



SOUNDSCAPES: SOUNDS OF AN ECOSYSTEM

THEME

- Forest Health
- Ecology
- Plant Conservation

TYPE OF LESSON

- Instructor-Led
- Hands-On
- Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- Outdoors
- Virtual
- Classroom
- Other:

TEACHING STRATEGY

- Place-Based Learning
- Storytelling
- Nature Play
- Art / Movement
- Other: Collaboration in Small Groups

STANDARDS

- NGSS, LS4.D: Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)
- NGSS, 2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.

GRADES 3–5

DURATION 60 minutes



LESSON GOAL

Learners will explore the wide variety of sounds and components that make up an ecosystem and will gain practice in scientific observation.

LESSON SUMMARY

Learners listen to a soundscape recording, or listen to and record a local soundscape, to learn about the different components making up an ecosystem. They will explore the biodiversity and complexity of an ecosystem by identifying various sounds being made by nonliving parts of nature, by animals, or by humans.



WORD BANK

anthrophony
biophony
ecologist
ecosystem
geophony
soundscape
soundscape ecologist
urban



PRINTED/DIGITAL MATERIALS

- **My Sounds Worksheet** (1 per learner)
- **Rainforest Pictures** (1 per class)
- One or more audio clips of a rainforest from the internet, such as the following:
Note: refresh the page if sounds do not play automatically.
 - Downloadable rainforest soundscapes (online or MP3) – <https://bit.ly/PH-Rainforest>
 - Amazon rainforest clip 1 – <https://bit.ly/PH-Clip1>
 - Amazon rainforest clip 2 – <https://bit.ly/PH-Clip2>
 - Amazon rainforest clip 3 – <https://bit.ly/PH-Clip3>
 - Borneo rainforest clip – <https://bit.ly/PH-Clip4>

OTHER MATERIALS

- Pencils (1 per student)
- Optional: Clipboard (1 per student)
- Timer (1 per class)
- **Outdoor lessons:** Recording device on a phone or tablet (1 per class)
- **Classroom or virtual lessons:** Audio player and speaker (1 per class)

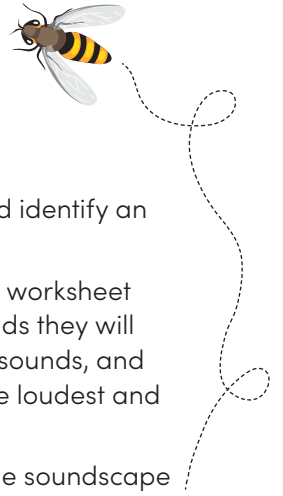
SETUP

1. Review the **lesson procedure**.
2. Decide whether you will conduct an **outdoor exploration**, a **classroom exploration**, a **virtual exploration**, or combination of approaches depending on your resources and audience.
3. **Outdoor explorations:** Select an appropriate and accessible location.
4. Review and consider the optional **pre-** and **post-lesson explorations** and the **extensions**.
5. Prepare the lesson **materials**.
 - **Classroom or virtual explorations:** Print out the **Rainforest Pictures** or pull up a digital version to show; or select **audio clips of a rainforest** to play.
 - **Outdoor explorations:** Get a recording device ready. Download a recording app if you are using one (such as the Record the Earth app: <https://www.recordtheearth.org/>).
 - **Classroom and outdoor explorations:** Gather writing tools and print copies of **My Sounds Worksheet**. Set up speakers to play your audio clips and/or soundscape recording.
 - Get a 3-minute timer ready.





SOUNDSCAPES: SOUNDS OF AN ECOSYSTEM



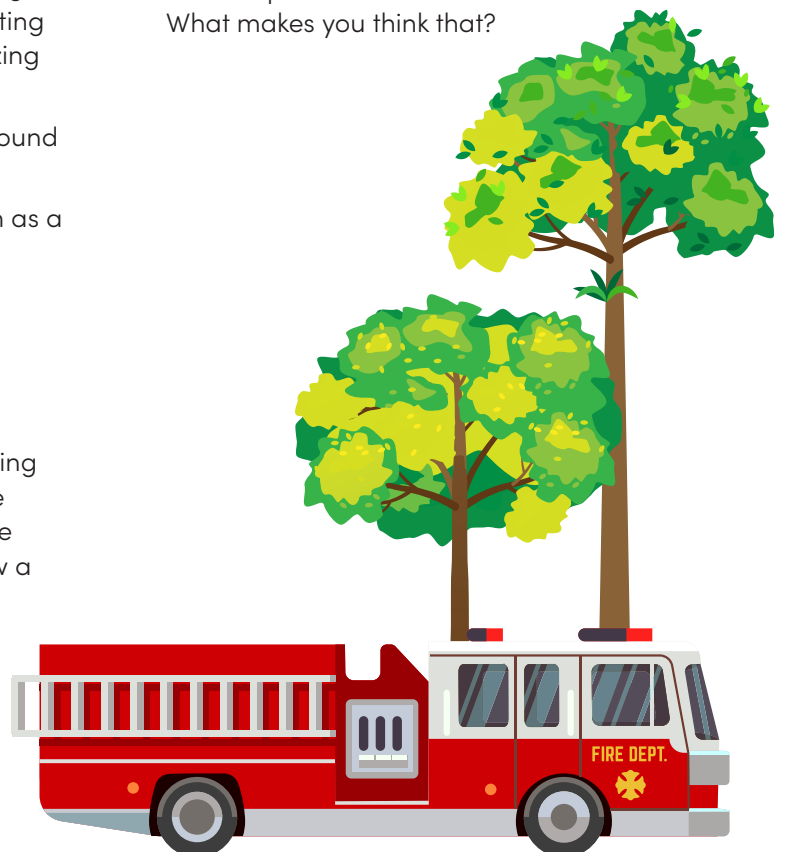
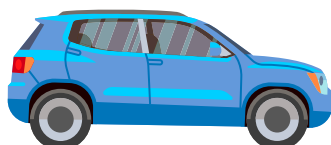
LESSON PROCEDURE

- Optional: Complete one or more of the **pre-lesson explorations**.
- Introduce the topic with the **lesson opener**.
- Conduct a warm-up sound listening exercise: Instruct learners to be still with their bodies and quietly count all the sounds they hear on their fingers until they have a “fistful of sounds.” After everyone has at least five sounds, discuss one or two sounds with the group.
- Hand out the **My Sounds Worksheet** and pencils.
- Tell learners what they will be listening to (a recording or the actual soundscape outdoors). **For outdoor explorations**, identify the general type of ecosystem, such as garden, urban park, or forest. If using a recorded sound clip, tell students what ecosystem is featured in the recording (the Amazon or Borneo rainforest, for example). Show the **Rainforest Pictures**.
- Ask learners to write in **Part A** what they think they will hear in their soundscape.
- For classroom and virtual explorations using a pre-recorded soundscape:**
 - Have learners in the classroom sit where they can hear the recording. In virtual classrooms, make sure all learners have their volume high enough and have them wear headphones if possible.
 - Tell learners they will be listening closely to a soundscape recording for 3 minutes.
 - Have learners read **Part B** of the worksheet and instruct them on how to tally the sounds they hear by category, list the sounds, and mark which sounds are the loudest and the quietest.
 - Ask learners to get comfortable and settled before starting the recording. When ready, tell the learners to listen quietly and begin marking their worksheet and start the 3-minute timer.
 - After 3 minutes, stop the clip, and ask learners to fill out **Part C**.
- For outdoor explorations:**
 - Review safety guidelines.
 - Bring learners to the location and identify an area for them to sit.
 - Have learners read **Part B** of the worksheet and explain how to tally the sounds they will hear by category, how to list the sounds, and how to note which sounds are the loudest and the quietest.
 - Ask learners to listen closely to the soundscape for 3 minutes and mark their worksheets while you record the soundscape.
 - Open the recording app or turn on the recording device.
 - Ask learners to settle in before starting the timer.
 - Start recording. Make a vocal note on the recording about the date, time, location, and weather. Then ask learner to begin listening silently while they fill out **Part B**. Record for 3 minutes.
 - After the recording, ask learners to fill out **Part C**.
- Go through the learners’ lists from **Part B**, and discuss the sounds everyone heard. Be prepared to play or replay parts of your new recording or the sound clips if appropriate.
- Replay the soundscape recording or clip and ask learners to draw the soundscape based on the sounds they heard. Be creative. (Have learners share their drawings show-and-tell style or through a gallery walk.)
- Discussion: Identify a specific sound in the soundscape and talk about what could be making the sound. Is it made by a living thing or a nonliving thing? Why is it there and how did it get there? Does the sound come from nature or from humans? What questions do you have about the sound? (Have learners discuss their responses with partners and/or write about them.)
- Optional: Complete one or more of the **post-lesson explorations**.

LESSON OPENER

Share the following with learners to introduce the topic:

- We can use different senses to learn about our environment, including its sounds.
- An ecosystem is a place where both living and nonliving things interact with their environment. There are many different types of ecosystems. For example, rainforests, deserts, and even cities are ecosystems.
- An ecosystem has many parts working together to create a healthy environment. The living parts of an ecosystem include all of its plants and animals. The nonliving parts include things like the land, air, and water.
- Scientists called *ecologists* study the living and nonliving things in an ecosystem.
- *Soundscape ecologists* are ecologists who use sound recordings to study an ecosystem. Their recordings are called *soundscape recordings*. Examples of sounds you might hear in a soundscape recording include a woodpecker pecking on a tree and eating insects, raindrops falling on leaves, or bees buzzing from flower to flower.
- Sound ecologists study three different types of sound in a soundscape:
 - **Anthrophony**, or human-made sounds, such as a car going by or people talking
 - **Biophony**, or animal sounds, such as a bird singing
 - **Geophony**, or natural sounds from nonliving things, such as wind, rain, or waves
- Listening to a soundscape is different from listening to one sound at a time, because the soundscape includes all of the sounds together. A soundscape recording is like a landscape painting: both show a broad view of an area and its many parts.



LESSON QUESTIONS

- Did everyone hear the same sounds?
- Did you hear all the sounds you expected to hear?
- What was the loudest sound you heard? The quietest?
- Were there any sounds you did not recognize? What might they be?
- What would the ecosystem sound like at another time of day or season?
- Would you hear different sounds if you were here by yourself? What?
- What sounds do you think you would hear if you listened longer?
- Imagine visiting this ecosystem later with a friend. Would you talk loudly or quietly? Why?
- Are any of the sounds you heard more important than others? What makes you think that?

PRE-LESSON EXPLORATIONS

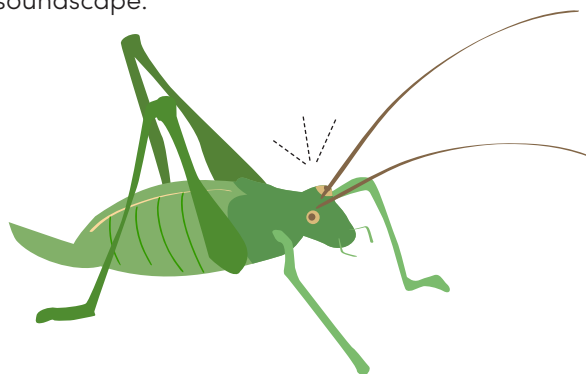
Help learners complete any of these prompts:

- Practice listening for different instruments in a song. (Prime learners to listen for the flute, the drums, the horns, and the strings in Stravinsky's Firebird Suite (<https://bit.ly/PH-Stravinsky>). Have them tally each time they hear a different instrument.)
- Try a classroom or school sound exploration in small groups or as a whole class. Choose a location, and practice listening for 30 seconds. Ask learners to count the sounds on their fingers. After, discuss what they heard, what was loudest, what was quietest, and what they could not identify. Repeat this exercise once with the whole class as an immediate warm-up to the lesson (see procedure).
- Try the **indoor exploration** as a preparation for the **outdoor exploration**.

POST-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- Contribute the class sound recording to the citizen science effort of the Center for Global Soundscapes: <https://bit.ly/PH-GobalSound>.
- Write a rap or poem from your experience.
- Make a recording of your ecosystem at home or in your neighborhood and write about the soundscape.



ADDITIONAL RESOURCES

- **The Macaulay Library of the Cornell Lab of Ornithology.** Background for educators and birdsong recordings. A multimedia natural history archive with tips on making recordings: <https://bit.ly/PH-macaulaylib>
- **Fragments of Extinction.** Tropical ecosystem soundscape recordings: <https://bit.ly/PH-Fragments>
- **Soundscape Ecology video clip from Nova.** Background for educators and students: <https://bit.ly/PH-SoundScape>
- **Understanding the Sounds of Ecosystems.** Living on Earth podcast excerpt. Background for educators and students. <https://bit.ly/PH-LivingEarth>



SOUNDSCAPES: SOUNDS OF AN ECOSYSTEM

WORD BANK

anthrophony: human-made sounds, such as talking or car noises

biophony: animal-made sounds, such as birds chirping or pecking trees

ecologist: a scientist who studies living things and how they interact with each other and with their environment

ecosystem: a collection of living organisms (such as plants, animals, and fungi) and the environment they live in

geophony: sounds from natural phenomena, such as wind and rain

soundscape: all of the sounds being made in a particular place during a particular length of time

soundscape ecologist: an ecologist who studies the sounds an ecosystem makes and what the sounds tell us about that ecosystem

urban: related to a city



Name: _____

My Sounds Worksheet

PART A. Getting ready.

What do you think you might hear when you listen to the soundscape?

PART B. Listening.

Date: _____ Time: _____ Location: _____

Name each new sound you hear. Put a tally mark by the word if you hear it again.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____


What is the loudest sound? _____

What is the quietest sound? _____


PART C. Reflecting

Go through your list from Part B. Tally the words into the boxes below and count the totals.

How many sounds did you hear in each category?

<p>Geophony (natural sounds from nonliving things)</p>  <p>A</p>

<p>Biophony (animal sounds)</p>  <p>B</p>

<p>Anthrophony (human sounds)</p>  <p>C</p>

Which did you hear the most: natural sounds from nonliving things, animal sounds, or human sounds?

Which sounds did you hear more than once?

Which sounds were continuous or happened throughout the whole time?

Did you recognize all the sounds? If not, what do you think might be making those sounds?

Rainforest Pictures

