

K-4TH GRADE UNIT

LESSON 1

What's an Urban Forest?

NUTSHELL

In this lesson, students name places in their town where trees grow. They search for living and nonliving things in their classroom and schoolyard. Students use an Urban Forest Memory card game to learn how living and nonliving things interact. They write a story or draw a picture to describe the life of a raindrop in their town. Finally they review what they have learned by comparing similarities and differences between urban and rural forest ecosystems.

BIG IDEAS

- An urban forest is all the trees and other vegetation in and around a town, village, or city. Plants, people, and animals are part of the urban forest. (Subconcept 1)
- An urban forest is an ecosystem. An ecosystem is an area that contains living (e.g., trees, people, animals) and nonliving (e.g., soil, buildings, roads) things existing together and interacting. Humans play a dominant role in the urban ecosystem. (Subconcept 2)
- Different components make up urban forests. They may include street trees, park trees, woodlands, riparian areas, manicured lawns, the urban-rural interface, and others. (Subconcept 3)
- Urban forest ecosystems are part of matter cycling and energy webs. (Subconcept 4)

OBJECTIVES

Upon completion of this lesson, students will be able to:

- Explain that plants, people, and animals are part of the urban forest in cities and towns.
- List living and nonliving parts of an urban forest.
- Name different places in an urban forest where trees grow.
- Explain how living and nonliving things in an urban forest ecosystem interact and are a part of the water cycle.

SUBJECT AREAS

Arts, Language Arts, Science, Social Studies

LESSON/ACTIVITY TIME

- Total Lesson Time: 165 minutes
- Time Breakdown:
 - Introduction 10 minutes
 - Activity 1 45 minutes
 - Activity 2 40 minutes
 - Activity 3 40 minutes
 - Conclusion 30 minutes

TEACHING SITE

Classroom and schoolyard (if possible)

BACKGROUND

We may not think of the trees along our streets, in parks, along rivers, and in yards as part of a forest, but they are. All the trees, other plants, and animals in a city, town, or village are part of an urban forest.

A forest is an ecosystem. An ecosystem is all the living and nonliving things in an area interacting with each other. In an urban forest, the increased influence of humans means that in addition to trees, other plants, animals, sun, and soil there are people, buildings, asphalt, pets, utilities, and more. This makes the urban forest a unique type of forest, but still one that is connected to other ecosystems.

MATERIALS LIST

FOR EACH STUDENT

- Copy of Student Pages  **1A-C**, *Urban Forest Memory Cards*
- Copy of Student Page  **2**, *Comparing Forests*
- Scissors

FOR THE TEACHER

- Overhead transparency of Teacher Page  **1**, *Water Cycle*
- Overhead transparency of Student Page  **2**, *Comparing Forests (optional)*
- Overhead markers

VOCABULARY

Abiotic: Nonliving things.

Biotic: Living things.

Community: The plants and animals living in an area.

Ecosystem: An area that contains living and nonliving things existing together and interacting. Ecosystems come in all sizes. (e.g., forest, meadow, log).

Forest: An ecosystem that is characterized by a dominance of tree cover and contains a variety of other organisms (e.g., other plants, animals).

Rural Forest: A forest ecosystem found in the countryside outside of cities, towns, or neighborhoods.

Urban Forest: A forest ecosystem that includes all the trees and other vegetation in and around a town, village, or city. Plants, people, and animals are part of the urban forest.

It is important to note that rural forest ecosystems are relatively large areas compared to urban forests. Rural forests are not devoid of human influence. However, there is a difference between urban and rural forest ecosystems in the degree of impact that people have on the forests.

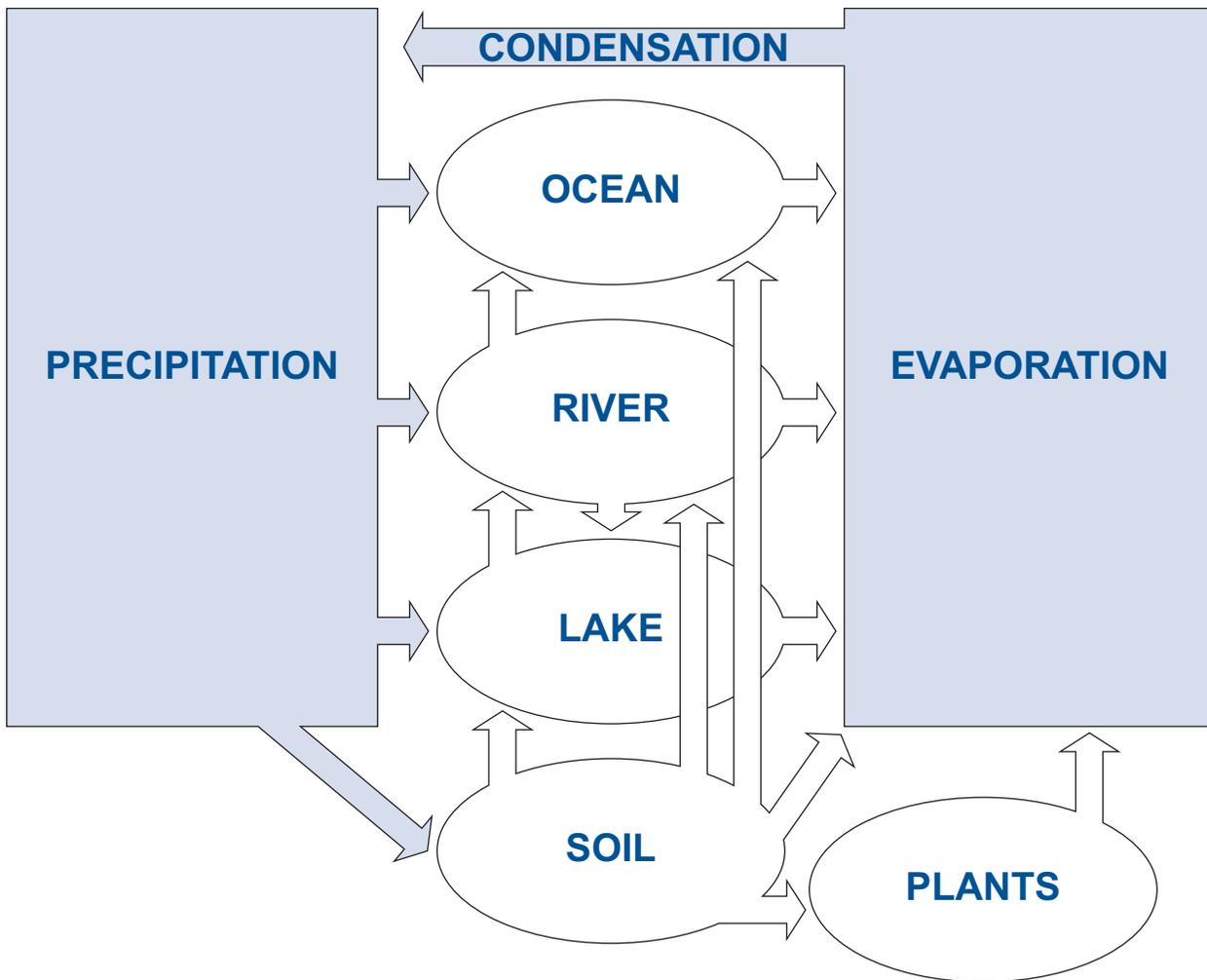
When thinking about the interactions that occur in an urban forest, it may help to keep in mind that things that don't really seem "natural" to us are still part of this ecosystem. Just as rocks are part of other ecosystems, concrete and asphalt are part of urban forests. A squirrel in a rural forest relies on nuts and seeds to eat. In an urban forest, they may also eat bread that people throw for birds or even discarded french fries.

Trees face different challenges and receive different benefits from their locations. In a rural forest, trees compete for nutrients, sunlight, space, and water. A well-maintained tree in an urban forest may be watered and fertilized so it doesn't need to compete for those things. However, an urban tree may also be subjected to more air and water pollution. Trees in both places may have to compete with other trees for sunlight. Urban trees may also have to compete with shade from buildings.

Water flows and moves through ecosystems. This water cycle connects all parts of earth. There are infinite paths a water molecule can follow. The illustration below shows some very simplified paths that water may follow. For instance, water may be absorbed by plants from the soil, but there are also aquatic plants that absorb water from rivers, lakes, and oceans. They are not listed here. A cycle really has no beginning or end, but we'll start with rain falling

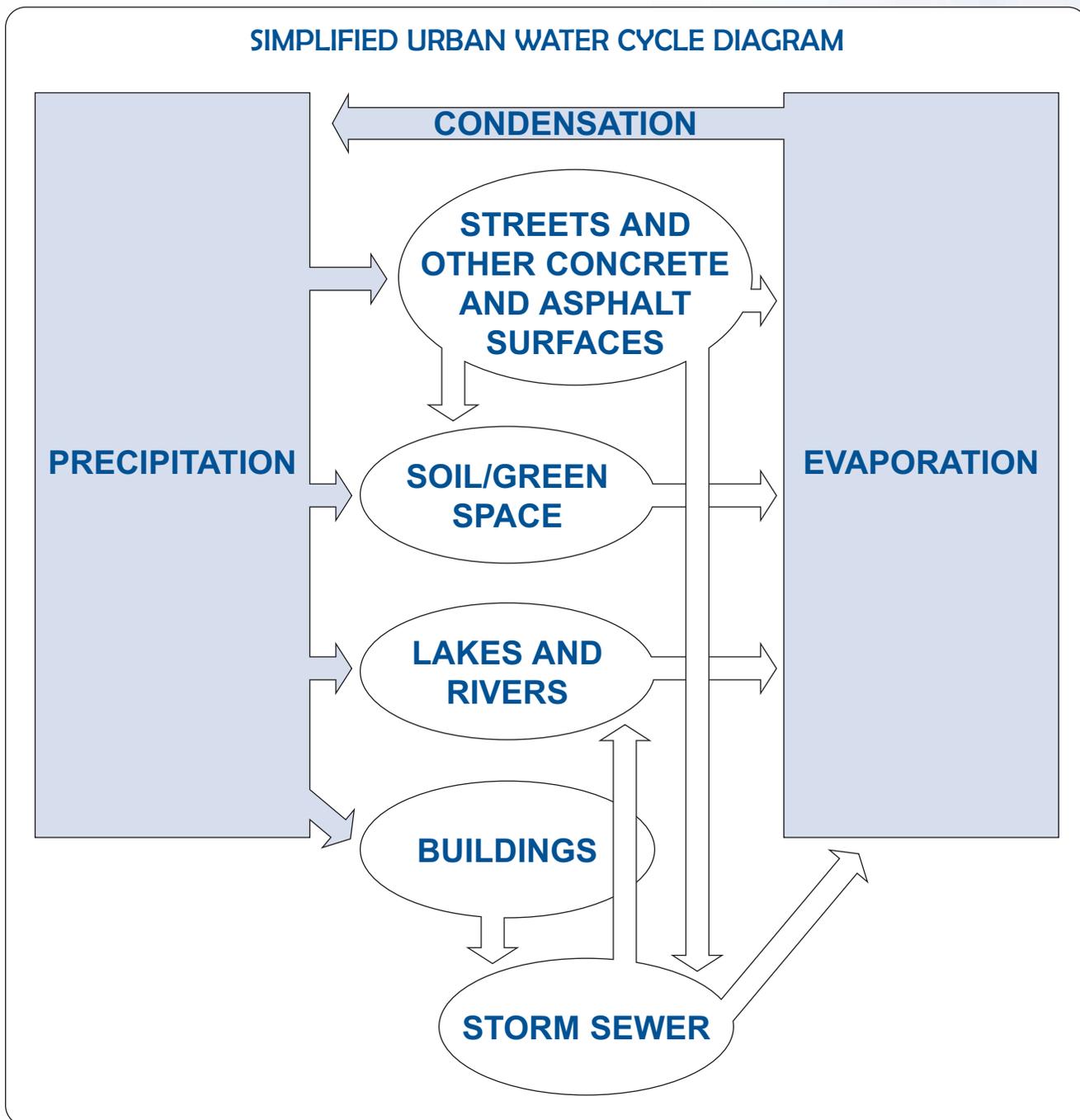
from clouds for this discussion. In this example, a raindrop falls from the clouds and lands in a rural forest on plants, rocks, soil, animals, or water bodies. From this point, it could flow into a river or lake and eventually end up in the ocean, it could soak into the soil and end up in the groundwater, it could be absorbed by plant roots and be released into the air during photosynthesis, it could be consumed by an animal, or it could just evaporate.

SIMPLIFIED WATER CYCLE DIAGRAM



There is far less area in an urban forest covered by soil or water bodies that can readily absorb a raindrop. Concrete sidewalks, asphalt streets, rooftops, and cars shed rain as it falls. That rain flows until it can be absorbed by soil or into a water body. Gutters and storm sewers carry

water away from hard-surface areas to prevent flooding. This water is eventually directed into lakes and rivers. Even rain falling on soil may run off into storm sewers if it falls too fast for the soil to absorb it. This cycle is illustrated below.



Rain that falls on the leaves of trees and other plants is slowed. The water will still fall to the ground or run down a tree trunk eventually, but with it falling slower, the soil has more time to soak it up. Plants use water in photosynthesis too, so they can help dry out soil between rains. The puddles formed by a rain shower can be used as a source of water for wildlife in an urban area.

It is important to remember that the water we use in our homes and businesses also fits into this cycle. Municipalities may get their water from large natural bodies of water, such as Lake Michigan, from groundwater that is then stored in a water tower, or from a reservoir filled with rainwater. That water is pumped into our homes and businesses. Some is put on lawns; it soaks into the soil and eventually back into groundwater. Some is used inside in our sinks, toilets, showers, dishwashers, etc. That inside water flows down the drain and into the sewage pipes. The sewage pipes carry water to a sewage treatment plant where waste is removed by a series of complex processes. That water, with the contaminants removed, is discharged into a nearby lake or river.

PROCEDURE INTRODUCTION (↑↓)

1. Gather students into a circle. Using a pine cone, ball, or crumpled paper, play a quick game of “hot potato.”
2. Ask students to think of all the places in their town where trees grow. Begin the game by naming a place where trees grow, then toss or hand the object to a student. (*Along streets, in yards, in parks, in empty lots, along a river.*)

Once the student with the object has named a place they will pass it on to another student until most of the possible answers are exhausted. Accept any reasonable answer appropriate for the ability of the students.

3. After the places have been named, explain that all those areas help make up what we call an “urban forest.” Explain that an urban forest is the trees and other plants, animals, and other things that live in cities and towns.

ACTIVITY 1 – LIVING AND NONLIVING SEARCH (↑↓)

(Modified from Unit K-1 Lesson 2 from the *LEAF K-12 Forestry Lesson Guide*.)

1. Tell students to look around the room and spot some living things. (*The aloe plant, pet fish, students.*) Explain that all these things are part of your classroom community. Tell them they are members of lots of communities: some small, like the classroom; some big, like Wisconsin; some in-between, like the town you live in.
2. Now ask students to look around the room and spot the nonliving things. (*Desks, books, posters.*) Explain that these things influence the living community in the room. Ask if you would be able to act as a classroom community working together to learn if there were no books or desks. (*Maybe, but it wouldn't be the same.*) Tell the students that a community of living things combined with the nonliving things it uses is called an ecosystem.

3. Ask your students to put on their thinking caps and get ready for a field trip. Explain that the field trip will be a short one, with no bus needed. They'll need to have sharp eyes ready to spot as many living and nonliving things as they can. Tell students they'll be going on a walkabout, looking around their schoolyard for living and nonliving things. When you return to the room, you'll be asking them to share living and nonliving parts of the school ecosystem that they spotted. They could come up with things such as (living) kids, other people, crows, pigeons, squirrels, ants, flies, trees, grass AND (nonliving) cars, buildings, sidewalks, playground equipment.

NOTE: If your schoolyard or weather is not conducive to the activity, observe from a window.

4. Upon your return from a 5- to 10-minute walk around your schoolyard, gather as a group in the classroom. Let students take turns sharing what living and nonliving things they saw. Ask them these questions: What does that person or thing do for our community? (*The city bus driver helps people get to the store and work; the buildings help people stay warm and dry.*) Why is it important? (*If the mail carrier weren't there, we wouldn't get important letters; if there weren't cars or buses, it would be harder to get where we were going.*) Help students realize the importance of the item or person not only to them, but also to others in your community. Be sure that someone points out that THEY are part of the community.

SUGGESTION: For upper level students, you may want to introduce and use "biotic" and "abiotic" instead of using "living" and "nonliving."

ACTIVITY 2 – URBAN FOREST MEMORY (↓)

(Modified from Unit K-1 Lesson 2 from the *LEAF K-12 Forestry Lesson Guide*.)

1. Refer back to the Introduction and remind students that they learned the term "urban forest." Remind students of what they learned about the roles of living and nonliving things in the walkabout they did in the first activity. All those things working together make an ecosystem. Explain that an urban forest is an ecosystem and that people are a part of the ecosystem.
2. Explain how to play *Urban Forest Memory*. In *Urban Forest Memory*, cards are turned upside down and spread out so that you can't see their pictures. The game is played with a partner. The first person flips over one card, looks at the picture, and then tries to flip over the matching picture. If you get a match, then you can put that pair of cards next to you, away from the other cards. If you do not get a match, put the cards back where you got them and try to remember what they were in case you need one of those pictures to make a match later in the game.
3. Show students Student Pages  **1A-C**, *Urban Forest Memory Cards* that you have copied for each of them. Explain that all the pictures are things that are part of the urban forest. Some parts are living and some parts are nonliving, but they are all important and work together. Tell students that later you will be asking them to share their ideas about how the things in the picture work together. Explain that there are cards that say "Me" and they need to draw a picture of themselves on them, because they are a part of the urban forest.

4. Pass out the sheets to students. Have students color the pictures on the cards, if desired, before they cut them apart. Make sure they initial or somehow mark the front of their cards so they can collect their own when they switch partners.
5. Once all the students' *Urban Forest Memory Cards* are ready, discuss the roles the things on the cards have in the forest and how they interact. Give them a few examples and let them suggest some as well. (*The crow/squirrel/ant eats the french fries; the student rides in the car; the squirrel climbs the tree; etc.*)
6. Pair students, have them find a quiet place to play, and let them begin. After everyone has played a round, have students pick up their own cards and regroup with another partner. Continue as time and the interest of the students allow.

ACTIVITY 3 – STORY OF A RAINDROP (↑↓)

1. Remind students that all living and nonliving things in an urban forest are connected. (If you did not do Activity 2, you may want to do step 5 of that activity here.) Tell them that an urban forest is also connected to the places beyond it. Explain that one of the ways they are connected is through the water cycle.
2. Put Teacher Page  1, *Water Cycle* overhead transparency on the projector. Explain that this is a very simple way of thinking about how water flows on earth. Stress that the water cycle is very large and very complex. As you discuss how water flows from clouds as precipitation, through the many paths possible, and evaporates to become clouds again, draw arrows on the overhead transparency. (A diagram showing the connections is included in the Background section of this lesson.)
3. After you have described the general idea of how water cycles work, ask students to think about the living and nonliving things in an urban forest and how water might flow between them. As a brief example, ask students to speculate what might happen to a raindrop that falls on the roof of the school. Guide them through some of the potential steps. (*Flows through a gutter to the ground and soaks in; flows through a gutter to concrete, flows over concrete to storm drain; drips off roof onto shrubs below, drips off of shrubs and soaks into soil; etc.*)
4. Assign students to either draw a picture or write a short story of the life of a raindrop. It should begin with the raindrop falling from a cloud and landing in their town. Assign students a starting point for their raindrop after it falls from the cloud. (*Tree, house, street, person, grass in the park, animal, car, litter, river, puddle.*) As needed, describe what happens to water in your town so students understand the general idea and possible options. (*Gutters, storm sewers, where rivers are and where they flow, rain that lands on dirt and soaks in goes to groundwater, etc.*) Define where you want the story to end. (*With the raindrop entering the ocean, evaporating into the clouds, or falling again on some very different ecosystem.*)
5. When all the stories have been written, ask for volunteers to read theirs aloud. Compare what happens to a raindrop that falls on a tree to one that falls on a sidewalk. Did all the raindrops encounter living and nonliving things? (*The answer should be yes.*)

CONCLUSION – BEYOND THE URBAN FOREST (↑↓)

1. Define rural forest for your students. (*A forest found in the countryside outside of cities, towns, or neighborhoods.*) Ask the students if they think there are living and nonliving things in rural forests. (*Yes.*) Ask them if they think they are the same living and nonliving things that are in urban forests. (*Some are; some aren't. Squirrels live in both places, but bears don't usually live in cities. You don't usually find dogs or cats living in rural forests. There is sunlight, water, and soil in both forests. Buildings in a rural forest are scattered, if they are there at all.*)

NOTE: Pictures of urban and rural forests intended to aid in student discussion are available on the LEAF website. Go to www.uwsp.edu/leaf and navigate to the educator supplemental resources section.

2. Either hand out Student Page  2, *Comparing Forests* to each student, or use it as an overhead transparency. Using the examples on the student page as a starting point, create a list of the living and nonliving things in an urban forest in the left-hand column.

SUGGESTION: For a visual option instead of the worksheet, show pictures of different things. Ask students if they are living or nonliving, if they might be in a rural forest, and if a rural forest has more, less, or the same. Then continue with step 6.

3. Fill in the second column with “L” or “N” to show if it is a living (L) or nonliving (N) part.
4. Once you have the list of things in an urban forest and have indicated whether they are living or nonliving, move to the rural forest column. Ask students if there are trees in the rural forest. (*Yes.*) Add “trees” to the list

under rural forest. Continue adding things to the urban forest list, putting anything urban forests have in common with rural forests in the “rural forest parts” column (on the same line). Add anything they think is in a rural forest, but not in an urban forest.

5. Now fill in the last column with “more,” “fewer,” or “same” when comparing the rural forest to the urban forest. (*There are more trees in the rural forest, there are fewer people in the rural forest, there are fewer buildings in the rural forest, there is the same amount of sunlight. Remember that rural forests are large. Roads pass through them, people live in them.*)

SUGGESTION: Instead of writing the words, use symbols such as (↑) for more, (↓) for fewer, or (=) for the same.

6. Discuss some of the answers the students came up with if the worksheet was handed out. If no one included people as part of either forest, remind them that we should be included.
7. To conclude, write some of the parts of an urban forest on the board in a scattered fashion. Include rural forest at the edge. Ask each student to suggest how the things you’ve written down are connected. (*Squirrels eat seeds from trees, trees use water, birds use water, grass uses sunlight, people mow grass, trees use soil, ants use soil, birds fly to rural forest, water flows into the river, the river flows through the rural forest, etc.*) Draw each of the connections on the board. The result should be a web of lines connecting everything to something else, often to several things.

LEAF LINKS

The lessons listed below, for the *LEAF Wisconsin K-12 Forestry Education Lesson Guide*, contain possible enhancements, extensions, or replacements for *Urban Forest Lesson Guide: K-4 Lesson 1*.

UNIT K-1, LESSON 2: WHAT'S IN A FOREST

Students learn about living and nonliving parts of a forest by playing a game and creating artwork.

The Introduction, Activity 1, and Activity 2 from K-1 Lesson 2 were the basis for Urban Forest Lesson Guide: K-4 Lesson 1. Use K-1 Lesson 2 to directly relate living and nonliving things in rural forests to what students have learned about urban forests. The Conclusion from K-1 Lesson 2 could be used as well, modifying it to have students draw a picture of their favorite urban forest part.

UNIT K-1, FIELD ENHANCEMENT 2: SENSING THE FOREST

Students use all of their senses to discover the living and nonliving parts of a forest.

Use K-1 Field Enhancement 2 as it is written as a field extension for Urban Forest Lesson Guide: K-4 Lesson 1. The activities can be done in a schoolyard, park, or school forest.

UNIT 2-3, LESSON 2: WHAT MAKES A FOREST?

Students discover how living things are influenced by nonliving things through a matching activity, song or skit, and creating a class mural of Wisconsin forests.

Expand on the idea of interactions by using 2-3 Lesson 2 as it is written after completing Urban Forest Lesson Guide: K-4 Lesson 1.

UNIT 2-3, LESSON 3: FOREST ENERGY FLOW

Students learn about energy flow in the forest by role-playing producers, consumers, and decomposers.

Expand on the idea of cycling after completing Urban Forest Lesson Guide: K-4 Lesson 1 with 2-3 Lesson 3 Activity 1. Modify the activity to be more urban audience-friendly by changing the consumer and decomposer examples (deer, mushroom) to “pigeon” and “beetle.” Continue with Activity 2 and the Conclusion to round out the producer, consumer, decomposer ideas.

UNIT 2-3, FIELD ENHANCEMENT 2: OBSERVING FOREST INTERACTIONS

Students explore living and nonliving forest features on a hike and spend time observing and drawing parts of a forest.

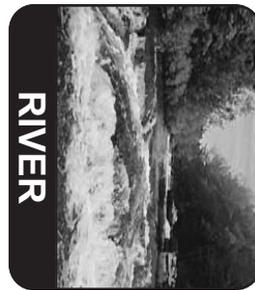
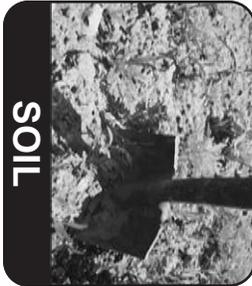
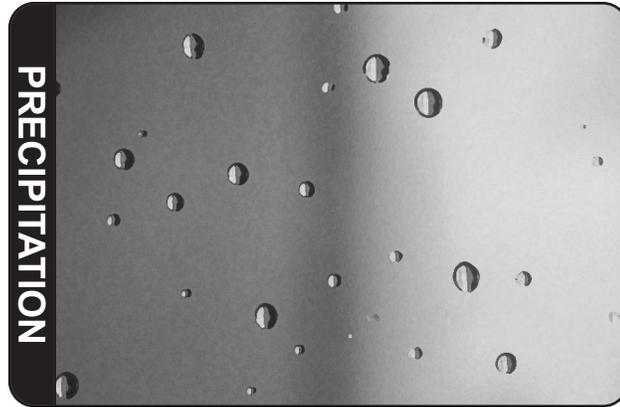
Use 2-3 Field Enhancement 2 as it is written as a field extension for Urban Forest Lesson Guide: K-4 Lesson 1. You will need a wooded area to conduct the activities. This lesson will expand on the interactions between living and nonliving things.

UNIT 2-3, FIELD ENHANCEMENT 3: FOREST ENERGY SCAVENGER HUNT

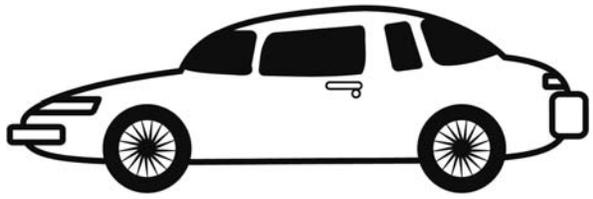
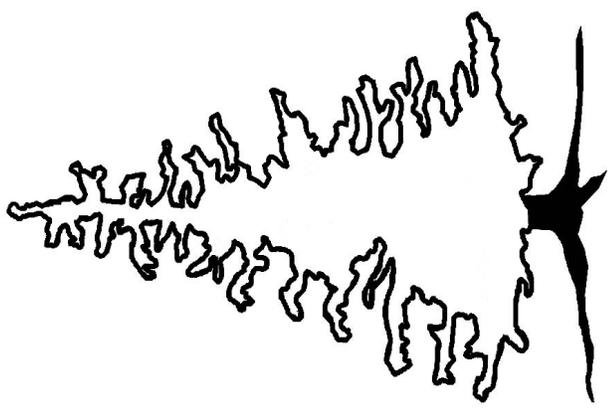
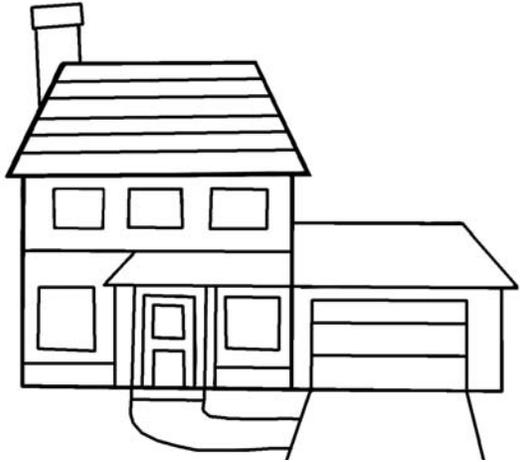
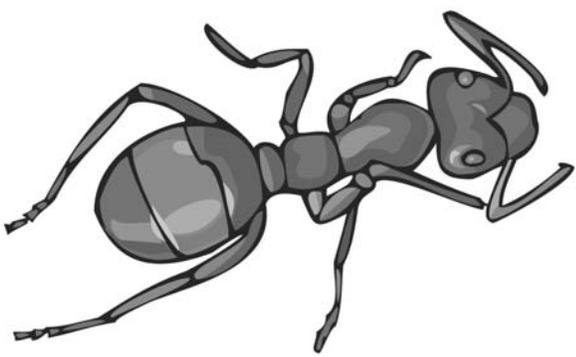
Students follow the flow of energy in a forest by going on a scavenger hunt.

Expand student understanding of interactions in ecosystems using 2-3 Field Enhancement 3 as a field extension for Urban Forest Lesson Guide: K-4 Lesson 1. 2-3 Field Enhancement 3 can be done as written. Teaching site is a schoolyard, park, or school forest.

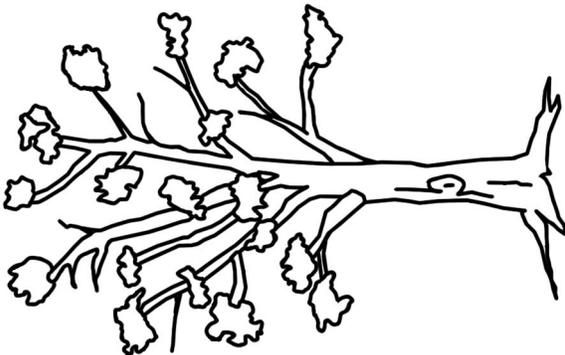
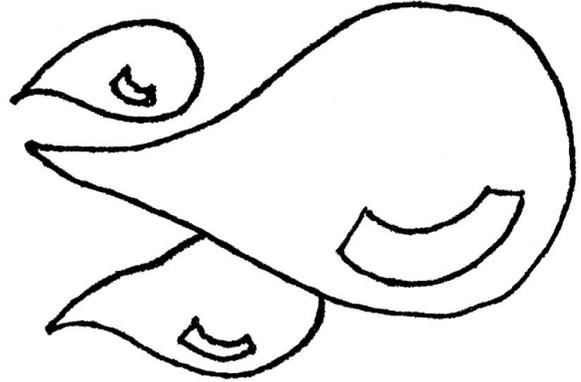
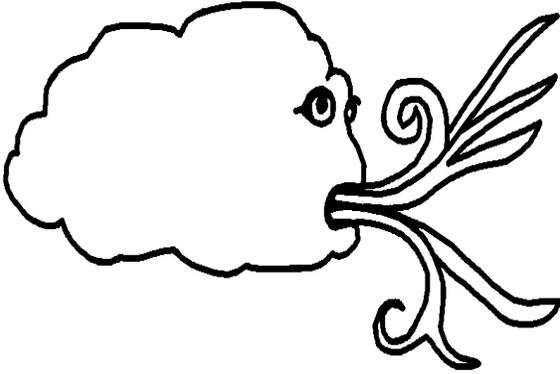
WATER CYCLE



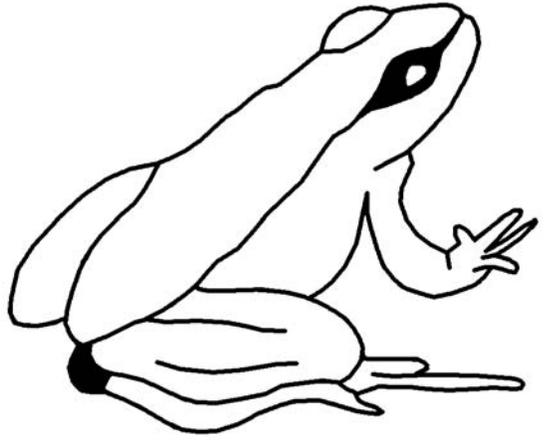
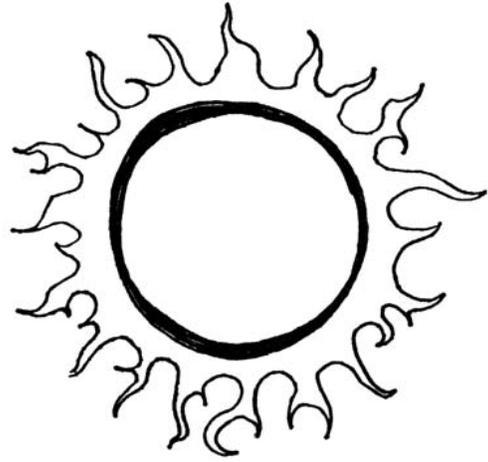
URBAN FOREST MEMORY CARDS



URBAN FOREST MEMORY CARDS



URBAN FOREST MEMORY CARDS



ME

ME

COMPARING FORESTS

URBAN FOREST PARTS	LIVING (L) or NONLIVING (N)	RURAL FOREST PARTS (that are also urban forest parts)	RURAL FOREST HAS MORE (↑) or FEWER (↓) or THE SAME NUMBER (=) AS URBAN FOREST
Trees			
Squirrels			
Rocks			

INSTRUCTIONS

1. Add ideas to the list of urban forest parts.
2. Mark “L” for living and “N” for nonliving.
3. Decide if the urban forest parts are in the rural forest too. Write them in the rural forest column on the same line.
4. Compare the rural forest parts to the urban forest parts. Are there more (↑), fewer (↓), or the same (=) number in the rural forest?