

Objective:

The Flood Control District of Maricopa County (FCDMC) grows native trees in tall-pot containers at an onsite nursery. Tall-pot trees are trees that are propagated in containers that are taller than the are wide. The FCDMC utilizes 6" diameter PVC pipe cut into 30" lengths to propagate their trees. The trees are planted on flood mitigation construction projects as well as habitat mitigation projects.

The FCDMC utilizes tall-pot trees because they are able to plant them without permanent irrigation, reestablish native plant communities on disturbed sites, support the functionality of flood mitigation projects, and enhance the appearance of flood mitigation projects. Trees provide various benefits to the community, such as much needed shade, air pollution mitigation, and much more. To further promote the nursery, FCDMC is interested in finding out what those benefits are. **What are the dollar values of the various tree services?**

Methods:

The project selected for this study was the Sonoqui IIIA basin and channel that was built in Queen Creek, AZ. A total of 410 trees were planted for this project in the Summer of 2013. The species of trees planted included: *Chilopsis linearis* (Willow), *Tesota* (Ironwood), *Paloverde* Spp. (Paloverde), and *Prosopis velutina* (Mesquite). The abbreviations in parenthesis will be utilized throughout the rest of the poster. An initial field study was conducted to count the living and dead trees and number them. Based on the number of living trees, a random number generator was used to select a 12% sample. To calculate the community benefits provided by the tree, i-Tree software, developed by the USDA Forest Service, was used. i-Tree requires the following data to be recorded and used as input values to calculate results:

1. Total tree height
2. Live canopy height
3. Diameter at breast height (DBH)
4. Canopy width
5. Dieback
6. Canopy light exposure
7. Height to crown base

All data was compiled and organized using Microsoft Excel Software.



During the field survey 301 trees were found to be alive and 109 were dead, showing a 75.37% survival rate. Of the 301 living trees, 246 were healthy and 55 were unhealthy. To achieve a 12% sample, 37 trees were randomly selected for in depth data recording. The data summary is recorded in Table 1.

Table 1: Mean values of selected tree characteristics by species at Sonoqui IIA in Queen Creek, AZ

Species	Total Height (ft.)	Canopy Width (ft.)	DBH (in.)	Crown Base Height (in.)	Crown Missing (%)	Crown Dieback (%)
Paloverde	6.9 ± 2.9	9.4 ± 6.0	5.2 ± 5.3	1.0 ± 0.4	4.8 ± 8.7	1.9 ± 4.3
Ironwood	7.0 ± 0.7	6.6 ± 3.4	2.7 ± 1.0	0.8 ± 0.4	0.0 ± 0.0	2.5 ± 3.5
Mesquite	5.4 ± 2.2	7.6 ± 4.9	1.7 ± 1.0	1.1 ± 0.7	0.0 ± 0.0	7.0 ± 11.6
Willow	8.8 ± 1.5	12.9 ± 5.3	5.4 ± 2.8	1.2 ± 0.6	2.1 ± 3.9	10.3 ± 13.6
Total	28.1 ± 7.3	36.5 ± 19.6	15 ± 10.1	4.1 ± 2.1	6.9 ± 12.6	21.7 ± 33

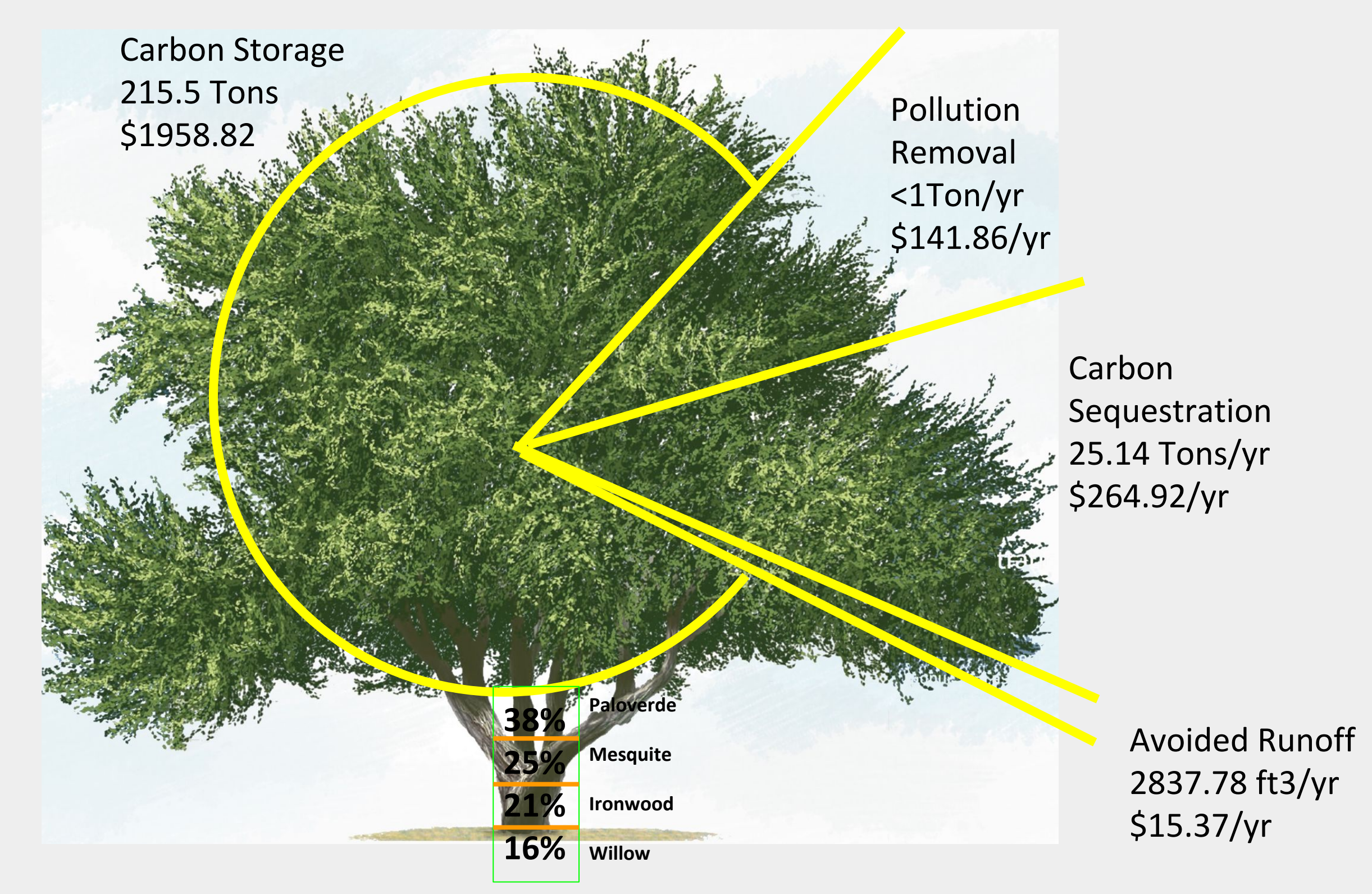
Mean Values ± SD Paloverde n(12), Ironwood N(7), Mesquite n(11), Willow n(7)

The i-tree software produced a report giving the quantity and dollar value of the selected community benefits per tree from the data collected. To extrapolate the total amount of community benefits provided by all of the trees for this project, the quantity and dollar value was multiplied by the number of living trees of each species surveyed. The results are summarized in Table 2.

Table 2: Quantity and dollar value of community benefits for living trees at Sonoqui IIIA

Species	Total Trees	Carbon Storage Tons \$	Carbon Sequestered Ton/yr \$/Yr	Avoided Runoff ft3/yr \$/yr	Pollution Removal Ton/yr \$/yr
PaloVerde	113	196.9 \$1540.19	20.81 \$166.11	1969.0 \$7.91	<1 \$70.06
Ironwood	63	1.62 \$112.14	0.36 \$29.61	43.74 \$1.26	<1 \$13.23
Mesquite	76	2.28 \$29.64	1.52 \$18.24	413.44 \$2.28	<1 \$22.80
Willow	49	14.7 \$276.85	2.45 \$50.96	411.6 \$3.92	<1 \$35.77
Total	301	215.5 \$1958.82	25.14 \$264.92	2837.78 \$15.37	<1 \$141.86

The following pie chart show the quantity of services distributed across all the trees at Sonoqui IIIA in the top and the species variations calculated at the bottom.



Conclusion:

The FCDMC spends approx. \$100 per tall-pot tree. As shown in Table 2, the Sonoqui IIIA tall-pot trees provide several community services that equals roughly \$2,380.47/year. That equals about \$7.91 per tree per year. This may seem like a small amount in comparison to what is spent, however, it is important to note that this is what the trees are calculated to provide at their current size. The trees are only 3 years old and will continue to grow. Every year the dollar amount will increase as the size of trees increase because they will be able to take in more pollutants and avoid more water runoff.

For instance, the Paloverde trees at Sonoqui IIIA have a mean size 7' tall x 9' wide. They can grow up to 30' tall and 30' wide (Murphy, 2007). This means that they are only earning 23.3% of their worth at their current size which is approx. \$15.79 per tree/year. If they were at maturity, they would be worth \$67.77 per tree/year. This adds up over the years across all of the trees. This is good because trees are a long term investment.

It is also important to keep in mind that these are only the values that could be calculated by the i-Tree software. There are many other benefits of trees, such as their reduction of the urban heat island, the shade that provides relief to pedestrians, the aesthetics, and the biodiversity that is increased by their presence. All of these are important benefits yet currently do not have a dollar value attached to them. This should always be considered when deciding the value and importance of trees.

Acknowledgements:

DCDC III
This material is based upon work supported by the National Science Foundation under Grant No. SES-1462086, DMUU: DCDC III: Transformational Solutions for Urban Water Sustainability Transitions in the Colorado River Basin. Any opinions, findings and conclusions or recommendation expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF). Reference: Murphy, L.(2007) *Our State Tree Puts on a Show in April*, https://cals.arizona.edu/mohave/master_gardeners/lake_havasu/articles/paloverdetrees.pdf