

ACTIVITY

13

Future of Our Forests

Student teams review what they have learned in this module by compiling a report on the future of forests in Southeast United States. Students can share their knowledge by writing a letter to their state or county forester, city arborist, local newspaper, community leaders, or other audiences that are relevant in your area.

Subjects

Agriculture, Biology,
Environmental Science,
Language Arts

Skills

Analyzing, Communicating,
Critical Thinking, Predicting,
Researching, Synthesizing

Materials

Student pages (see [Activity Webpage](#) link below);
Internet access

Time Considerations

Two 50-minute periods

Related Activities

Students should have an understanding of at least two concepts introduced in this module. See the chart in Getting Ready to review how to adapt the activity to review what you have covered.

Research Connection

Scientists around the world are exploring the process of climate change and the opportunities we have to mitigate and adapt.

Activity Webpage

Find online materials
for this activity at
[https://sfcc.plt.org/
section5/activity13](https://sfcc.plt.org/section5/activity13)



Objectives

By the end of this activity, students will be able to

- synthesize information about the forest and climate system, and
- communicate recommendations for forest managers about adapting to future climate uncertainty.

Assessment

- Use the handouts and summary reports to assess how well students understand the connections between climate, forest, emissions, and consumer choice.
- Ask students to write an essay in response to the prompt: Describe at least two ways in which climate change may affect forests in your area and how this might impact landowners in your community. Describe at least two strategies that people could do to either reduce or cope with this potential impact.

Background

Forests in the southeastern U.S. are very important resources. While these forests account for only 2 percent of the world's total forest cover, they produce 16 percent of its **timber** products. Forestland also protects watersheds, provides wildlife **habitat**, and offers outdoor recreation experiences for people. Healthy, **resilient** forests are important to the future of the Southeast, the nation, and the world.

The other activities in this module introduce students to the potential impacts of **climate change** on southeastern forests, the research underway to understand these changes and develop strategies to protect forest resources, the management possibilities that could reduce atmospheric **carbon dioxide** and increase resilience of forests, and the role that consumers could play in making choices that emit less carbon and in encouraging wood substitution to sequester carbon.

Additional background information can be found throughout the module.

You can help students synthesize this information and understand how each section of this module contributes to the future of southeastern forests by asking teams of students to summarize key points related to one topic in a one-page handout and short presentation. Group assignments are based on using several activities in this module. If you have not had time to use them all, you may need to change the group assignments to reflect the activities you have completed. You may want to remind students of which activities they completed by reviewing the associated background readings and slide presentations in this module. In addition, the cards on the Group Assignments student page can be a starting point for each group's research. After hearing from each group, ask students to write a summary report, essay, or letter for the



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This activity provides an opportunity for students to summarize the concepts they've learned about climate and forests.

state or county **forester**, city arborist, local newspaper, community leaders, or other audiences that are relevant in your area.

Teaching This Content

Learning occurs when we provide opportunities to experience *and* reflect. This activity gives students a chance to return to information they learned in this module and

put the pieces together for themselves and others. The act of recalling information may reveal misconceptions that were not effectively reconstructed and facts that were not retained. You can help students realize their questions and support them in digging up additional information. If they have identified the gaps in their knowledge, they may be more likely to remember the information they find to fill those holes.



Systems Thinking Connection

AS STUDENTS PREPARE handouts and presentations for the class, instructors may want to remind them to incorporate the systems thinking concepts that they have been learning as well. At what scale are they exploring the system? Where are they drawing the system's boundary? What are the important variables? What is the relationship between the variables? Are there connections that are often overlooked? Are these connections direct or indirect? Are there any delays between the causes and the effects? What are the feedbacks within the system?

When groups begin to synthesize all of the information and communicate it to others, they help the audience understand the system. What will make it easier for people to understand how the pieces fit together and interact? Students might find an analogy or example will be helpful. How does their group topic fit into the larger picture? What are the connections to concepts and topics covered by other groups? It might even be useful for students to tell the audience that they are describing a system and then define its variables, relationships, and boundaries.

Getting Ready



The Activity 13 webpage provides **Teacher Tools** that you can use to become more familiar with this activity's background and procedure (<https://sfcc.plt.org/section5/activity13>).

Select the Group Assignments cards you need based on the following chart. Note that in addition to this activity, Activities 9, 11, and 14 are not included on the chart. Adjust the questions on the Reflection student page to match the groups you have chosen. Make copies of student pages and cut the cards you will need for your groups.

Review the information on the selected Group Assignments student page and locate the background information, videos, or presentations from activities in this module that you need to provide for each group.

Doing the Activity

1. Divide the class into equal groups based on the number of role cards that you can use (which is based on the activities you conducted from this module). Each group will need to access websites, videos, and background information associated with the information on their card. Provide a copy of the Reflection student

page to each group member so students can develop summary answers to the questions related to their topic.

2. Invite each group to review the data, summarize the information in a one-page handout, and make a presentation to the class with findings and synthesis. The reports should include at least three supporting references.

3. As students listen to the group presentations, ask them to complete the Reflection student page.

4. After all groups have presented, discuss the following questions as a class:

- What are some general trends for how climate change might affect forests in your area?
- How can forests help reduce atmospheric carbon dioxide?
- What can forest landowners do to reduce risks associated with climate change?
- What can consumers do to reduce carbon dioxide added to the atmosphere through human activities?
- What information will help people understand and act on these concepts?

5. After hearing the presentations and collecting the handouts, ask each group of students to write a summary report, essay, or letter to



If your class experienced this activity . . .	You can use this card . . .
1: Stepping through Climate Science	Climate Scientist Group, Forest Ecologist Group
2: Clearing the Air	Climate Scientist Group
3: Atlas of Change	Climate Scientist Group, Forest Ecologist Group
4: The Changing Forests	Forest Ecologist Group, Forest Researcher Group
5: Managing Forests for Change	Forest Ecologist Group, Forest Manager Group
6: Mapping Seed Sources	Forest Manager Group, Forest Researcher Group
7: Carbon on the Move	Tree Biologist Group
8: Counting Carbon	Tree Biologist Group
10: Adventures in Life Cycle Assessment	Forest Industry Group
12: The Carbon Puzzle	Forest Manager Group, Forest Industry Group



In this activity, students work in groups to compile a report on the future of southeastern forests.

explain the importance of forests, how forests are likely to be impacted by climate change, and what landowners and citizens can do to mitigate the effects of climate change and protect the health of southeastern forests. As a class, select the audience(s) for these documents. For example, you may wish to communicate this information to the state or county forester, city arborist, local newspaper, community leaders, parents, or other members of the community. You could choose to share all of the reports with one audience or have different groups write for different audiences.

6. Systems Reflection: Use the questions in the Systems Thinking Connection box to prompt student discussion and to reinforce important systems concepts, such as scale, boundaries, direct and indirect impacts, and time delay.



7. Summarize this activity by helping students see the system and the connections between climate change, forest management, industrial wood production, and consumer choices. In sum, students may gain hopeful strategies for adapting to and perhaps even mitigating climate change. Sharing what they have learned with others will help students learn the information and

gain a sense of worth: they are helping to bring these strategies to those who can use them. They are making a difference!

Modifications

Adjust the Group Assignment Cards to reflect the activities you conducted with your class and ask each group to tell a story, perform a skit, write a handout, or make a presentation that conveys what they learned. The synthesis product may be designed to answer this question: What should people know about forests and climate? This can be shared with other students or parents.

Enrichment

Ask a local forester or forest landowner to visit your classroom to listen to the student presentations. This person could share knowledge about the topics being discussed and also share career information with students.

Allow students the opportunity to give their presentations as part of a Climate Change forum open to the public or at another appropriate event.

Additional Resources

Southern Forest Futures Project

U.S. Forest Service

www.srs.fs.usda.gov/futures

This website provides summary reports, a webinar, and other resources related to a multiyear research effort that forecasts changes in southern forests between 2010 and 2060.

Southern Forests for the Future

World Resources Institute

www.seesouthernforests.org

This website contains maps, photos, case studies, and other information to highlight key features and trends for southern forests.



Group Assignments (1 of 3)

Climate Scientist Group

YOUR TASK: As a group, create a 5- to 10-minute presentation and one-page handout to explain why scientists believe that humans are impacting the climate and focus on the types of changes that will affect your state.

You can start your research with the following websites and documents:

- **TACCIMO Climate Report** (www.sgcp.ncsu.edu:8090/about.aspx): Under the *Generate a Report* tab, click *Climate Report* and select your state. This report will contain a range of potential future climate projections represented by different combinations of global climate models and scenarios.
- **NOAA Climate** (www.climate.gov): This website provides information, maps, and videos to help you understand climate science.
- **Climate Change: Evidence, Impacts, and Choices** (<http://nas-sites.org/americasclimatechoices/more-resources-on-climate-change/climate-change-lines-of-evidence-booklet>): This booklet explains climate change, impacts expected in this century, and how science can inform management and reduce risks. At this site, you can also find a video and figures to help with your presentation.
- **Climate Change: Evidence and Causes** (http://www.nap.edu/catalog.php?record_id=18730): This short booklet provides clear answers to 20 common questions and background basics to climate change science.
- **NASA Global Climate Change** (<http://climate.nasa.gov>): This website provides information on the evidence, causes, effects, and uncertainties of climate change. There is also recent data on global temperature, carbon dioxide levels, and the rate of sea level rise.

Forest Ecologist Group

YOUR TASK: As a group, create a 5- to 10-minute presentation and one-page handout to build on the Climate Scientists' summary and apply these projected climate changes to forests. Which changes are likely to affect the forests in your state? How? What types of changes could people experience?

You can start your research with the following websites and documents.

- **Climate Change, Forest Impacts and Adaptation** (www.epa.gov/climatechange/impacts-adaptation/forests.html): This website discusses the impacts of climate change on forests and productivity as well as the role of disturbances.
- **Earth & Sky, Neil Sampson Says Climate Change Speeding Flux of Forest Ecosystems** (<http://earthsky.org/earth/climate-change-speeding-flux-of-forest-ecosystems>): During this 90-second interview, scientist Neil Sampson describes how forests may be affected by climate change.
- **Forests and Global Climate Change: Potential Impacts on U.S. Forest Resources, Section 2 of Report, Ecological Impact** (www.c2es.org/docUploads/forestry.pdf): This report discusses the link between climate change and ecosystem shifts. Both past and projected changes are considered.
- **Tree Atlas** (www.nrs.fs.fed.us/atlas/tree): This site includes information about climate models and projects how forest ecosystems in the eastern U.S. might fluctuate as the climate changes.



Group Assignments (2 of 3)

Forest Manager Group

YOUR TASK: As a group, create a 5- to 10-minute presentation and one-page handout about managing forests under changing climate conditions. What exactly should forest landowners do to protect and conserve their forest resources? Why?

You can start your research with the following websites and documents.

- **Southern Forests for the Future** (www.seesouthernforests.org): This website contains maps, photos, and information you can use in your presentation.
- **Protecting Your Forest Asset: Managing Risks in Changing Times** (http://www.pinemap.org/publications/fact-sheets/Protecting_Your_Forest_Asset.pdf): This pamphlet reviews healthy forest strategies and approaches to decrease the risks associated with projected climate change impacts.
- **Southern Group of State Foresters** (www.southernforests.org): This website provides links to explore your state forest agency's website to learn about forest management.

Forest Researcher Group

YOUR TASK: As a group, create a 5- to 10-minute presentation and one-page handout that provides insights into the many ways researchers are helping managers improve southeastern forests.

You can start your research with the following websites and documents.

- **State Climatologist Interview with NC People** (<http://video.pbs.org/video/2134881398/?starttime=671000>): This video is an interview with the North Carolina State Climatologist to explain how climate impacts forests in the region.
- **The Forest Service and Climate Change** (www.fs.fed.us/video/climate): This video introduces climate change science, impacts on forest ecosystems, and how the U.S. Forest Service is responding to climate change.
- **PINEMAP** (<http://pinemap.org>): This website contains research summaries, newsletters, photos, and videos that describe current research related to pine plantations and climate change in the Southeast.
- **WaSSI** (<http://www.forestthreats.org/research/tools/WaSSI>): This web-based tool provides information about how changes in precipitation and temperature may affect water resources and forest ecosystems at the regional watershed level.



Group Assignments (3 of 3)

Tree Biologist Group

YOUR TASK: As a group, create a 5-to 10-minute presentation and one-page handout about the carbon cycle and how trees sequester carbon. Your group can discuss the estimated levels of carbon sequestration that can be expected from maintaining the productivity of forests in the Southeast and planting trees on less productive agricultural land. Your group can also discuss the effect of higher carbon dioxide levels on tree growth.

You can start your research with the following websites and documents.

- **Earth & Sky, Greg McPherson's Tree Carbon Calculator** (<http://earthsky.org/earth/greg-mcphersons-tree-carbon-calculator>): Scientist Greg McPherson talks about a tool he developed to help determine how much carbon a tree sequesters and the value of knowing this information.
- **The Carbon Cycle** (<http://earthobservatory.nasa.gov/Features/CarbonCycle/>): This website contains an overview of the importance of carbon and the carbon cycle.
- **I-Tree** (<http://www.itreetools.org/index.php>): This website provides information on the benefits provided by urban trees.
- **Carbon Dioxide and Future Forests** (<http://ns.umich.edu/new/releases/8614>): This article from the University of Michigan discusses the effect of higher levels of carbon dioxide and ozone on tree growth.
- **Tree Growth Spurt** (http://www.nytimes.com/2010/02/02/science/earth/02trees.html?_r=0): This *New York Times* article provides information on recent research about growth spurts in trees due to increasing levels of carbon dioxide in the atmosphere.

Forest Industry Group

YOUR TASK: As a group, create a 5- to 10-minute presentation and one-page handout about how forest products play a role in reducing atmospheric carbon. Your group is part of a company that produces a variety of products from forest resources—particularly lumber, OSB (oriented strand board), and plywood. These products sequester carbon, and when consumers purchase them, the carbon stays sequestered for the lifetime of the product. Even more carbon emissions can be eliminated if these products were purchased instead of similar products that rely on fossil fuels or limestone for production (such as those made from concrete or steel). You can explain the life cycle assessment of wood products and how using wood can be a valuable contribution to mitigating the effects of climate change.

You can start your research with the following websites and documents.

- **Consortium for Research on Renewable Industrial Materials, CORRIM** (<http://www.corrim.org>): This website provides fact sheets, videos, and other resources. In particular the *Editorials* (under *Publications* tab) provide helpful information for your presentation.
- **The Carbon Cycle Poster, The Forest Foundation** (<http://www.calforestfoundation.org/pdf/carbon-poster.pdf>): This poster highlights the role of forests and wood products in the carbon cycle.
- **Forest Carbon Management: Let's Brainstorm the Tradeoffs** (<http://www.treehugger.com/corporate-responsibility/forest-carbon-management-lets-brainstorm-the-trade-offs.html>): This website provides information about carbon sequestration in forests and carbon pools.



Reflection

NAME

DATE

As you follow along with the group presentations, answer the following questions on this worksheet. Also, make sure to write down information that you think will be important to include in your summary letter.

1. Climate Scientist Group: How are temperature and precipitation projected to change in your state?

2. Forest Ecologist Group: How can these projected changes in climate affect forests in your state?

3. Forest Manager Group: What management strategies should forest landowners use to protect and conserve forest resources? Why?

4. Forest Researcher Group: Describe current research being conducted to help foresters improve the productivity and resilience of forests in the Southeast.

5. Tree Biologist Group: How can forests reduce atmospheric carbon dioxide?

6. Forest Industry Group: What is life cycle assessment and how can life cycle information help us reduce atmospheric carbon dioxide?