Nashua River Watershed Investigations for Grades K - 8
Lesson # 7-1

Title: 7-1 Treemendous Trees: Warriors of the Watershed

Grade level & Standard: Grade 7
7MS-LS1-4. Explain, based on evidence, how characteristic animal behaviors as well as specialized plant structures increase the probability of successful reproduction of animals and plants respectively.

Objective: Students will discuss characteristics of trees and their contributions to forest, riparian, and river ecosystems within the watershed using card labels on a large tree model. Students will make connections between various tree parts and the benefits listed on the cards. Student teams will study a tree plot or individual tree closely and look for evidence of activity with animals and plants.

Background: Trees play a vital role in the watershed through a variety of ways. Not only do they provide nutrients to other organisms (leaves, sap, cambium, seeds, fruits, flowers) but their roots provide stability holding the soil along river banks and sloping landscape while their decomposing wood and leaves build nutrient rich soil on the forest floor. Tree canopies provide cooling shade for water bodies as well as forest understory providing critical temperature control for the earth's surface. Trees serve as wind buffers reducing wind and water erosion while providing wind shelter for many plants and animals. The roots of a tree serve to intercept pollution run-off while filtering chemicals out of surface and underground water traveling toward a local waterbody. Trees are major contributors to the water cycle during the process of photosynthesis, respiration and transpiration.

Vocabulary:

- All organisms, animals and plants, must obtain energy to maintain basic biological functions for survival and reproduction. Plants convert energy from sunlight into sugar in a process called **photosynthesis**. Photosynthesis uses energy from light to convert water and carbon dioxide molecules into glucose (sugar molecule) and oxygen (Figure 2). The oxygen is released, or "exhaled",

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from leaves while the energy contained within glucose molecules is used throughout the plant for growth, flower formation, and fruit development.

Carbon Dioxide & Water & Light Energy = Glucose & Oxygen

- **Respiration** occurs when glucose (sugar produced during photosynthesis) combines with oxygen to produce usable cellular energy. This energy is used to fuel growth and all of the normal cellular functions. Carbon dioxide and water are formed as by-products of respiration.

Glucose & Oxygen = Water & Energy & Carbon Dioxide

- **Transpiration** is the process of water movement through a plant and its evaporation from aerial parts, such as leaves, stems and flowers. Water is necessary for plants but only a small amount of water taken up by the roots is used for growth and metabolism. The remaining 97-99.5% is lost by transpiration.

Discussion points: How do trees contribute to their local watershed and other organisms within that ecosystem? What are the benefits of trees to other forms of life? How do trees reduce water pollution and climate change?

Materials:

- One large tarp or ground cloth
- One large 6 foot tree model made of brown felt including roots, trunk with hole, branches.
- Tree leaves, nuts, seeds to decorate tree model
- One branch each of a deciduous tree and a coniferous tree
- Colored flagging tape (or colored yarn) for marking plots or individual trees
- One set of "How Trees Benefit the Watershed" cards from templates provided.
- 5 sets of the following (one for each team):
    - *Tree Finder: A Manual for the Identification of Trees by their Leaves* by May Theilgaard Watts (approximately $3.25/book)
    - "How to Use Leaves to Identify Your Tree" (attached dichotomous key sheet)
    - "Trees of the Nashua River Watershed" (attached sheet)
    - Measuring tape
    - Ziploc bag
    - Clipboard with pencil
    - Treemendous Tree Data Sheet (attached)

Procedure:

1. Mark five plots that include a variety of trees using colored flagging tape in your schoolyard or other outdoor forest area.

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2. Set up tree model with decorations and branches on tarp or cloth.

3. Circle class around tree model.

4. Introduce parts of a tree, deciduous vs. coniferous, opposite and alternate branching.

5. Students brainstorm functions and benefits to the ecosystem using “How Trees Benefit the Watershed” cards (14 discussion points on 7 cards - templates attached) while placing benefit cards on tree model.

6. Divide class into five teams and hand out clipboards with books, reference sheets, and data sheet, ziploc bag, and measuring tape.

7. Assign each team a plot for tree investigations and research.

8. Students complete data sheet including tree i.d., observations, measuring circumference at waist height, collecting leaf samples, and noting evidence of interactions with other plants and animals (contributions at bottom of sheet).

9. Gather to share their trees’ contributions to the watershed and found evidence of plant and animal interactions.

Treemendous Trees materials

Photo taken by Carolyn Perkins

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7-1 Treemendous Trees lesson includes a model tree made out of felt or plastic.
Photo taken by Stacey Billings Chilcoat

Data Sheets: (attached)

- Treemendous Trees data sheet
- Trees of the Nashua River Watershed identification chart
- “How to Use Leaves to Identify your Tree” dichotomous key
- “How Trees Benefit the Watershed” cards template

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Treemendous Trees Data Sheet **NRWI Lesson 7-1**

Students in your team:_____

Procedure:

1. Identify the boundaries of your designated plot.
2. Identify each tree using REFERENCE MATERIALS PROVIDED and record below.
3. Collect one leaf from each tree.
4. Measure the CIRCUMFERENCE of each tree. Record below.

Type of tree	Describe leaf	Describe bark	Opposite/alternate branching	Circumference

What are six ways that your trees contribute to their ecosystem? Look for evidence of other life interacting with the trees. (Hint: remember intro. activity)

1)_____ 4)_____

2) _____ 5)_____

3)_____ 6)_____

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Stability

Shade

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Produces O_2

photosynthesis

Wind buffer

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Removes CO_2

photosynthesis

Soil building

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Water cycle

Liquid water to vapor

Intercepts Pollution Run-off

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Shelter

crown

Shelter

trunk

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Shelter

roots

Nutrients

crown

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Nutrients

trunk

Nutrients

roots

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