THE ROLE OF FORESTS IN OUR DAILY LIVES

A kid's guide to discovering the importance of forests.

Forests are critical for our survival and play an important role in our daily activities. They produce oxygen, keep us cool, fight flooding, and refill aquifers. They feed us, and they heal us. We don't always make the connection to trees or forests when we drink a glass of water or write with a pencil, but we rely on trees every single day. Let's take a closer look at trees and their importance. Along the way, you'll be introduced to new words, fun activities, and the amazing ways forests and trees impact our daily lives.

HEALTHY FORESTS = HEALTHY COMMUNITIES

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CITY OF SAN ANTONIO PARKS & RECREATION

FRIENDS OF SANA SAN ANTONIO NATURAL AREAS

TEXAS URBAN FORESTRY COUNCIL

Special thanks: Casey Cowan, Jean Hackett, Gretchen Maddock, Jayne Neal, and Catherine Stier.

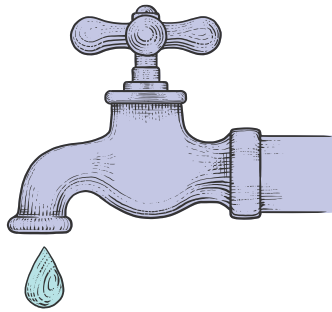
Section 1

TREES ARE IMPORTANT, AND HERE'S WHY!

TREES MAKE US HAPPIER. Did you know trees help to improve our mental well-being? Researchers found that the presence of green plants increases our attention spans and decreases stress, which calms us. In fact, studies show as little as 20 minutes in nature everyday reduces our stress levels significantly! Trees also offer spaces to play and learn. They make great locations for reading, creating art, and playing hide-and-go-seek.

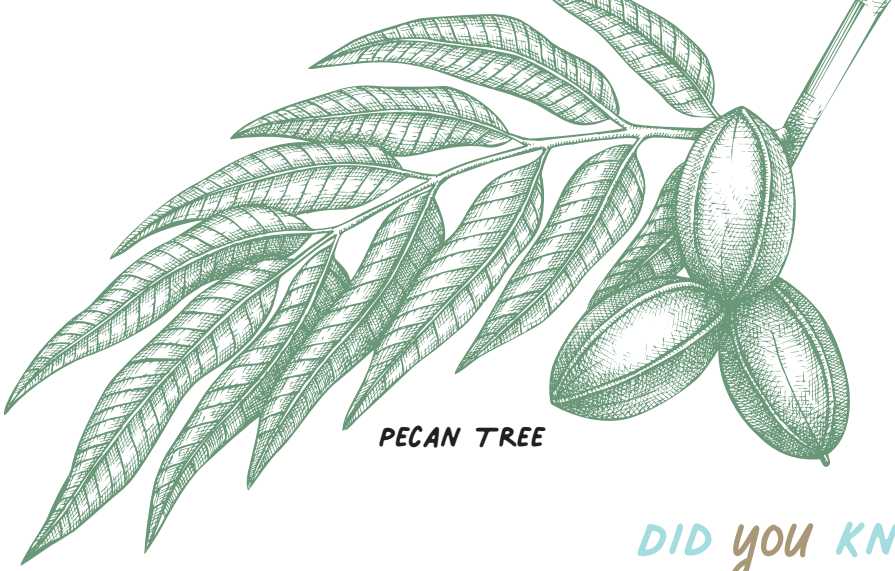
TREES HELP PROVIDE CLEAN DRINKING WATER. Trees and soil work together to reduce groundwater pollution. The tree canopy also slows the rainfall down helping water absorb into the soil. While the tree roots take up water; they promote **infiltration** (the movement of water into the ground from the surface). Trees also help channel water into rivers and streams and prevent **erosion** (wearing away of soil) by using their roots to hold soil together. It's important we have a lot of clean places for rain to absorb into the aquifer.

TREES PRODUCE OXYGEN. Humans and wildlife breathe in oxygen and breathe out carbon dioxide. Trees take in the carbon dioxide and produce the oxygen we need! They use the sun's energy to turn the carbon dioxide into **glucose** (sugar) through a process called **photosynthesis**. This process not only feeds the tree but also releases oxygen through the tree's **stomata** (tiny openings or pores on the leaves). Nature continues to provide in amazing ways!



DID YOU KNOW?

Most water that comes out of faucets in San Antonio is from the Edwards Aquifer. The Edwards Aquifer is made of limestone, a white or gray chalky sedimentary rock you find around San Antonio. The limestone has eroded over long periods of time to form caves. They create underground channels for the water to flow. Endangered species such as the Texas blind salamander live only in the Edwards Aquifer!



PECAN TREE

TREES FEED US. How many types of trees do you rely on for food? Fruit and nut trees, like apple, peach, pecan, and walnut, provide food for people. Wildlife also depend on trees for their survival. Hackberry trees are called cafeteria trees because they provide food for so many animals. Woodpeckers, mockingbirds, raccoons and squirrels eat the berries, which provide good sources of protein, fats, and **carbohydrates** (starches and sugars). This is especially important in winter after most other fruits have disappeared. In fact, hackberry leaves are a favorite food for 43 species of moths and butterflies. Deer will also eat the leaves if their normal food sources are gone.

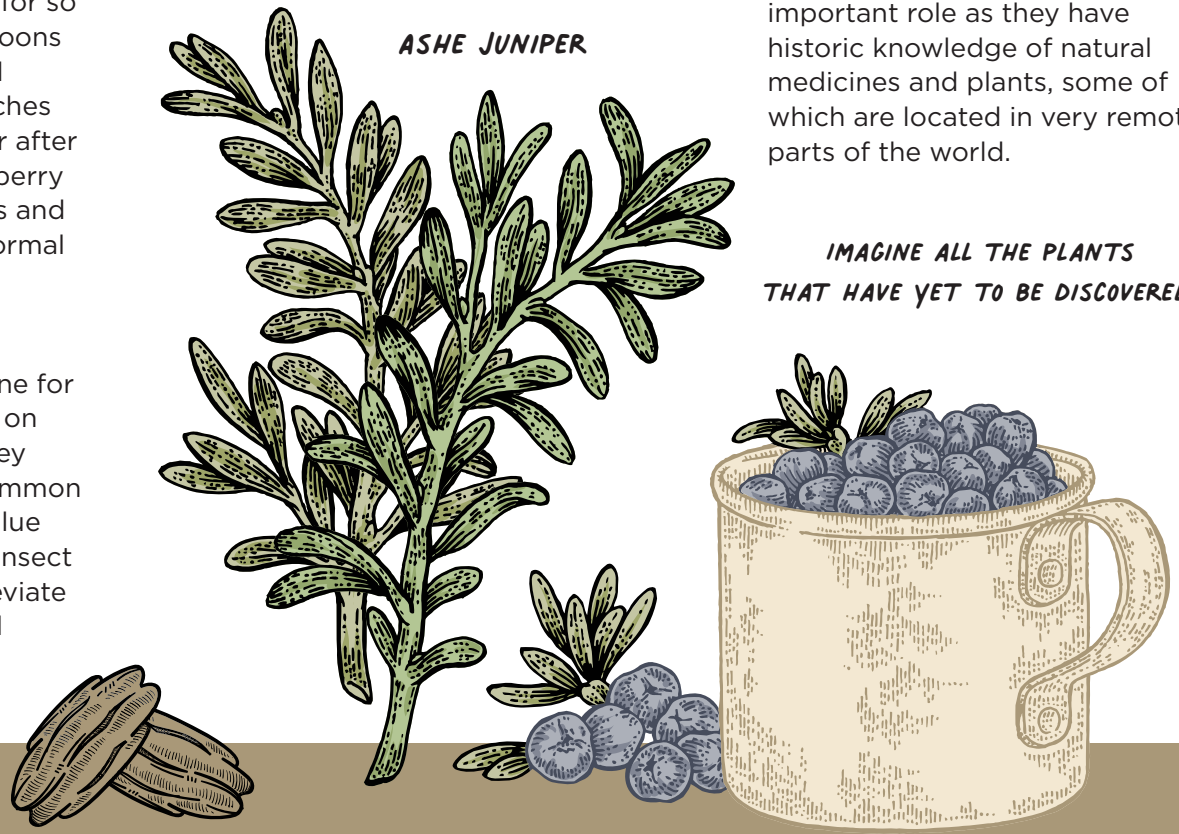
TREES ARE MEDICINAL. Trees have provided medicine for thousands of years. Native Americans depended on trees like the hackberry, ashe juniper, pecan, honey mesquite, live oak, desert willow, and Texas persimmon to treat and prevent diseases. For example, the blue ashe juniper berries, or "cones" were used as an insect repellent. The desert willow was used to help alleviate fever and aches since it contains similar chemical properties to aspirin.

DID YOU KNOW?

Around the world, there are around 70,000 plant species that are used in modern medicine. Indigenous communities play an important role as they have historic knowledge of natural medicines and plants, some of which are located in very remote parts of the world.

IMAGINE ALL THE PLANTS THAT HAVE YET TO BE DISCOVERED!

ASHE JUNIPER



DID YOU KNOW?

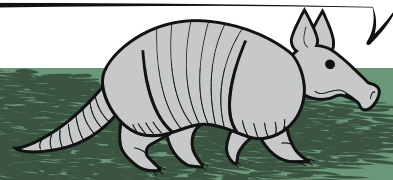
Urban cities like San Antonio have higher levels of air pollution, due to increased population as well as polluting activities such as driving, manufacturing, construction and demolition. As pollutants in the air increase, cases of asthma and other **respiratory** (breathing) health issues rise. When it's hot and humid, the air may become so polluted that it is dangerous to be outside for certain groups of people, especially children, older people, and those with asthma. A city may declare an **Ozone Action Day.** This means you should play inside, limit driving, and try to use less electricity.

TREES IMPROVE AIR QUALITY. Trees improve air quality by absorbing pollutants, such as vehicle emissions, through the **stomata,** the pores on their leaves. Water vapor and oxygen exit through the stomata providing cleaner (and cooler!) air, improving air quality.

TREES HELP REDUCE FLOODING. Did you know trees, small plants, and forest litter act like a natural sponge by absorbing storm water runoff and reducing erosion? When rain falls onto the trees, it drips down through the leaves and branches to the forest floor, protecting the soil from the full force of rain. Roots also help anchor trees. This protects against mudslides while allowing the soil to retain water. Having more trees protects against flooding and reduces the need for storm water drains and treatment plants which saves money in environmental costs.

TREES HELP WITH COOLING. Buildings absorb more heat than plants, so cities are often warmer than forests. This is called the **heat island effect.** During the summer heat, buildings absorb **solar radiation** (heat given off by the sun), causing us to use more air-conditioning. Trees provide shade during hot summers.

WHAT WOULD YOU DO TO IMPROVE AIR QUALITY IN YOUR COMMUNITY?



DID YOU KNOW?

By planting more trees, we can reduce the heat island effect. Trees also add moisture to the air which creates clouds. In addition, trees keep the rivers and streams cool and protected, so water evaporation is reduced.

THE BEST TIME TO PLANT A TREE WAS 20 YEARS AGO, THE SECOND BEST TIME IS NOW.
- CHINESE PROVERB

Section 2

UNDERSTANDING FOREST LAYERS

Most forests have 3 layers: canopy, understory, and forest floor. Different species of plants and animals live in these layers. Each layer has different levels of water, sunlight, and air circulation. The layers form an interdependent system. Plants and animals in each layer are influenced by and rely upon species in the other layers to encourage nutrient recycling. In other words, this complex structure supports a forest food web where all species depend on one another.

The **canopy** receives the most sunlight, and it contains branches and leaves of the tallest trees. Insects and mammals that eat leaves or fruit live in the canopy as do fruit eating birds. Because canopy trees rely on birds and mammals to spread their seeds, the seeds appear as nuts or in fruit. Canopy trees in Texas include live oak, ashe juniper, walnut, and pecan. Can you think of others?

The **understory** has the greatest variety of plant and animal species in a forest. It is inhabited by young trees, small trees, and shrubs. These trees and plants need less light than canopy species. Trees in the understory may have broad, flat leaves to catch sunlight. Shrubs here have woody stems. In San Antonio, understory trees include redbud, Texas persimmon, and Texas mountain laurel. Other plants found at this level include agarita, prickly pear, and white brush.

The understory is the workhorse of a forest. It shades the soil, so plants at all layers don't dry out. A thick understory also provides protection for animals against predators, cold and heat.

The **forest floor** is covered by leaves and twigs that fall from higher layers. Decomposers, like worms, termites, snails, and fungi live on the forest floor and break down dead plants and animals which creates rich soil. Some animals also make burrows which make it easier for water and air to get into the soil.

Section 3

FORESTS AROUND THE WORLD

TROPICAL RAINFOREST

- Tropical rainforests support a wide variety of plant and animal species.
- Wet with over 80 inches of rain each year.
- Warm and humid all year round.
- There are no seasons.
- Most soil is not very fertile.
- A thin layer of fertile soil is found at the surface where dead leaves decompose.
- Due to heavy rainfall, nutrients quickly wash out of the soil.

Tropical Rainforest Africa

CHAPARRAL

- Summer is very dry and lasts up to 4 months.
- The dry summer makes the chaparral biome sensitive to fires.
- Plants in the chaparral have adapted to summer fires so that their seeds may lie dormant until they are touched by fire.
- Average rainfall is 10-17 inches a year.
- Most animals are nocturnal.

Australian Chaparral

DECIDUOUS FOREST

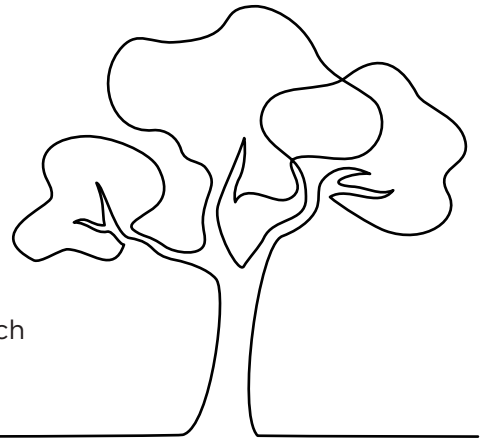
- Has a long, warm growing season as one of 4 distinct seasons.
- Temperatures range between -22F- 86F. Average rainfall is 30-59 inches a year.
- The soil is rich. Leaves dropped from trees each winter provide a source of organic material.
- With the dropping of their leaves during one season, trees enter a dormant period.

Deciduous Forest Japan

CLASSROOM EXTENSION

Have children design and draw a tree. Answer the following:

1. What is the name of their tree? (Can be silly)
2. Which forest biome does the tree live in?
3. How does the tree attract pollinators?
4. How has the tree adapted to temperature, rainfall and fire?
5. How does it protect itself from insects or other plants and animals which would destroy it?



CHARACTERISTICS OF TREES IN 3 DIFFERENT BIOMES

DO YOU KNOW THE DIFFERENCE?

WHAT IS A FOREST BIOME?

A **biome** is a large region defined by particular climate conditions such as light, temperature and rainfall. Plants and animals living in each biome have special features that help them to adapt and survive in a particular biome. Major biomes include tropical rainforest, chaparral, and deciduous forest.

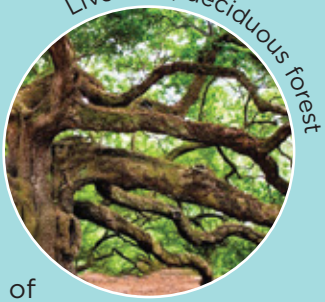
Maple tree | deciduous forest

BARK

Tropical Rainforest: Smooth, isn't adapted to cold weather, roots hold epiphytes (like ball moss or orchids), allows for rapid water run-off

Chaparral: Fire resistant, hard and heavy

Deciduous Forest: Thick bark to limit evaporation from trunk after rains, strong, sweet scent to attract pollinators



Live oak | deciduous forest

BRANCHES

Tropical Rainforest: Mostly high up to capture sunlight, few near the ground

Chaparral: May cut off water to branch in times of drought to save the tree from dying

Deciduous Forest: Branches grow in many layers and point in many directions to capture sunlight at different times of the year

Rainbow eucalyptus | chaparral

TRUNKS

Tropical Rainforest: Tall and thin to reach sunlight

Chaparral: Grows slowly, short, usually in thickets

Deciduous Forest: Large to support many branches

Palmetto leaves | tropical rainforest

LEAVES

Tropical Rainforest: Lower-level leaves have drip tips for water run-off, leaves usually large

Chaparral: Thick, waxy leaves to prevent drying out. Leaves may be needles, hairy, or spiny and often hold water

Deciduous Forest: Large, broad leaves drop as winter approaches

Heliconia flowers | tropical rainforest

FLOWERS

Tropical Rainforest: Grow directly on tree trunks, colorful to attract pollinators, may be poisonous to fight disease carrying instects

Chaparral: Typically bloom at night to avoid heat, often bloom after rains, strong, sweet scent to attract pollinators

Deciduous Forest: Flowers usually bloom in spring before leaves come out

Tropical rainforest tree roots

ROOTS

Tropical Rainforest: Shallow because nutrients only lie in the upper few inches of soil, large roots on surface to hold trees up

Chaparral: Long tap roots to reach water during droughts, large root systems

Deciduous Forest: Deep to break up rock below to give the soil more minerals, root spread may be twice as large as tree crown

Section 4

BUILD A FOREST HABITAT

Use your imagination and the templates provided. Then color, cut and glue the animals and trees to create a forest habitat. Use page nine as the background for your forest.

HELPFUL HINTS

Do you have a well-balanced ecosystem? A diverse forest is a resilient forest. Consider the many ways plants and animals in a forest ecosystem are connected.

As you learned, forest layers provide habitat to diverse wildlife. This includes the forest floor, understory, and canopy. Consider these layers as you build your forest. Imagine what could happen if one of these layers disappeared.

FURTHER EXPLORATION

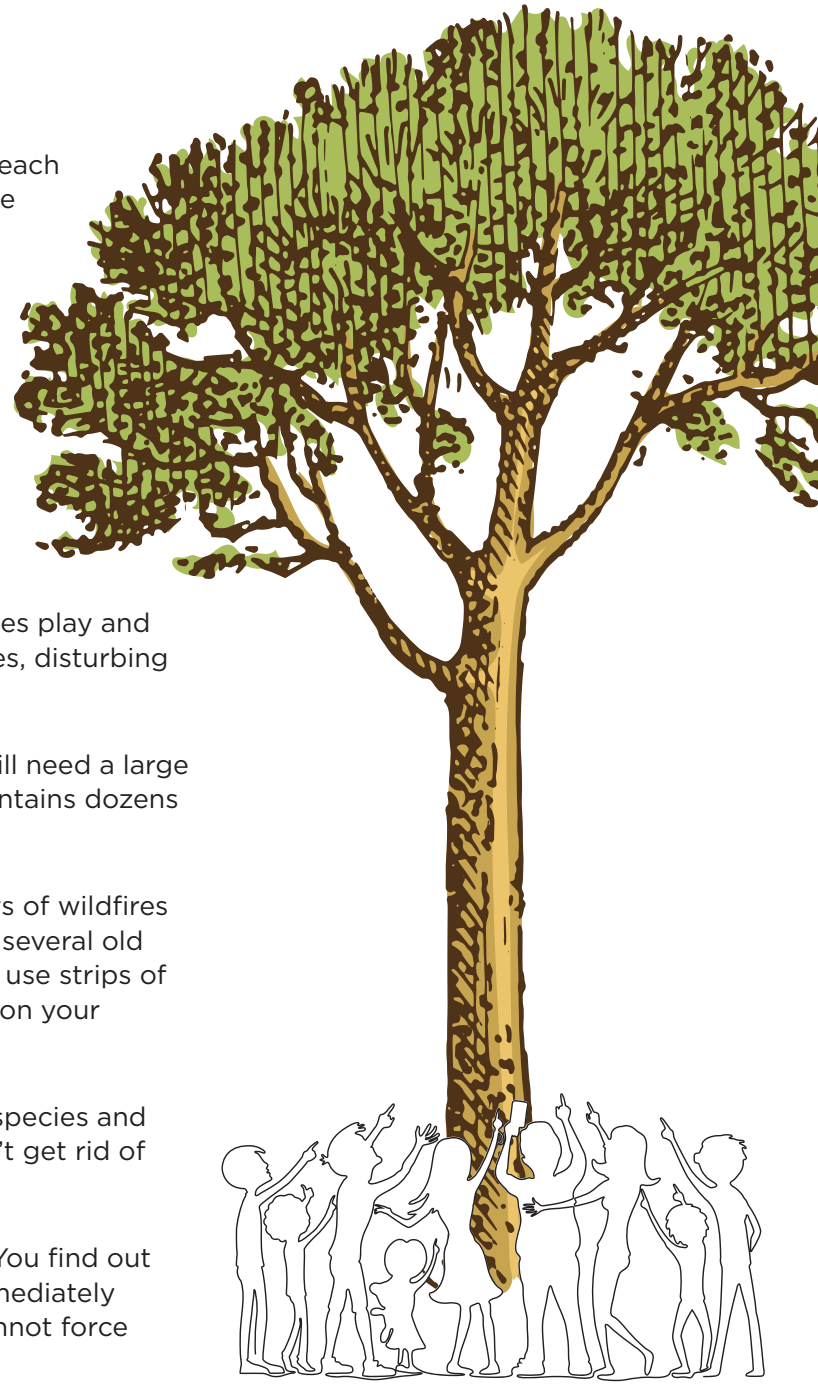
Need a little inspiration? Observe the diversity of trees where you live. Take a walk through your neighborhood and sketch the variety of trees. **How many can you find?** Notice the tallest trees down to the smaller trees. **Are all the forest layers represented?**


COLOR THE NEXT TWO PAGES!
HEY CUT IT OUT!

Section 5

DISCUSSION: LET'S TALK TREES

Take a look at the scenarios below and discuss as a group how you would respond to each situation. Consider the cost, time, and resources it might take to make the best possible choice for your family and community.



Scenario 1: Imagine you find dead birds next to a tree in your grandmother's yard. You find out the birds died from eating the tree's berries, what should you do?

Scenario 2: Imagine you are a **forester** (a person who practices the science, art, and profession of managing forests). You recently find out the pesticide you've been using to keep insects from eating leaves off the trees is making nearby wildlife sick when they eat the insects. What do you do?

Scenario 3: You are the manager of a popular local park in your city where many families play and spend time together. Recently, huge flocks of grackles have started roosting in the trees, disturbing picnicking families and pooping on everything. What do you do?

Scenario 4: You are in charge of building a shopping center in a new part of town. It will need a large parking lot for the many people they expect. The area where the parking lot will go contains dozens of large, healthy oak trees. What do you do and how much will it cost?

Scenario 5: Imagine you live in a house out in the country. Because increasing numbers of wildfires are a danger in the area, you've been told not to have trees near your house. You have several old growth Ashe juniper trees near the house. Endangered golden-cheeked warblers must use strips of bark from these trees to build their nests. Though you've not seen any of the warblers on your property, you know they nest nearby. What is the best solution?

Scenario 6: You find out that the big, beautiful trees in your backyard are an invasive species and that they will spread all over the neighborhood pushing out the native trees if you don't get rid of them. What should you do?

Scenario 7: Imagine you are an **arborist** (a person who takes care of individual trees). You find out that oak wilt has been discovered in a neighborhood. If trees with oak wilt are not immediately treated, they will die. Oak wilt will spread all over the city if action is not taken. You cannot force people to spend money to treat their trees. What should you do?

RESOURCES

Discover the Forest is a webpage featuring activities and resources for younger children **(ages 6-13).** It covers a number of topics, including the trees of the forest, wildlife and plant identification, fossil identification, and navigation.
discovertheforest.org/activities

The **Tree Detective Lesson Plan** is a plan put together by the National Wildlife Federation for children of numerous grade levels. Activities are geared toward **grades 3-6,** but also include younger audiences.
nwf.org/~/media/PDFs/Be%20Out%20There/Schoolyard%20Habitats/tree_detectives.ashx

Nature Conservancy Resources is a webpage that has activities for **all ages,** complete with videos on a variety of forestry topics, such as wildfires and sustainability.
nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/

The **USDA Forest Service** has a great educational resources page with lesson plans for **all ages**—including adults!
fs.usda.gov/learn

The **World Forestry Center** has compiled outstanding resources, for kids, as well as lectures and webinars for adults. Content can be found here for **all ages.**
worldforestry.org/at-home-forestry-education-resources/

Learning About Forests, run by the Foundation of Environmental Education, also has numerous free resources, covering topics like biodiversity and how forests use water. This organization has content for **all ages.**
leaf.global/our-resources