



LEAF: Learning About Forests

POST-ACTION AUDIT, GRADES 9-12

Did the team/class work with any resource specialists and/or volunteers? Yes No
If yes, please list.

Using the same sample group as in the baseline audit, conduct the survey again post-action plan implementation. Record the average response. On a scale from 1-10, 10 being the most important and 1 being the least important:

- How important are trees to plants and animals? _____
- How important are trees to the national economy? _____
- How important are forest systems to communities? _____
- How important are a school's actions to forest conservation and stewardship? _____

REQUIRED DASHBOARD METRICS

1. What is the total worth, in dollars, of the trees in the forest study site? _____



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TABLE 1. DEFINING THE STUDY SITE

<p>1. Confirm the GPS coordinates for the forest study site, by comparing them to your coordinates in the baseline audit. Use your smartphone's GPS or go to: https://www.whatsmygps.com to find the coordinates.</p>	<p>Latitude N _____ Longitude W _____</p>
<p>2. Is the study site being actively managed? If yes, for what? Check all that apply.</p>	<p>() Yes () No () Timber () Firewood () Wildlife Habitat</p>
<p>3. How many trees are in the forest study site?</p>	<p>() A few (less than 5) () Some (between 6 and 12) () Many (more than 12) () Exact number if known _____</p>
<p>4. If there are dead trees on the study site, count the number of standing fallen dead trees.</p>	<p>_____ N/A _____ Standing dead trees (snags) _____ Fallen dead trees (logs)</p>
<p>5. What types of trees are found in the study site?</p>	<p>() Deciduous () Evergreen () Mixed</p>
<p>6. How is land used surrounding the study site? Check all that apply.</p>	<p>() Residential () Park or Public Green Space () Commercial () Undeveloped Land</p>



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CHART 1. TREE SPECIES DATA

Reassess the 5-10 trees from the baseline audit and complete Chart 1. If needed, refer to the **Forest Study Site Measurement Guide**.

Tree Species	Deciduous (D) or Evergreen (E)	Age Sprout, Seedling, Mature, or Snag	Tree Height in Feet	Tree Diameter (DBH) in Inches
Example: Sugar Maple	D	Mature	17	28
#1				
#2				
#3				
#4				
#5				
#6				
#7				
#8				
#9				
#10				

Think about the following questions as you summarize the information in Table and Chart 1.

1. What changed in and/or around the forest study site between the baseline and post-action audit or between audit years?
2. Since the action plan was implemented, has tree biodiversity improved?
3. Describe one action students took to support current community tree campaigns or initiatives.



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TABLE 2. WEATHER

<p>1. Identify the season during which data is being collected.</p>	<p>() Summer () Fall () Winter () Spring</p>
<p>2. Surface Ozone Use ozone test strips for this measurement.</p>	<p>_____ parts per billion (ppb)</p>

Think about the following question as you summarize the data in Table 2.

1. How is the season's weather different from the weather during the baseline audit?
2. What empirical evidence have trees provided that there has been a season change?
3. Have there been any extreme weather events since the baseline audit that impacted tree health, flood, drought, fire, hurricane, etc.? If yes, upload photographic evidence.
4. Describe the relationship between weather and forest health.



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TABLE 3. WATER QUALITY

1. Did students conduct baseline water quality tests? If yes, conduct the following water quality tests.		() Yes () No
2. pH Test 1 _____ pH Level Test 2 _____ pH Level Test 3 _____ pH Level () Acidic () Neutral () Basic		3. Temperature Test 1 _____ °F _____ °C Test 2 _____ °F _____ °C Test 3 _____ °F _____ °C
4. Conductivity Test 1 _____ μS/cm Test 2 _____ μS/cm Test 3 _____ μS/cm	5. Alkalinity Test 1 _____ CaCO ₃ mg/L Test 2 _____ CaCO ₃ mg/L Test 3 _____ CaCO ₃ mg/L	6. Dissolved Oxygen Test 1 _____ mg/L Test 2 _____ mg/L Test 3 _____ mg/L
7. Transparency – Choose method A or B. A1. Secchi disk – distance from observer to: Test 1 _____ m water surface _____ m where disk disappears _____ m where disk reappears Test 2 _____ m water surface _____ m where disk disappears _____ m where disk reappears Test 3 _____ m water surface _____ m where disk disappears _____ m where disk reappears A2. Secchi disk reaches the bottom and does not disappear – distance from observer to: Test 1 _____ m to water surface _____ m depth to the bottom of the water site Test 2 _____ m to water surface _____ m depth to the bottom of the water site Test 3 _____ m to water surface _____ m depth to the bottom of the water site B. Transparency Tube Tube test 1 _____ cm or _____ greater than depth of transparency tube. Tube test 2 _____ cm or _____ greater than depth of transparency tube. Tube test 3 _____ cm or _____ greater than depth of transparency tube.		



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TABLE 4. SOIL QUALITY

1. Soil Temperature <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">At 5 cm</td> <td style="width: 50%; border: none;">At 10 cm</td> </tr> <tr> <td style="border: none;">_____ ° F _____ ° C</td> <td style="border: none;">_____ ° F _____ ° C</td> </tr> <tr> <td style="border: none;">_____ ° F _____ ° C</td> <td style="border: none;">_____ ° F _____ ° C</td> </tr> <tr> <td style="border: none;">_____ ° F _____ ° C</td> <td style="border: none;">_____ ° F _____ ° C</td> </tr> </table>		At 5 cm	At 10 cm	_____ ° F _____ ° C	_____ ° F _____ ° C	_____ ° F _____ ° C	_____ ° F _____ ° C	_____ ° F _____ ° C	_____ ° F _____ ° C	2. Soil pH Test 1 _____ pH Level Test 2 _____ pH Level Test 3 _____ pH Level <input type="checkbox"/> Acidic <input type="checkbox"/> Neutral <input type="checkbox"/> Basic	
At 5 cm	At 10 cm										
_____ ° F _____ ° C	_____ ° F _____ ° C										
_____ ° F _____ ° C	_____ ° F _____ ° C										
_____ ° F _____ ° C	_____ ° F _____ ° C										
3. Nitrogen (N) Test 1 () Low () Medium () High Test 2 () Low () Medium () High Test 3 () Low () Medium () High		4. Phosphorus (P) Test 1 () Low () Medium () High Test 2 () Low () Medium () High Test 3 () Low () Medium () High		5. Potassium (K) Test 1 () Low () Medium () High Test 2 () Low () Medium () High Test 3 () Low () Medium () High							
6. Soil Texture <input type="checkbox"/> Sandy <input type="checkbox"/> Clay <input type="checkbox"/> Silt <input type="checkbox"/> Loam		7. Soil Consistence <input type="checkbox"/> hard <input type="checkbox"/> loose <input type="checkbox"/> firm <input type="checkbox"/> plastic and sticky		8. Soil Color A. <input type="checkbox"/> dark <input type="checkbox"/> light B. <input type="checkbox"/> brown with yellow hues <input type="checkbox"/> brown with grey hues <input type="checkbox"/> brown with green hues <input type="checkbox"/> brown with blue hues							

Think about the following questions as you summarize the data in Table 4.

1. Review why it is important to observe and test water and soil quality near tree systems?
2. Is there a significant difference in water and/or soil quality since conducting the baseline audit? Explain.
3. How are water, soil and tree health connected?



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Consider contacting a local non-profit, business, government agency, college or university. Their involvement is a great way to connect to the community, inspire students, demonstrate career possibilities and share resource expertise. If you cannot conduct a study in the field please determine the best way to gather data, i.e. a phone call, an email or ideally a virtual conferencing tool with someone who works as a forester, forest ecologist, landscape architect, park planner, volunteer, etc. Contact your state forest service office for resource specialist contacts, resources or recommendations.

Invite parents and community members to participate in the auditing process. Students can take on the role of educator by working with volunteers on citizen science. This experience is a great way to build community.

TABLE 5. WILDLIFE - GENERAL

1. Are there animals present at the forest study site?	() Yes () No
2. Did students see animals in the following families? Check all that apply, then fill in Chart 2. Wildlife-Animal Observations.	<input type="checkbox"/> mammals <input type="checkbox"/> birds <input type="checkbox"/> insects <input type="checkbox"/> reptiles <input type="checkbox"/> amphibians
3. Did you observe other plant types at the study site?	() Yes () No
4. Did students see plants from the following groups? Check all that apply, then fill in Chart 3. Wildlife-Plant Observations.	<input type="checkbox"/> bushes <input type="checkbox"/> grasses <input type="checkbox"/> wildflowers <input type="checkbox"/> ferns <input type="checkbox"/> mosses <input type="checkbox"/> other (fungi)

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CHART 2. WILDLIFE – ANIMAL OBSERVATIONS

Allow students opportunities to practice identifying what wildlife species they are observing. For example, is the bird a Robin or a Black-throated blue warbler? Is the squirrel a red or a gray squirrel? Often the type of wildlife you find in the study site will help to define the health and the type of forest.

Birds, Mammals, Insects, Reptiles, Amphibians	# of Animals Observed	Animal Evidence (tracks, burrows, nests, droppings, etc.)	Other Notes
Example: Birds	5	One nest	Nest had a broken egg, made up of pine needles, feathers and leaf litter

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CHART 3. WILDLIFE – PLANT OBSERVATIONS

Ground Cover (plant life on the ground)	Species or Description	Estimate the Amount Found at the Study Site (a lot, some, a little)
Bushes	Example: Blackberries	a lot
Grasses	Example: Woodland Sedge	some
Wildflowers	Example: White Trillium	a little

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CHART 3. WILDLIFE – PLANT OBSERVATIONS, CONTINUED

Ground Cover (plant life on the ground)	Species or Description	Estimate the Amount Found at the Study Site (a lot, some, a little)
Ferns	Example: Maidenhair	some
Mosses	Example: White-Tipped Moss	a lot
Other (Fungi)	Example: Oyster Mushroom	some

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Think about the following questions as you summarize the information in Table 5 and Charts 2 and 3.

1. How have student's ability to make observations and identify plants and animals changed from the baseline audit?
2. Have the quantity of wildlife or variety of wildlife improved since implementing the team/class action plan?
3. If the team/class worked with an agency to support conservation efforts of a specific, threatened or endangered species, please elaborate.
4. Describe one action students took to improve wildlife habitat at the forest study site.



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TABLE 6. TREE WORTH

Use the *National Tree Benefit Calculator*, <http://www.treebenefits.com/calculator>, to collect the data below. Some data will be used as metrics for your school's Eco-Schools USA Dashboard.

Use the information from Chart 1 to begin populating the table below. (The team/class is reassessing the trees from the baseline audit.) Next input the requested data into the online calculator at *National Tree Benefit Calculator*. If you would like to provide data for more trees or you would like to calculate multiple trees for a species, please enter the information into an Excel spreadsheet or other document and submit as evidence when applying for an Eco-Schools award.

Tree Species	Tree Diameter in Inches (in.)	Land Use	Stormwater Runoff in Gallons (gal.)	Energy Saved in Kilowatt Hours (kWh)	CO ₂ Captured in Pounds (lbs.)	Annual Overall Tree Benefit in Dollars (\$)
Example: American Beech	25	Park/Vacant	4,191	171	854	\$212
TOTALS						

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Think about the following questions as you summarize the information in Table 6.

1. Have there been changes between the baseline and post-action audit data? Explain.
2. Were any trees lost? If yes, how much was lost in gallons of water, kilowatt hours saved, pounds of CO₂ sequestered and total dollars.
3. How do trees in a community or forest impact sustainable development? Keep in mind the three dimensions, social, economic and environmental.
4. How have student attitudes toward trees changed?
5. What did students learn about the historical relationship communities and indigenous peoples had and continue to have with trees?
6. Describe one action students took to support current conservation efforts in the area/region.

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Review of All Data

1. Based on what is known and has been learned, what claims can be made based on the data and other evidence?
2. How has using systems thinking and interpreting or utilizing system models helped to understand forest systems within a larger ecosystem?
3. Explain the importance of **stability and change** (both positive and negative) within a forest system.
4. Have students observed **patterns** with a forest system? How has the identification of patterns supported learning? Explain.
5. What cause and effect **relationships** have students identified. Are all the identified relationships positive, negative or a mix?