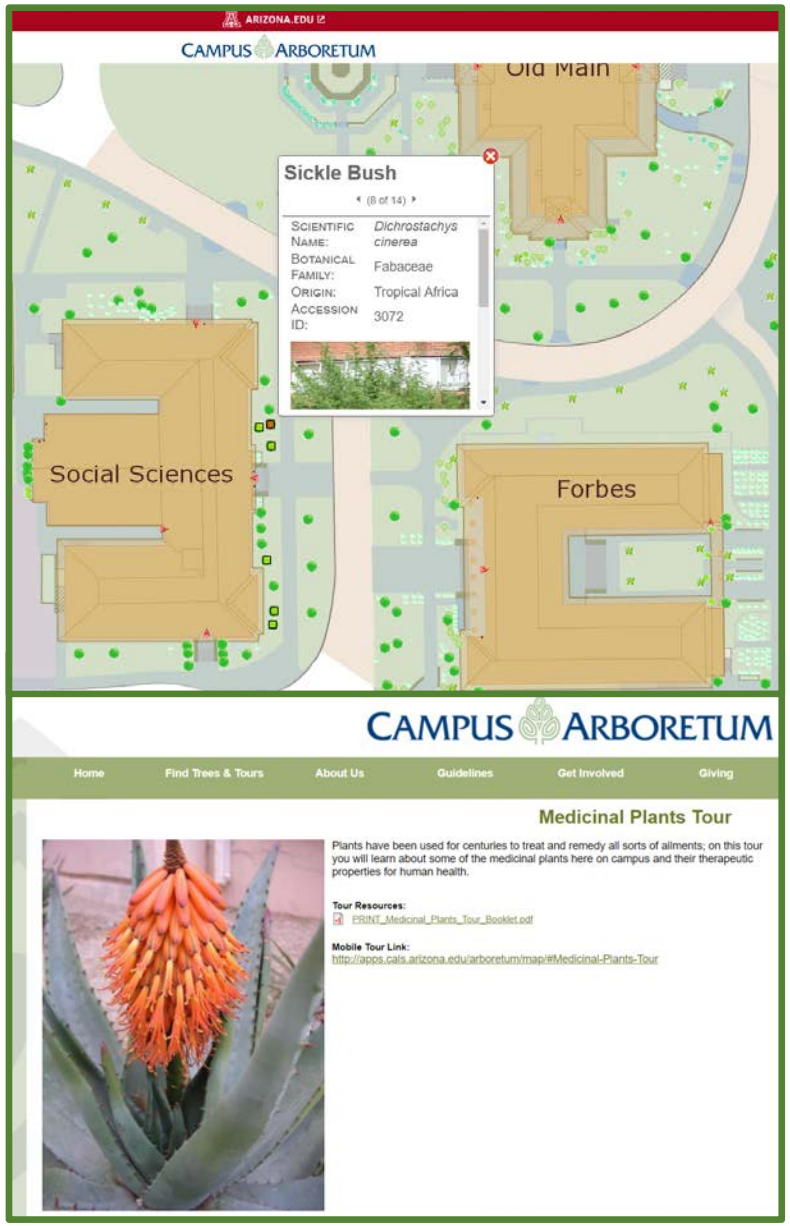


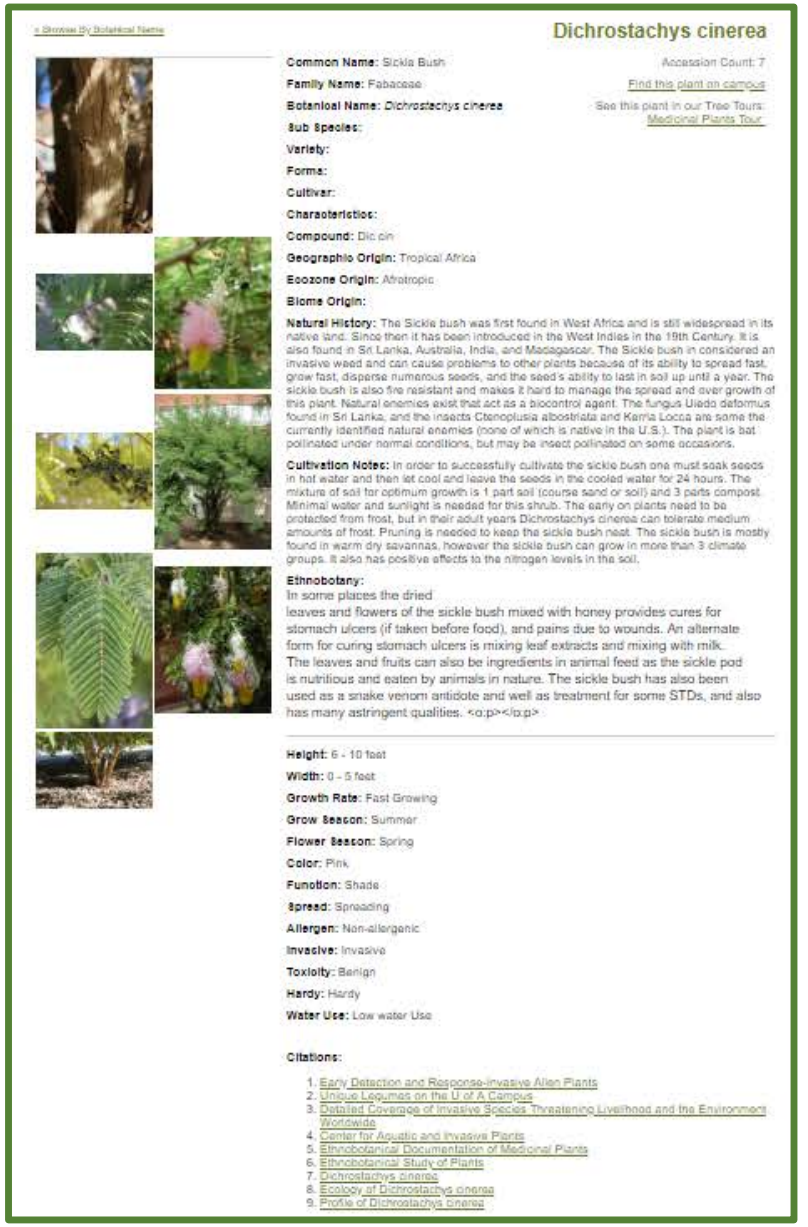
Plan Thoughtfully

- ✓ **Search for plants.**
- ✓ **Filter** results based on plant characteristics, site conditions or desired landscape function.



Campus Arboretum Resources





Plan Thoughtfully

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DESERT LANDSCAPES

DESERT GARDENING | SELECT PLANTS | DESIGN IDEAS | LEARN MORE | CONTACT US

PLANTS TO SPROUT IDEAS

Tried and true, virtually fool-proof plants and promising new experimental selections to consider.

Libby Davison Ash
Fraxinus greggii 'Libby Davison'
TREE

Wright's Acacia
Senegalia wrightii var. wrightii
TREE

Ironwood
Olneya tesota
TREE

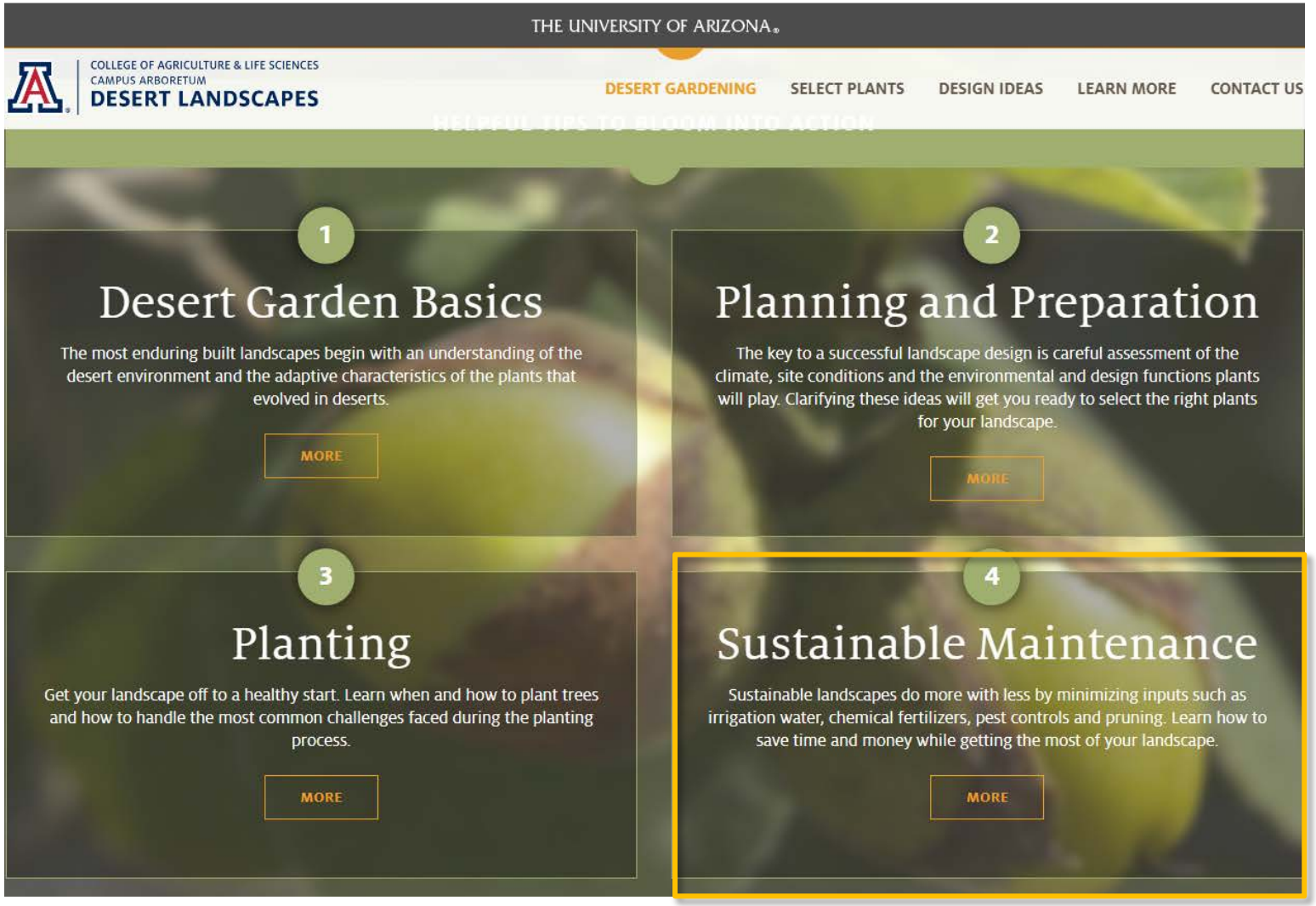
Mulga
Acacia aneura
TREE

Plant Properly

Daniel Harmon

B. S. Sustainable Plant Systems, Class of 2019

Manage Sustainably



John Pacheco

B. S. Sustainable Plant Systems, Class of 2020

- Irrigation
- Nutrition
- IPM
- Pruning
- Staking

Cora Ricoy

B. S. Sustainable Plant Systems, Class of 2019

Manage Sustainably

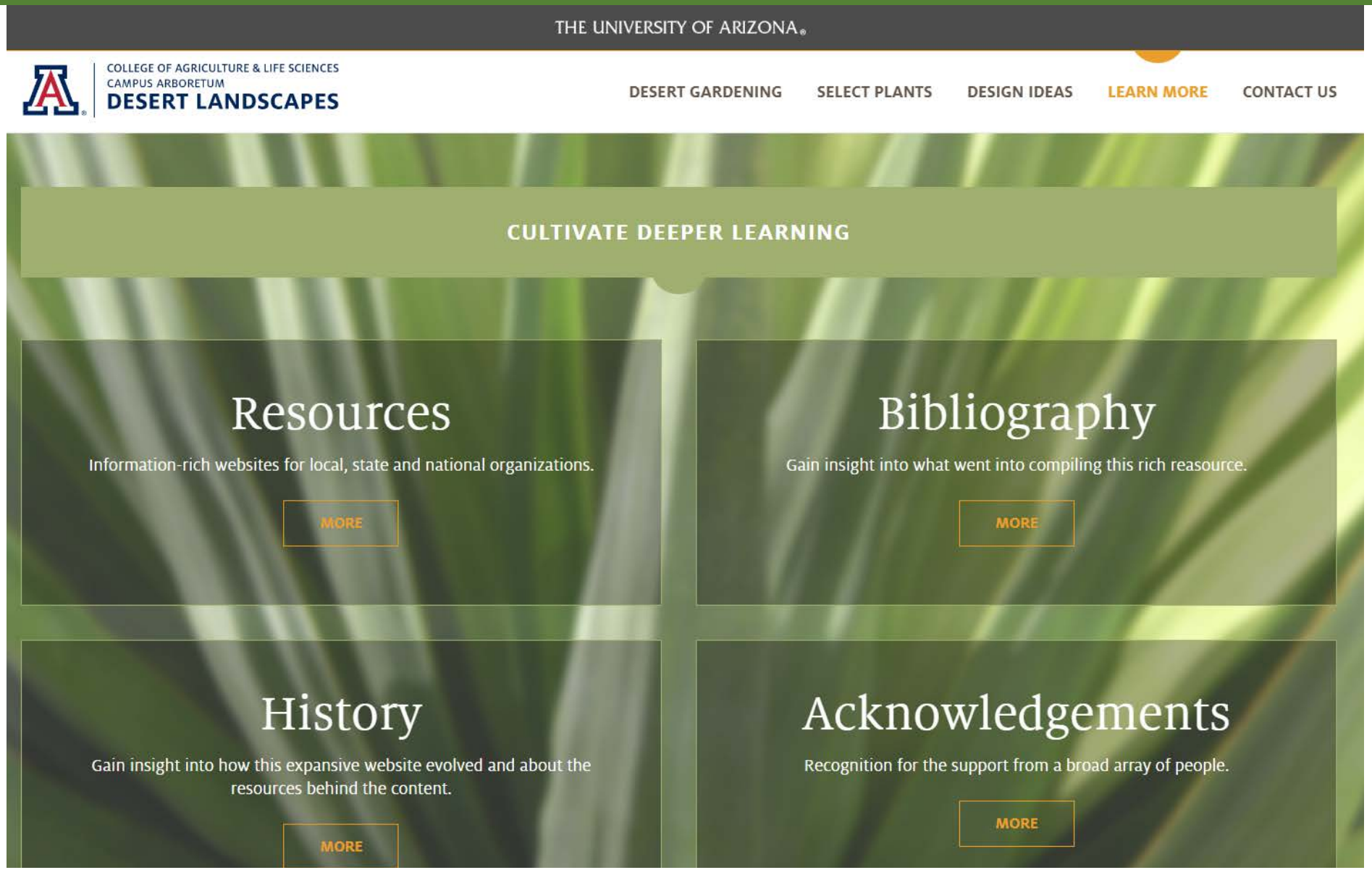
QTSArizona.com

Horticulture Unlimited

Manage Sustainably

AZ Plant Lady

Learn More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Resources
Information-rich websites for local, state and national organizations.
MORE
Bibliography
Gain insight into what went into compiling this rich reasource.
MORE
History
Gain insight into how this expansive website evolved and about the resources behind the content.
MORE
Acknowledgements
Recognition for the support from a broad array of people.
MORE

Questions?

Tanya M. Quist, PhD
https://arboretum.arizona.edu/

Key Points

- ✓ Trees play an essential role trees play in our environmental, economic and social well being.
- ✓ Older, mature trees provide the greatest benefits/ROI
- ✓ We are not meeting standards for climate resilience
- ✓ Urban deserts pose particular challenges for plants.
- ✓ Special care must be taken:
  - ✓ Select the right tree for the right place
  - ✓ Learn and employ sustainable maintenance practices

Plant and Care For Trees

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