Unit Series Lesson Plan

Texas Arbor Day | Middle School

Teach with Texas Project Learning Tree

The Texas Arbor Day Unit Series for 6th-8th grade immerses students in the complexities of forest ecosystems, emphasizing the intricate relationships between living organisms and their environment.

Through a series of engaging activities, students will explore ecological succession, the importance of urban forests, and the vital role biodiversity plays in sustaining healthy ecosystems. This unit aims to cultivate an understanding of how human actions impact forests and inspire students to become active participants in conservation efforts.

Teacher Resources

Texas Forest Literacy Framework

A Texans guide to learning and teaching about trees, forests, and related natural resources and environments.

https://tfsweb.tamu.edu/TexasForestLiteracyPlan/

Workshops and Professional Development

Texas Project Learning Tree helps you master teaching about our environment. Learn more about training with TexasPLT.

https://www.texasforestry.org/programs/environmental-education

Unit Series Week Plan

Texas Arbor Day 2024

Grade Levels: **6th-8th**

Unit Topic: **Texas Arbor Day - Trees & Forest Ecosystems**

Texas Arbor Day is Friday, November 1, 2024

Key Learning Areas

- Ecosystem Interactions
- Ecological Succession
- Forest Food Web
- Urban Forestry
- Biodiversity

Skills

- Data Collection & Analysis
- Critical Thinking
- Scientific Inquiry
- Collaboration and Communication
- Creative Problem Solving

Materials

PLT Explore Your Environment K-8 Guide

Create a free PLT Educator Account to download the free student pages:

https://www.plt.org/resources/resources-for-plt-lessons

- **My Tree ID App:** https://texasforestinfo.tamu.edu/MobileApps/MyTreeID/
- **Team Chart: pg. 264 of "Explore Your Environment"**
- **Urban Forest Quest:** https://calp2016.sites.olt.ubc.ca/files/2017/10/Coolkit-revision-22.compressed.pdf

Shop the full guide and additional resources at shop.plt.org

Week Summary

Texas Arbor Day Unit Series

Monday

Summary:
Students begin with a lesson that explores how living things interact with their non-living environment and serve as building blocks for a healthy and functioning ecosystem.

Main Activity: To Be Biotic, or Not to Be **Time:** 45 minutes

Tuesday

Summary:
In this lesson, students learn about species diversity and how it changes within ecosystems at different stages of succession through studying test plots.

Main Activity: Started from the Grass, Now Trees Way Up **Time:** 45 minutes

Wednesday

Summary:
Students will simulate the interconnectedness of a forest ecosystem, experiencing how disruptions can lead to food scarcity, competition, and population shifts.

Main Activity: Scramble for Survival **Time:** 45 minutes

Thursday

Summary:
Students learn about Urban Forests and discover the key functions of trees and their surprising connections to city life. Students become citizen scientists, learning the importance of trees and inspiring action to protect them.

Main Activity: Forests For Us **Time:** 45 minutes

Friday

Summary:
In this lesson, students discover the ecological importance of tree biodiversity in local ecosystems through hands-on activities that identify different tree species.

Main Activity: Tallying Up Tree Tenants **Time:** 45 minutes

Monday

TEKS 6.12E, 6.12A, 7.10B, 8.11A

To Be Biotic, or Not to Be

Students begin with a lesson that explores how living things interact with their non-living environment and serve as building blocks for a healthy and functioning ecosystem.

Learning Outcomes

- Compare living (biotic) vs. non-living (abiotic) features in the 3 areas
- Identify how the environment (abiotic) affect the plants & animals (biotic)

Vocabulary

- ecosystem
- abiotic
- biotic
- microclimate

Materials & Prep

- Choose 3 varied sites (field, trees, water)
- Print out "Team Chart" student page
- Practice using equipment (thermometers, light meters, compass apps)

Activity Details & Instructional Strategies:

1. Think of your favorite spot (park, library, etc.). What makes it special? Living things/non-living things?
2. Tell students about visiting 3 places to see how living & non-living things interact (ecosystems).
    - Discuss respectful behavior outdoors (look, learn, leave alone).
3. Divide into teams, or have 2 teams study each component and average data
    - Soil: Check moisture & texture (wet/dry, sandy/clay)
    - Sun & Wind: Observe wind direction & sunlight (bright/shady)
    - Temperature: Measure temperature (ground, soil, 1 yard above)
    - Land: Check flatness, water flow direction, and features (buildings, cliffs)
    - Plant: Observe plant types & locations (trees, shrubs, grasses)
    - Animal: Observe animal types & evidence (insects, birds, tracks, burrows)
4. Investigate & Discuss:
    - Teams share findings and complete data charts.
    - Discuss differences between sites and interactions (light/plants, water/soil)
        - Think: Which element most affects plant/animal diversity? Why?

Assessment

Have students create a graphic organizer showing connections between what they learned (sunlight, soil, etc.) and their observations. Students will place the elements in circles around the page and connect them with lines describing the relationships. For instance, a line connecting sunlight and soil might say "More sunlight = drier soil."

Tuesday

TEKS 6.12E, 7.10B, 7.8A, 8.12B, 8.12C

Started from the Grass, Now Trees Way Up

In this lesson, students learn about species diversity and how it changes within ecosystems at different stages of succession through studying test plots.

Learning Outcomes

- Investigate how plant and animal variety relate to ecosystem changes.
- Identify stages of ecosystem development based on present species.
- Analyze test plots to understand ecosystem succession.

Vocabulary

- ecological succession
- pioneer species
- undergrowth
- canopy

Prep

Find a study site with multiple succession stages (grassland, shrubs, trees) or use pictures.

Activity Details & Instructional Strategies:

1. Take students to an area with diverse plant communities (e.g., park with woods). Have them find areas where plant types (grasses, shrubs, trees) seem to be changing. Encourage them to look for animals and signs of disturbance (erosion, construction) that might affect plant growth. They should try to find areas with:
    - Grasses and herbs only
    - Grasses, herbs, and shrubs
    - Grasses/shrubs with young trees
    - Ground cover and young trees
    - Mature trees
2. Discuss the stages of succession found and potential disturbances (disease, fire, etc.)
3. Divide students into groups of 3. Have them create a map marking landmarks and areas representing different succession stages.

Assessment

Prompt students to create a detailed map of the site, including topography, non-living elements, plant types, and signs of animals representing succession stages. Have them then write a summary report on all three sites, including observed succession stages, plant life cycles, disturbance factors, and evidence of animal life.

Wednesday

TEKS 6.8B, 6.12F, 7.5B, 8.12A

Scamble for Survival

Students will simulate the interconnectedness of a forest ecosystem, experiencing how disruptions can lead to food scarcity, competition, and population shifts.

Learning Outcomes

- Understand trophic levels in a forest ecosystem (producers, herbivores, carnivores, decomposers).
- Analyze the interconnectedness of an ecosystem and how disruptions can lead to cascading effects.
- Explore the concepts of food scarcity, competition, and population shifts within an ecosystem.

Vocabulary

- Producers
- Decomposers
- Endangered species
- Threatened species

Materials

- Large open space
- index cards

Activity Details & Instructional Strategies:

1. Discuss producers, herbivores, carnivores, and decomposers.
2. **Ecosystem Roles:** Get index cards! Plants, and animals (herbivores, carnivores, decomposers) are written on them. Stand in a circle - this is our healthy forest!
3. **Trouble in the Forest!** We'll face a challenge like drought or flood. Plants affected sit down.
4. **Food Fight!** Herbivores with no food:
    - Change Diet (switch cards with another herbivore eating a different plant - discuss competition!)
    - Starve (sit down)
5. **Carnivore Chaos:** Less food for them too!
    - Reduced Prey (sit down or switch cards to a different carnivore with a broader diet - discuss competition!)
    - Move On (sit down, then stand up in a different spot - finding new hunting grounds)
6. **Decomposer Discussion:** How does the disruption affect decomposers (more or less food)?
7. **Reflection:** Talk about the impact - food scarcity, competition, population shifts. How do abiotic factors (sunlight, water, soil) matter? Brainstorm solutions!

Bonus: Play multiple rounds, research real-world examples, or create a post-disruption food web!

Assessment

Prompt students to write a paragraph summarizing takeaways from the forest food web simulation. How did the chosen disruption impact the different parts of the ecosystem? Encourage them to explain how this activity helped them understand the interactions of a forest ecosystem and the potential consequences of environmental changes.

Thursday

TEKS 6.2E, 6.12A, 7.4A, 7.10B, 8.11A, 8.12A

Forests For Us

Students learn about Urban Forests and discover the key functions of trees and their surprising connections to city life. Students become citizen scientists, learning the importance of trees and inspiring action to protect them.

Learning Outcomes

- Define "urban forest" and recognize its various components
- Explore the ecological, social, and economic benefits provided by urban trees
- Understand how human activities can impact the health and composition of urban forests

Vocabulary

- Urban Forest
- Livability

Materials

- A safe area with street trees
- Print "Urban Forest Quest" worksheets (pg. 15 of Coolkit)
- Measuring tapes

Activity Details & Instructional Strategies:

1. Divide into pairs/groups and head outside.
2. Use "Urban Forest Quest" to guide observations & measurements of trees.
3. Back in the classroom, let's analyze the evidence collected:
    - Green Powerhouse: Why is having a lot of trees in a city important?
    - Diversity is Key: What can the variety of tree sizes and species tell us about the health of an urban forest?
    - Canopy Connection: Why is a connected tree canopy (where tree leaves overlap) beneficial? (Consider both benefits and potential challenges related to non-native squirrels.)
    - Nature's Protectors: Reviewing our intel from page 5 of the Coolkit, how do urban forests benefit us, especially considering our changing environment (climate change)?
4. Discussion: Brainstorm ways to use this activity to engage families & neighbors in urban forestry. Discuss how to better care for trees: watering during droughts, avoiding damage, reporting problems to city arborists.

Assessment

Have students interpret their data and explain how the observed characteristics of the urban forest contribute to the environmental health of your community. Encourage them to consider factors like air quality, stormwater management, and potential habitat creation. Then have them write a paragraph of the benefits of urban forests.

Friday

TEKS 6.2, 6.12, 7.2A, 7.11B, 8.13C

Tallying Up Trees Tenants

In this lesson, students discover the ecological importance of tree biodiversity in local ecosystems through hands-on activities that identify different tree species.

Learning Outcomes

- Identify leaves from a natural area to analyze and quantify tree species diversity

Vocabulary

- Monoculture
- Diversity

Materials

- pens/pencils
- My Tree ID App
- Plastic bags
- notebooks

Activity Details & Instructional Strategies:

Engage:

- Compare a wheat field (monoculture) to a diverse meadow to highlight the value of variety.
- Discuss how natural forests, boast a rich mix of tree species, providing various products and resisting threats. Brainstorm why tree diversity might be important for wildlife.

Explore:

- Students collect leaves from a designated natural area, focusing on variety within a time limit.
- Encourage collecting only one leaf per unique type.

Explain:

- Discuss the concept of sampling as a way to represent a larger population.
- Ask students how they might improve their sampling process (e.g., transects, quadrats).

Extend:

- Introduce a rarity index to quantify how common a tree species was in their collection.
- Discuss how this index can be used to compare different forest areas.
- (Optional) Research the area's forestry history and hypothesize how practices might have affected diversity.

Evaluate:

- Students self-evaluate their participation, considering data accuracy, ways to improve future samples, and teamwork during identification.

Assessment

Challenge students to identify the origins of their food. They can ask questions like: "What part of the plant gives us walnuts?" or "Where does maple syrup come from, and what kind of tree makes it?" Encourage them to research the origins of ingredients like bread and explore the surprising plant sources behind familiar foods.