



Teacher Guide 2: Forest Features

This guide gives teachers and educators ideas and strategies for using the World Resources Institute’s interactive mapping tool, [SeeSouthernForests.org](http://www.SeeSouthernForests.org), in 9th-12th grade classrooms. The guide follows individual state standards for earth/environmental science, biology, geography, and social studies for six southern U.S. states: Arkansas, Florida, Georgia, Mississippi, North Carolina, and Tennessee. These standards can be found on the Teacher’s Page section of the website (www.SeeSouthernForests.org/teachers), along with big ideas, guiding questions, and other resources that may be useful for incorporating the website into the classroom. This guide also makes frequent reference to the Southern Forests for the Future publication, which can be read and downloaded under the “Discover Southern Forests” tab in the green menu bar on the homepage of the [SeeSouthernForests.org](http://www.SeeSouthernForests.org) website.

I. FOREST COVER GAIN/LOSS

Sample Activity: Explore stability and/or change in forest cover.

- Using the “forest cover gain/loss map” theme, select the case study denoted by the red pin entitled “Forest Cover Gain and Loss Statistics.”
- Using the maps provided, have students determine which county in each state gained the most forest cover and which county lost the most forest cover.
- Have students determine which state overall gained the most forest cover and which state lost the most forest cover.
- Which part of the region seems to be losing more? Which part of the region is losing less? Where do the areas of gain and loss tend to be focused?
- Project the timeline of gain/loss in the Southern Forests for the Future publication. (chapter 3, page 24, figure 3-1). Have students identify historic events within each era given. (Suggestion: Students can write events on pieces of paper or sticky notes, then attach them to the diagram on the screen.)
- Have students understand the difference between gross forest cover loss and net forest cover loss over the timeline.

- Use this to emphasize “Big Ideas” about forest cover gain/loss:
- Forests are continually changing.
- Some major drivers of change include economics, policies, and human land use change.
- Loss or gain of forests has implications in terms of jobs, ecosystem services, and long-term health of the community. Loss or gain of forests has implications for the “look and feel” of a community.

Note: See Teacher Guide 3, Drivers of Change, for more activities on this topic.

As a supplementary activity on forest cover, reference the Project Learning Tree module “Global Connections: Forests of the World.” Activity 4 titled “Analyzing Patterns of Forest Change,” has students analyze how the Duke Forest in North Carolina has changed over a period of 75 years.

II. COMPOSITION

Sample Activity: Discover what types of tree species are present in your county, city, or state.

- Click on the “Composition” tab in the Map Themes toolbox. Once the map has loaded, type in the name of your city and state in the “Find A Place” textbox near the upper left portion of the site.
- Use the legend to determine what species of trees are present. Ideas to extend the learning using other resources:
 - Take students outside to identify species using a guidebook. Students can create an inventory of species on a specific plot, then graph and compare plots to identify which plots have the most biodiversity, invasives, etc. For additional details on biodiversity and species in southern forests, see Chapter 2 in *Southern Forests for the Future*. A guidebook focused on eastern forests would also be helpful for this exercise.
 - Have students develop their own illustrated guide to local species using the level of biology and classification appropriate to your students.
 - See Teacher’s Guide 3 for an activity in which students create an inventory of pests and pathogens under one of the case studies under the red pins.
- Select the western-most pin, “invasive plants,” and have students use the links to research the non-native species of plants and/or animals that may be affecting native species, and ways to prevent this from happening. Also see pages 43-46 of the *Southern Forests for the Future* publication. Take a look at the pest and disease threat map on the website under the “Drivers of Change” theme.
- Have students begin to understand why certain species exist in certain regions (variation in climate, soil, etc). Break up the students into several groups. Have each group research

a type of forest and have them present their findings. For example, longleaf/shortleaf pine forests are found primarily in the south central and southeastern portion of the region (see page 4, table 1.1 in the *Southern Forests for the Future* publication for a table of the dominant tree communities and associated tree species in southern forests).

As a supplementary activity on forest classification, reference the Project Learning Tree module entitled “Global Connections: Forests of the World.” Activity 3, titled “Mapping the World’s Forests,” has students use a well known climate model to accurately classify and map local and global forests.

III. OWNERSHIP

Sample Activity: Simulation of forest land ownership

Use the prompts below to lead a simple simulation that gives students parcels of forest land and allows them to explore the consequences of different management decisions. The goal is for students to consider management decisions that are sustainable and realize to understand what the ecosystem services that they are the forests providing to the wider community they are a part of, such as water purification, recreation opportunities, hunting and fishing, and so forth.

- Print a large map of the southern U.S. and hang it on the wall. Use a grid system to plot what parcels of forested land each student in the class “owns.” (Assume each plot of land has a healthy mix of native species, with limited invasive species. This will make projecting the consequences of management decisions easier.)
- Allow students to buy and sell land; develop the land for agriculture, industry, etc.; turn the land into a State or National park; or sustainably conserve the land. Suggested decisions are in the table below.

- Develop a set of impacts of students' management decisions; depending on how students manage their land, the consequences will vary. Encourage students to consider impacts on people, biodiversity habitat, ecosystem services (e.g., recreation, water quality), and the community's economy. Students should consider (1) impacts on their immediate land, and (2) impacts to the broader region. (Students should understand that environmental and social impacts do not stay "contained" on their land, but have broader implications.) Finally, have students determine the potential positive and negative impacts of their decisions. Sample management decisions and impacts are provided in the table below.
- As students make their choices, track them on the wall map, noting potential impacts on neighboring plots of land.
- At the end of the simulation period, review the choices that students have made and review the collective impacts.
- To extend the learning, have students review principles of sustainable management.
 - Reference the three case studies in the forestry map theme entitled "Sustainable Forestry Initiative," "Forest Stewardship Council," and "American Tree Farm System."
- Have students apply their understanding of impacts by researching regional land use and forest management decisions.

Management Decisions	Potential Impacts
No action/No public access (No human intervention on forest -- forest left alone without management -- with access for owner only.)	Impacts will depend on natural environmental changes (natural succession, fire, unintentional introduction of additional invasive species from a neighbor's land, etc.). Emphasize to students that ecosystems are not static, but constantly changing. Reference page 23 in the Southern Forests for the Future publication.
The owner opens forest to the public as a reserve for recreation and/or hunting.	<p>Creating the reserve may require the construction of roads, paths or other access points; this may require removal of trees, with potential impacts on soil, erosion, and water quality. Encourage students to consider different options for creating access, and the impacts of each. (Consider, for example, the impact caused by creating a walking trail vs. paving a path or creating wide trails for off-road vehicles.)</p> <p>A new reserve could create tourism and related economic opportunities. To enhance this, the owner may decide to remove the existing invasive species, or partner with community organizations to do so. Private property surrounding the new reserve would likely go up in value, as proximity to recreation opportunities is considered desirable.</p>
Clear the land for development.	Clearing the land for housing or other development would create economic opportunities for some (including the owner), but may impact the value of properties surrounding the once-forested area. The forest habitat would be lost, impacting multiple species on the land, removing carbon sinks, depreciating water quality, increasing erosion in nearby waterways, and potentially destroying natural corridors with adjacent land. Thus, the impacts could be far reaching.
Selective harvesting of trees/ Sustainable management.	This option would potentially offer economic benefits while maintaining ecological health.

IV. PROTECTION

Sample Activity: Overview of protection

Begin by introducing the definition of a protected area. Protected areas are clearly defined geographical regions that are recognized, dedicated, and managed by legal or other effective means to achieve the long-term conservation of nature and associated ecosystem services.

Key points to highlight include:

- Protected areas have some form of permanent designation, preventing the conversion of a natural ecosystem and prescribing the types of use of the ecosystem.
- 12.8% of southern forests are located in protected areas.
- The majority of protected areas are owned by the federal government; the rest are owned by state and local governments, non-governmental organizations, or private citizens.
- 60% of southern forestland is owned by non-industrial forest owners. Another 27% is owned by industrial or corporate owners.
- Given the low percentage of public ownership and the high percentage of private ownership, expanding public protected areas is not necessarily the best strategy to keep forests from being converted.

As a supplementary activity on changing land ownership and land use planning, reference the Project Learning Tree module “Exploring Environmental Issues: Places We Live.” Activity 6 entitled “A Vision for the Future,” has students developing and presenting a vision for the future of an area in their community.

Sample Activity: Explore various levels of protection, then identify the pros and cons regarding protection of longleaf pine forests and savannas, one of the most endangered ecosystems in North America.

- Using the protection map theme, click on a protected area shown on the map.
- Once the gray box has loaded click on the IUCN category and review the levels and definitions of protected areas. Have students generate activities that would and would not be allowed in each; consider activities such as research, recreation, and logging. (Example: in a strict nature reserve, scientific research is allowed, but hiking and logging are not.)
- Additional points to emphasize:
 - Not all protected areas have the same degree of protection. The Gap Analysis Program (GAP) has three major levels of protection:
 - **Status 1** confers permanent protection from land conversion and precludes extractive activities. (Only 1.1% of southern forests are under this degree of protection.)
 - **Status 2** confers permanent protection and a mandated management plan, but allows management practices or permits uses that can degrade the quality of existing natural communities, including the suppression of natural disturbance.
 - **Status 3** confers permanent protection from conversion but allows extractive activities such as logging and mining.
 - Discuss reasons for different levels of protection, and the impacts on different stakeholders (citizens, other species, communities, local economies, etc.) For example, protected areas typically entail land uses that reduce the potential for revenue, so they have to be financed through government funding or private funding.
 - Apply the concepts to review one case study, “Longleaf Pine Forests and Savannas.” To access this, click on the western most pin.

- Split the class into two groups and have students read this case study. Half the class should research and take notes on the pros of protecting this ecosystem, and the other half should focus on the cons.
- Have each side present its findings. Use a T-chart on the board to keep track of information presented. After both sides have presented their findings review the key points and discuss the options and consequences of each. Identify questions that are unresolved or need further research, and have students talk about possible answers.
- Compare the longleaf pine ecosystem map with the biodiversity hotspot maps on pages 18 and 19 of the *Southern Forests for the Future* publication.

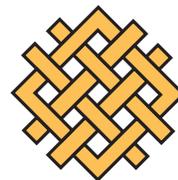
the board, and a traditional atlas map showing major cities in the south on the other half of the board.

- Use the atlas to identify major cities on the wildness map. (Use the text box to mark cities, or attach sticky notes to the screen.)
- Have students draw conclusions about the correlation between urban areas and degree of wildness and fragmentation:
 - Where do we see the least wild areas? In urban areas or rural areas? Where do we see the most wild areas? What does this tell us?
 - Where are the major intact forests? How do these correlate with existing protected areas? (Use the protected areas layer on the website to locate existing protected areas).
 - What types of human structures cause fragmentation? What are the biological consequences of fragmentation? How can we keep areas from becoming fragmented?

V. FRAGMENTATION

Sample Activity: Explore the connections between habitat fragmentation, degrees of wildness, and urban/suburban areas.

- Begin by having students brainstorm definitions for fragmentation, wildness, and intact forest landscapes. Have them discuss why it is important to have intact forest areas.
- Use the case studies provided in the fragmentation map theme to have students explore these key concepts. Emphasize the actual definitions of fragmentation and intact forest landscapes. (Fragmentation is the process by which land is broken up into smaller and smaller parcels. Intact forest landscapes are unfragmented forest ecosystems, at least 500 km² in size, without roads, logging, or other significant signs of human activity.) Have students reflect on the difference between the definitions they brainstormed and the actual definitions. For example, students may not have realized that “intact” is defined by acreage.
- Next, project the wildness map on one half of



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