

Tree Plantings for Watershed Protection Plans

Presented by Sam Hill, Woodland Ecologist
Water Resources and Forest Health

TEXAS A&M FOREST SERVICE



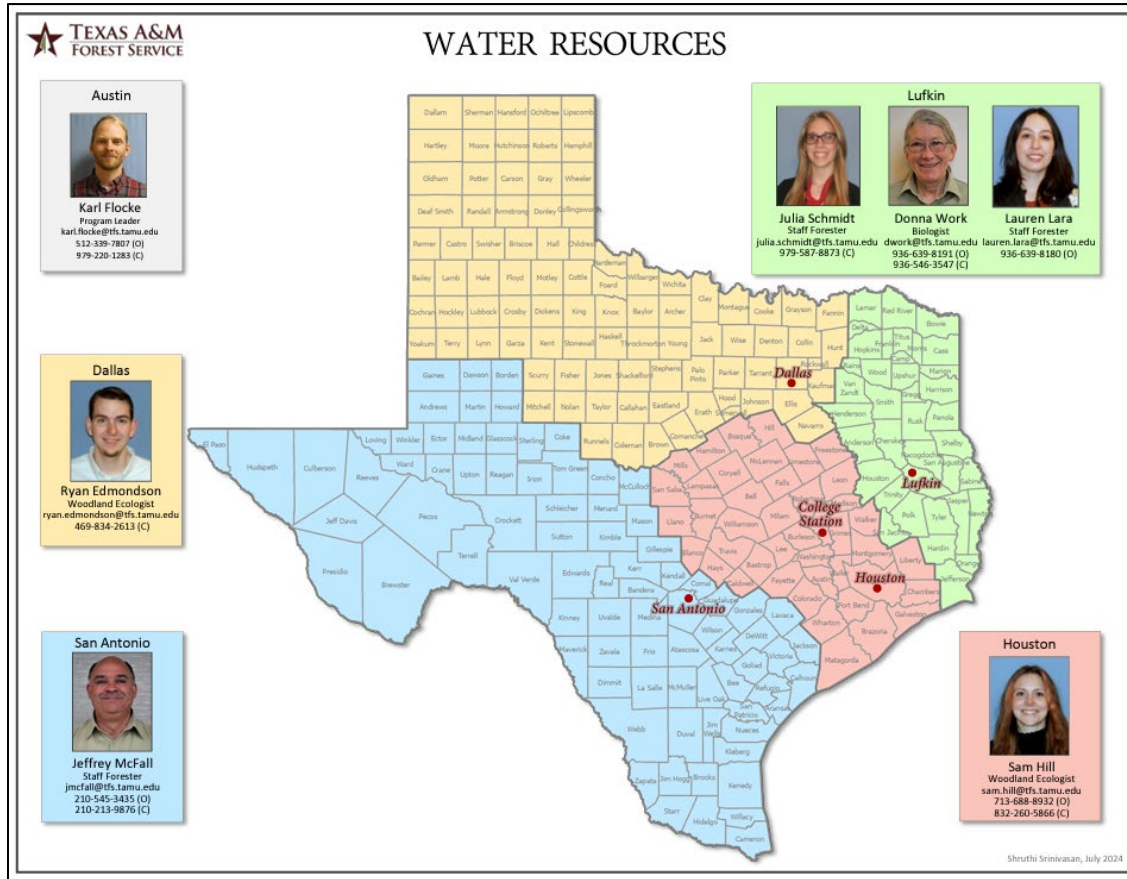
Texas A&M Forest Service | Our Mission



W.G. Jones State Forest in Montgomery County, TX.
Jones State Forest is one of five state forests
managed by the Texas A&M Forest Service.

*Texas A&M Forest Service
provides statewide leadership
and technical assistance to
ensure trees, forests and
related natural resources are
sustained for the benefit of
all. The agency supports the
state's incident response
capability, protecting against
wildfire and responding to a
range of all-hazard incidents.*

Texas A&M Forest Service | Water Resources Program



- Provide guidance on best management practices related to logging, urban forestry, green stormwater infrastructure
- Liaison between Agency, local, and state shareholders related to watershed protection
- WAT-ER (Watershed Assessment Team – Emergency Response); monitor wildfires at high risk of impairing water quality

Water Resources program
webpage



Benefit of Trees in Watersheds



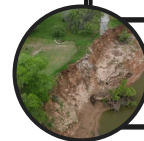
Slow down runoff



Prevent and reduce flood impacts



Stabilize soils



Reduce erosion

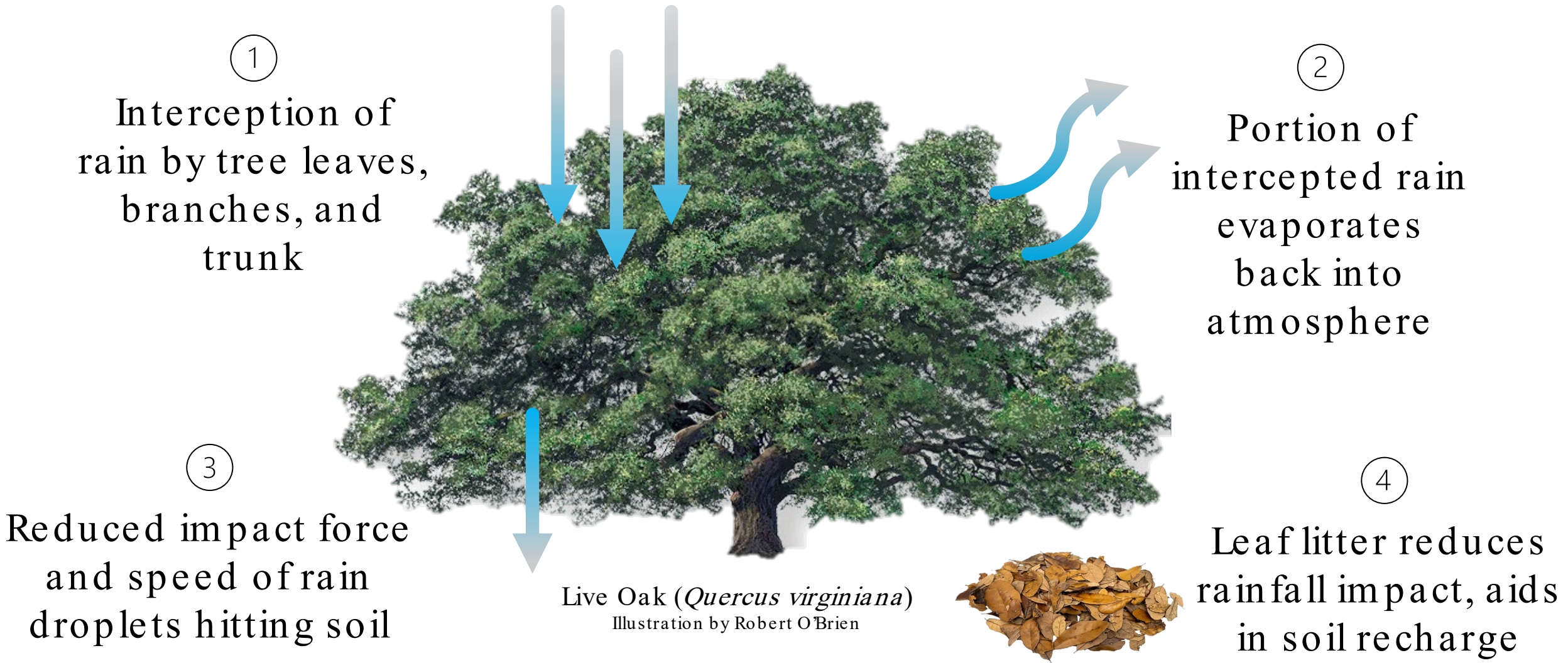


Filter and trap pollutants

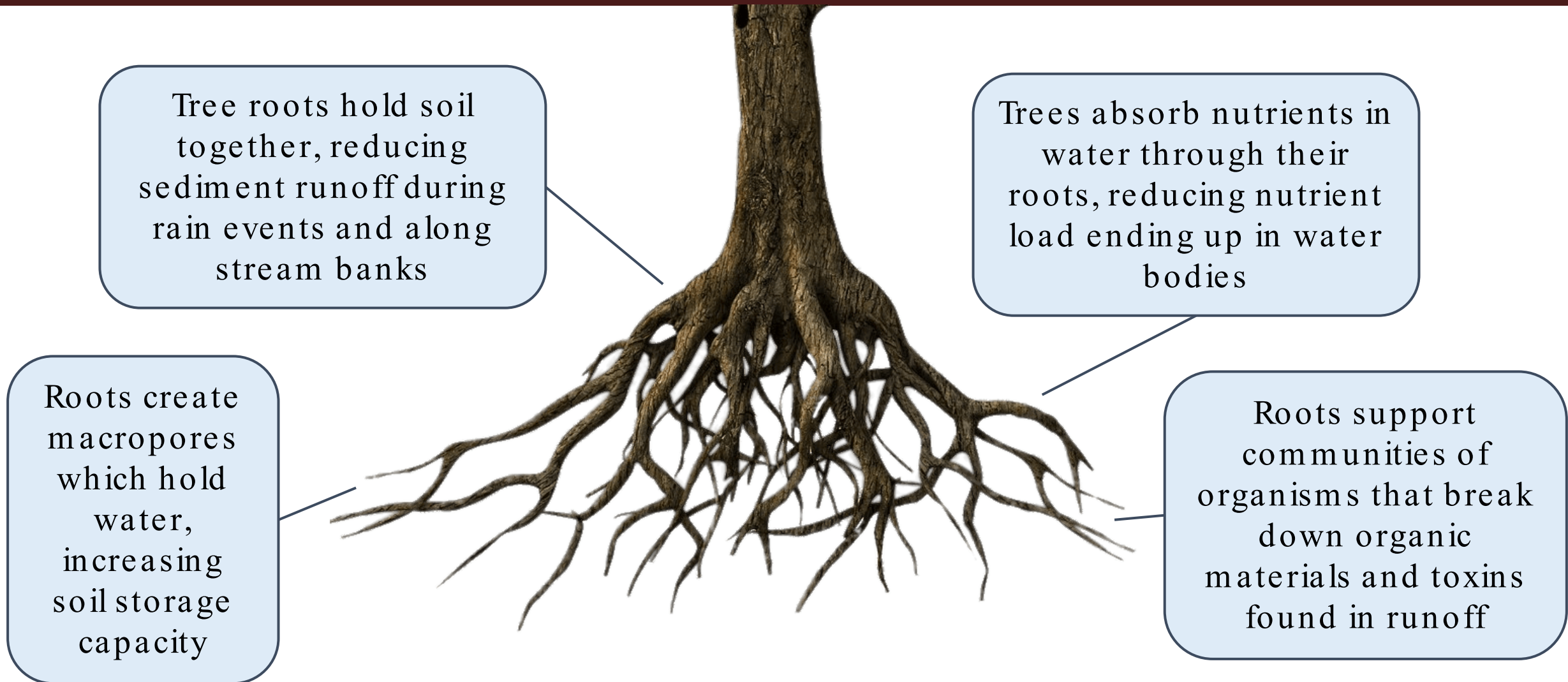


Maintain ideal stream parameters for wildlife

The Forest/ Water Relationship | Rainfall Interception



The Forest/ Water Relationship | Root Benefits



Tree Plantings for Watershed Protection Plans

PLANNING AND ORGANIZING



Green Ash
Fraxinus pennsylvanica

Copyright © Robert O'Brien

Planning

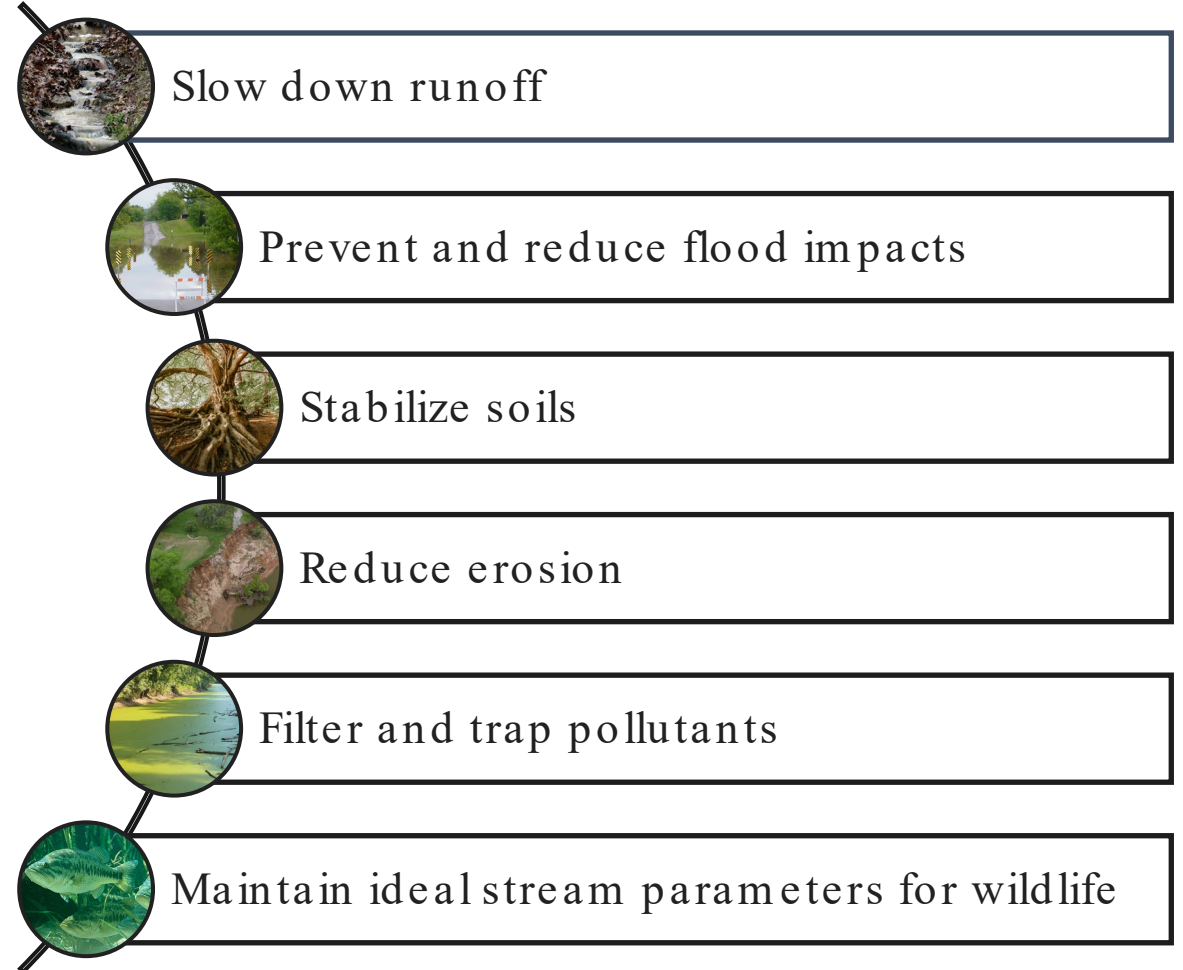
- **Why** are we planting trees?
- **Where** are we planting trees?
- **What** are we planting?
- **Who** will fund it? Who will plant?
- **When** are we planting?



Community members and Texas A&M Forest Service staff planting trees at an event in College Station.

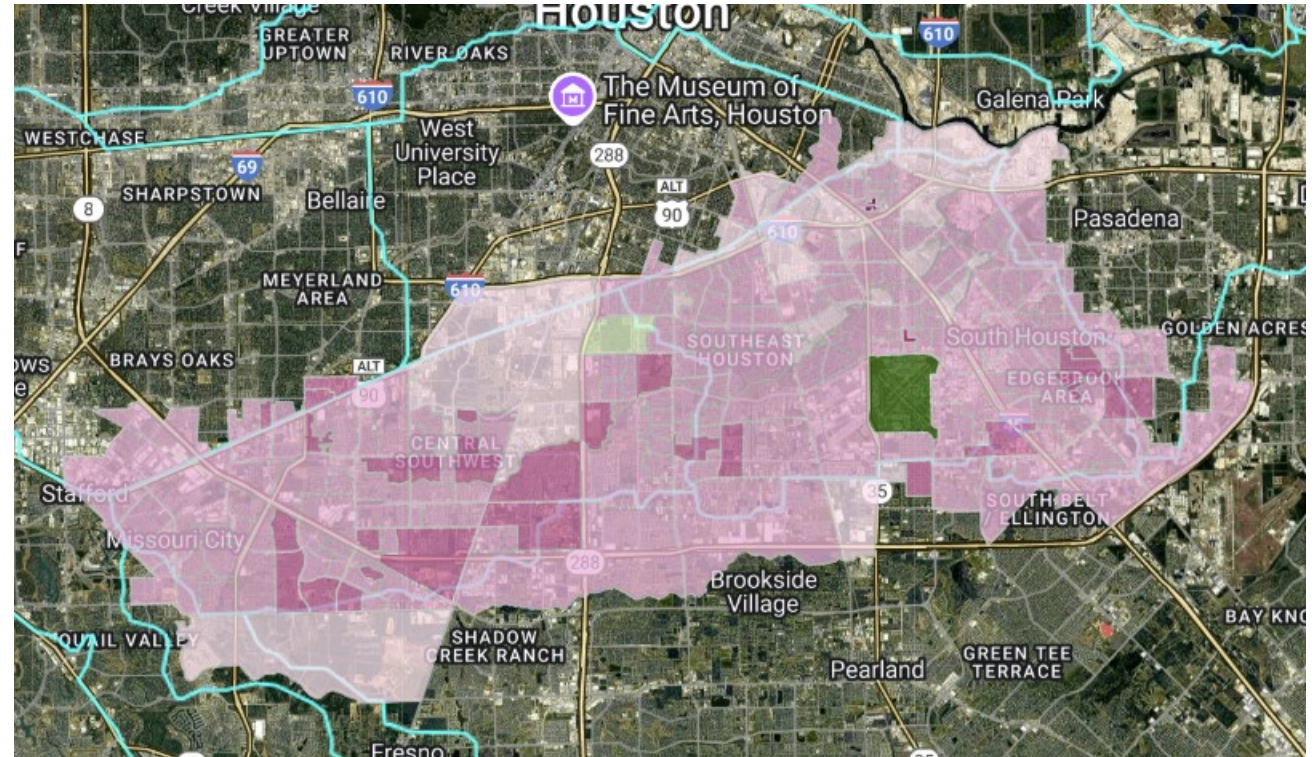
Benefits of Trees and Forests

- What is the benefit we want the trees to provide?
 - **Water quality improvement**
 - Urban heat mitigation
 - Air pollution removal
 - Aesthetics



Choosing Planting Locations

- Where will we plant to have the greatest impact?
- Several decision-making tools are available to the public
 - [i-Tree Landscape](#)



A map of U.S. Census block groups within the Sims Bayou watershed. Color gradient represents **priority planting index** related to population. Red areas have relatively high population density, low tree cover per capita, and high available planting space due to low tree stocking level.

Generated using i-Tree Landscape.

Where to Plant

- **Refer back to the co-benefits you want the trees to provide**
 - Planting within the riparian area will provide more water quality benefits
 - Planting in the uplands or urban areas will mitigate stormwater and produce co-benefits such as urban heat mitigation
- **Ability to gain access for post-planting maintenance** can be a limiting factor
- **Potential planting sites**
 - Schoolyards
 - Public parks and greenspaces
 - Riparian corridors along bayous, streams, etc.
 - Stormwater basins, drainage channels, bioswales
 - Road medians



2012 site



Same site in 2019

Houston Area Urban Forestry Council (HAUFC) *Tree Planting Competition* site in a stormwater basin.

Species Selection

- **Collaborate with regional partners** to determine past successful species
 - Texas A&M Forest Service
 - AgriLife Extension
 - Texas Master Naturalist chapters
 - Parks & Recreation departments
 - Conservancies and other conservation groups
 - Local forestry council
- In an urban forest, plan for no more than:
 - 5% of one species
 - 10% of one genus
 - 15% of one family
- **Diverse species composition** improves forest resilience to pests and diseases

Species Selection Considerations

Environmental

- Is the planting in a riparian area, or in the uplands?
- Has there been previous development that may have altered the soil health?
- Are there buildings or right-of-way (ROW) nearby?
- What niche does this species occupy; understory, canopy, edge, wildlife habitat

Social

- Will there be human activity nearby?
 - Safety
 - Aesthetics
- What byproducts of the tree (leaves, fruit, roots, etc.) may impact human activity?

Maintenance

- Can the area be accessed by planters and maintenance teams?
- Will the species need routine structural maintenance or pest treatment?

Species Selection Considerations

- Type and effectiveness of ecosystem services vary by species
 - Rain fall interception
 - Streambank stabilization
 - Stormwater filtration

Data calculated using MyTree
<https://www.itreetools.org/>



Carbon Dioxide Uptake	\$658.07
Carbon Sequestered ¹	3,041.49 lbs
CO ₂ Equivalent ²	11,152.14 lbs
Storm Water Mitigation	\$45.68
Runoff Avoided	5,111.79 gal
Rainfall Intercepted	37,125.78 gal
Air Pollution Removal	\$7.45
Carbon Monoxide	17.89 oz
Ozone	407.14 oz
Nitrogen Dioxide	59.59 oz
Sulfur Dioxide	4.39 oz
PM _{2.5}	38.36 oz



Carbon Dioxide Uptake	\$386.64
Carbon Sequestered ¹	1,786.95 lbs
CO ₂ Equivalent ²	6,552.16 lbs
Storm Water Mitigation	\$31.04
Runoff Avoided	3,473.13 gal
Rainfall Intercepted	25,224.54 gal
Air Pollution Removal	\$5.03
Carbon Monoxide	12.17 oz
Ozone	266.83 oz
Nitrogen Dioxide	40.57 oz
Sulfur Dioxide	3.05 oz
PM _{2.5}	24.01 oz



Carbon Dioxide Uptake	\$370.33
Carbon Sequestered ¹	1,711.58 lbs
CO ₂ Equivalent ²	6,275.8 lbs
Storm Water Mitigation	\$55.72
Runoff Avoided	6,235.43 gal
Rainfall Intercepted	45,286.56 gal
Air Pollution Removal	\$9.11
Carbon Monoxide	21.82 oz
Ozone	496.49 oz
Nitrogen Dioxide	72.68 oz
Sulfur Dioxide	5.36 oz
PM _{2.5}	46.86 oz

*Container-grown trees are germinated in pots. Containerized trees are bare-root trees that have been recently potted.

Tree Stock Types

	Live cuttings	Bare root	Container-grown/Containerized*	Balled-and-burlapped (B&B)
Pros	- Cheap and can be gathered from local stock - Riparian colonizers such as willow, cottonwood	- Small, easy to transport - Lower cost	- Range of sizes (gallons) 10-20 gal. volunteer friendly	Burlap and twine keeps soil in place → minimized risk of root exposure, damage, and desiccation
Cons	- Limited species variety - Limited genetic diversity	- Roots must be kept moist prior to planting - May require staking	- Roots may have grown matted - Girdling roots can develop due to root circling	- Large portion of absorbing roots may be lost when digging to wrap - Unremoved burlap may act as root barrier, unremoved twine and wire may girdle tree

Choosing Tree Sizes

- Saplings and small trees
 - Volunteer-friendly
 - Especially reliant on maintenance watering for 1-2 growing seasons post planting to ensure survival
- Medium to large trees
 - May require machinery to transplant
 - More immediately aesthetically pleasing
 - Take longer to adjust to new environment



James Campos, a Texas A&M Forest Service Program Specialist with the *Tree Improvement Program*, holds a **containerized seedling**.

Purchasing Tree Stock

- Wholesale nurseries
 - Ensure stock is **native and adapted to region**
 - Check trees for visible damage, signs of pests and disease
 - For container stock, check for circling roots
- Work with regional partners to determine providers they've successfully used in the past



The Texas A&M Forest Service *Tree Improvement Program* greenhouse in College Station.

Urban Tree Improvement Program

- Texas A&M Forest Service *Urban Tree Improvement Program* creates **Texas Tested, Texas Tough** seedlings that are adapted for urban environments
- Orders typically placed one year in advance to allow time for seed collection and cultivation
- Reach out to Fred Raley (fraley@tfs.tamu.edu) or James Campos (james.campos@tfs.tamu.edu) for more info



Finding Funding

- Environmental benefits from tree plantings are **not limited to watershed improvement**
 - Collaboration with urban heat mitigation, air pollution removal, and other one health projects
- Tree plantings are a **community event**
 - Leverage local volunteer groups, corporate volunteer hours, and seedling/supply donations
- Primary costs are related to purchasing tree stock, planting, and maintenance
- Funding avenues
 - Federal, state, and non-profit grants
 - City improvement funds
 - Corporate donations
 - Texas A&M Forest Service's *Green Futures* project
 - Major Houston area industries, such as petrochemical companies

Texas A&M Forest Service's WPP Implementation Grant

Who

- Local governments, water utilities, NGOs
- Have **existing WPP** in watersheds that provide drinking water to **disadvantaged communities** and be EPA approved

What

- 15 **\$50,000 grants** to implement WPPs
- Grant-funded activities **related to tree/forestry components** of WPP (plantings, invasive removal, tree protection)

How

- Contact: Jeff McFall, Water Resources Forester;
WPPIG@tfs.tamu.edu
- Visit
<https://tfsweb.tamu.edu/WaterResourcesandBMPs/>
for detailed application info



When to Plant Trees

- During dormant season (late fall to early spring)
 - Tree devotes energy to root production
 - The earlier in the dormant period the tree is planted, the more time it has to establish roots
- **Texas Arbor Day** is the first Friday in November
 - Tree plantings can coincide with community celebrations and education opportunities



Kate Faris and Mac Martin, part of the Texas A&M Forest Service *Urban and Community Forestry* program, planting trees at an event in College Station.

Tree Plantings for Watershed Protection Plans

EXECUTING



Black Willow
Salix nigra

Copyright © Robert O'Brien

Proper Planting Technique

- Proper planting improves chances of tree survival
- **Review expectations** with planters/volunteers beforehand
 - Many people have misconceptions about proper tree planting
- [Planting Trees in 12 Easy Steps](#)

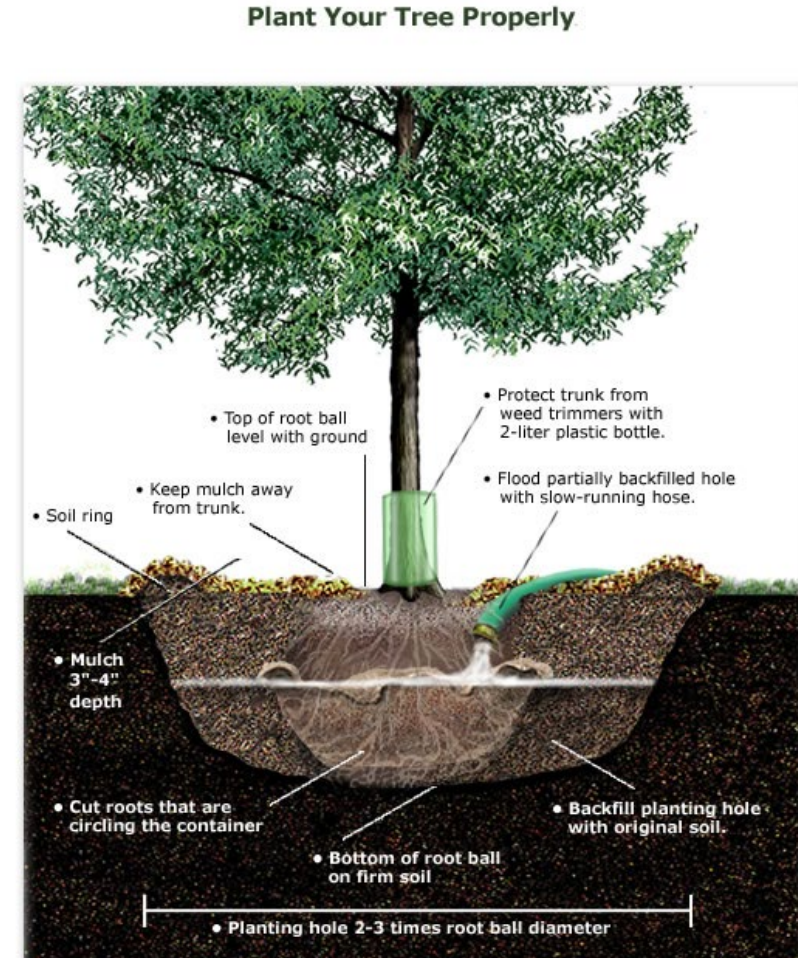


Illustration Copyright © Robert O'Brien

Planting Shape and Spacing

Scattered Pattern

- Species have specific spacing requirements to adequately grow
- More natural look
- Minimum planting space requirements
 - Small trees: 60 ft²
 - Medium trees: 120 ft²
 - Large Trees: 180 ft²

Grid Pattern

- Trees planted in rows
- Ease of access for other activities, maintenance
- When planting trees in rows, allow for the following growing space:
 - Small trees: 3 x 20 feet
 - Medium trees: 4 x 30 feet
 - Large trees: 4 x 45 feet

Common Tree Planting Pitfalls

Tree planted too deep



- Root collar should be at or slightly above natural grade
- Planting too deep can girdle the tree, and increases moisture at the trunk

Improper mulching



- “Volcano mulching” results in too much moisture near the tree trunk, encouraging pests and disease
- May cause girdling as roots grow into mulch layer and around tree

Improper staking



- Stakes left on past 1-2 growing seasons may girdle the tree

Tree Plantings for Watershed Protection Plans

MAINTENANCE



American Sycamore
Platanus occidentalis

Copyright © Robert O'Brien

Post-planting Maintenance

Immediately after planting

- Mulch around tree out to drip line (or 2-3ft diameter circle per inch of tree trunk caliper), two to three inches deep, **not touching the trunk**.
- Only stake trees if necessary. Consult an arborist if needed.
- Protect tree from animals and humans by installing barriers, such as wire-mesh cages.

First 1-2 years

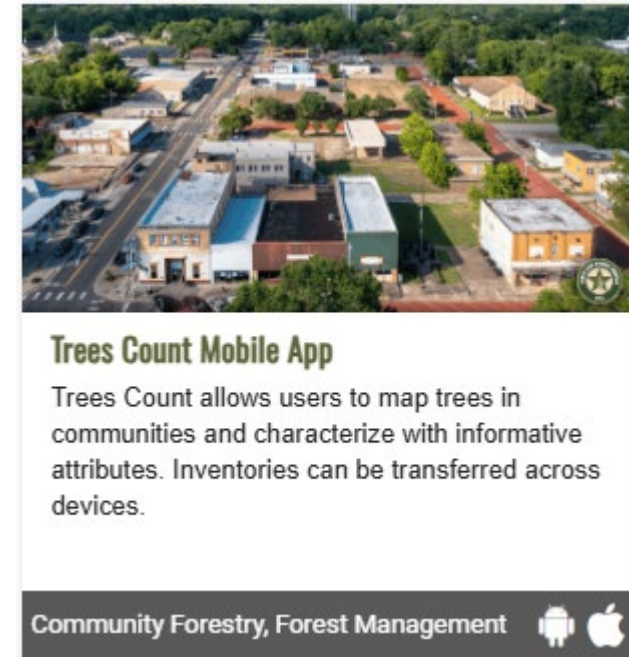
- Water each tree **6-8 gallons of water for every diameter inch of trunk** per week.
- Do not fertilize during the first growing season.
- Remove the stakes after first year.

Longterm

- If planted in an area with human traffic, a routine risk inspection may be needed.
- Trees may need supplemental watering in times of drought.
- Monitor for forest health issues and consult with a Texas A&M Forest Service staff member or a certified arborist.

Tracking Success

- Forest inventories can be a valuable way to **quantify** planting success and ecosystem benefits, and **monitor** tree stands for forest health issues
 - Texas A&M Forest Service's *Trees Count* mobile app
 - Excel data can be exported to i-Tree *Eco*



Tools for Assessing and Managing
Forests & Community Trees

Contact Info and Resources

Sam Hill, Woodland Ecologist

Email: sam.hill@tfs.tamu.edu

Agency Cell: (832) 260-5866



Texas A&M Forest Service
Homepage



Texas Forest Info Apps

