LE2 Overview

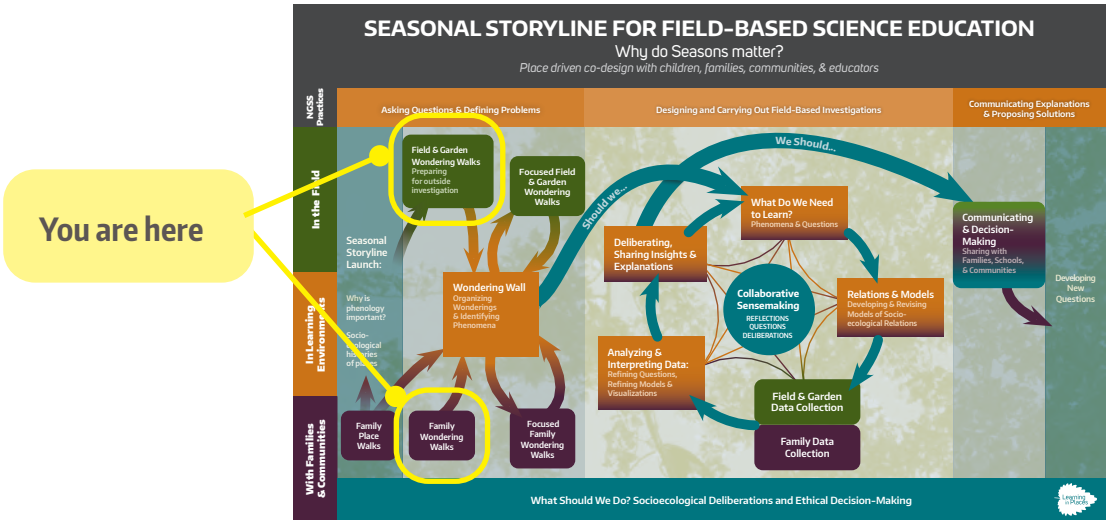
What do we notice from our Wondering Walks at school and with our families?

Beginning our Seasonal Investigation with Student-Led Curiosity

You, the students in your class, and their families have explored histories of places and ideas about seasons. Along the way, you have generated questions and wonderings from doing that work. In this learning engagement, you will begin a **seasonal investigation** grounded in histories of places and ideas about the seasons by inviting students and families to engage in **walking and wondering about the places that interest them.** Asking questions, particularly questions that lead to exciting and rigorous investigations, is a practice that students can cultivate through routine opportunities to engage in observing, wondering, and sensemaking.

Big Ideas About Nature-Culture Relations To Have In Mind As You Plan For This Bundle of Activities

In addition to providing an opportunity for students to engage in place-based inquiry, these learning activities help teachers and families learn more about what phenomena students and families notice around their neighborhoods and schools, and what they wonder about in those places. This is a key first step in **ethical deliberation and decision-making**: as learners notice and wonder about places they are connected to, their wonderings will reflect questions about human decisions that may have been made or could be made in the future that affect all who inhabit those places. By starting with places they are already familiar with, this bundle will give students practice learning outdoors: this may be new to some students and require new or different routines than those used during indoor activities or during typical outdoor school times, such as recess, free time, or travel to/from school. For more information about how to support outdoor learning, teachers can consult the Supporting Learning Outdoors Framework.



LE 2 LEARNING GOALS

This learning engagement incorporates both school and family learning activities to engage students and families in wondering and observing socio-ecological phenomena. By the end of this bundle, students will be able to:

» Observe and ask questions about socio-ecological phenomena and seasonal practices.

» Engage in outdoor walking and observing practices that are core field-based science practices honed throughout the seasonal storyline.

CONNECTIONS TO NGSS/ FIELD-BASED SCIENCE

» **Crosscutting Concepts:** Patterns, Cause and Effect; Scale; Systems and System Models, Stability and Change

» **Science Practices:** Asking questions; Obtaining, evaluating, and communicating information

» **Disciplinary Core Ideas:** ESS3.C: Human Impacts on Earth Systems (K-2)

Learning engagements in LE 2

It will be essential that you do some place mapping before you begin LE2 to plan your outdoor instruction. The Place & Place Designing: Mapping Opportunities to Learn will give you guidance on how to plan your instruction in outdoor places.

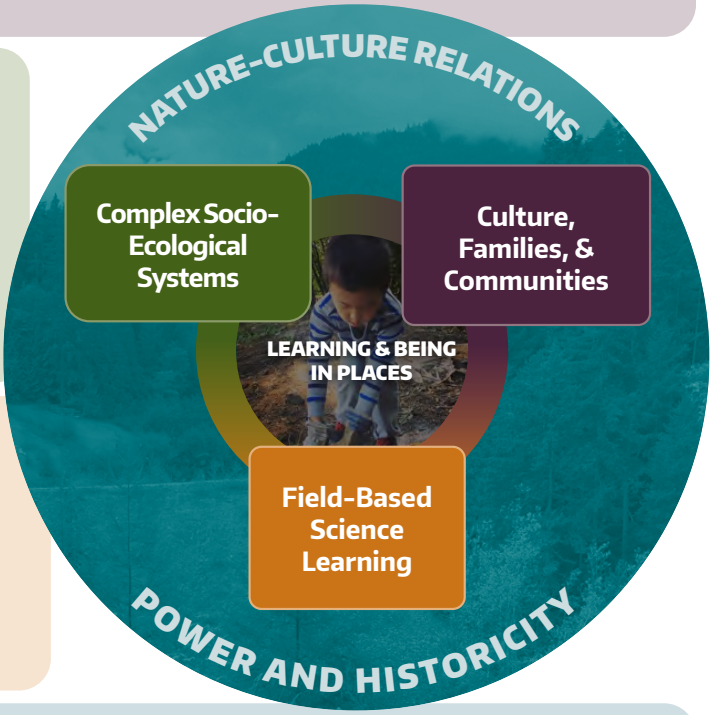
- **LE 2.1 Preparing for Outdoor Learning**: During this **classroom** activity, you and your students will prepare for engaging respectfully and responsibly outdoors. You can refer back to LE 1.2 to talk about who we share this place with and what they might need from us to feel safe and comfortable in their homes while we are learning outdoors. You can also use the Supporting Learning Outdoors Framework to think about outdoor routines, practices, and roles for students outdoors that support learning.
- **LE 2.2 Wondering Walk 1:** During this activity students will take a walk to generate observations about phenomena of interest to them and to generate "I wonder" questions that can fuel their investigations during the seasonal storyline. Students will use **LE2.2 student wondering walk** to draw, take pictures, or dictate to an adult their observed phenomena in the field. These will be important observation-related practices for them to develop. They also engage with their families in a wondering walk (**LE2.2 Family wondering walk)**
- **LE 2.3 Introduction to Five Socioecological dimensions and scale:** Students are introduced to 5 dimensions of socio-ecological thinking through different **classroom based** activities. They do a **LE2.3 family walk** where they look for evidence of **scale** in their neighborhoods.
- **LE2.4 Focused relationships wondering walk:** Using what they learned in the previous lesson about the 5 socio-ecological dimensions, students take an **outdoor walk** to notice **relationships**. They then take home the **LE2.4 Family Tool** to do a focused walk around relationships with their families.

Engaging the Rhizome

Culture, families, and communities:
In LE2, families will take a walk together to notice and wonder about phenomena in places that are important to them. As a teacher, this gives you the opportunity to gain a sense of the places where families choose to walk, the types of socio-ecological phenomena that they notice, and the questions they have about those phenomena. After students give you the results of their Family Wondering Walk and observations (LE 2.3), it is important that you include wonderings from the family walks along with the wonderings from the school Wondering Walks (LE 2.2). This is how you will form a complete "data set" from which to organize the Wondering Walls in LE3.

Complex Socio-Ecological Systems: LE2 introduces students to observing relationships outdoors, as well as perspective-taking of more-than-human others to understand how humans' choices had effects on others we share places with. As students do this kind of sensemaking, they start to see themselves as important parts of, but not dominant over, socio-ecological systems.

Field-based science Learning: LE2 introduces students to making observations and asking questions outdoors. Outdoors is explicitly positioned as a place for learning, as well as learning how to respect the homes of more-than-human others that we share places with. Families will also engage in observing and wondering outdoors.



Power and Historicity: Humans are always making decisions from powered positions. For example, when we choose to plant a garden, turn up the heat in our homes, rake the leaves, or even bike instead of taking the bus, we make decisions that have effects on more-than-humans in the socioecological systems of which we are a part. Starting to take perspectives of more-than-humans, and explore their needs alongside ours, helps students to become ethical decision-makers in socio-ecological systems. Likewise, classroom learning is always done from powered positions. When student and family ways of knowing (and wondering, in this case) are included in the classroom data set and positioned as equal to the wonderings generated in school, it signals to students and families that family knowledge is important and valued in the classroom. This is a powerful way to share power with students' family knowledge and to connect to students' family and cultural identities. When students see themselves, their families, and the places that are important to them connected to what they learn in school, they understand that school science is related to their lives and their communities. It is natural to be nervous about learners' behavior while outdoors. This might come from concerns about safety while outside, but research is clear that it often results in policing of children of color (especially black and brown children) more often and more harshly than white children. Students **will** be excited to be outside. They **will** speak in louder voices than they normally would in the classroom. They **will** spread out but will come back together as they share their ideas. Allow them both emotional and physical space to do this. Black people especially have historically not felt welcome in outdoor spaces. This is an opportunity to directly refuse anti-blackness while outdoors.

Learning in Places

Lesson Plan

LE2.1 Preparing for Outdoor Learning

Purpose

Outdoor learning is experientially and pedagogically different than indoor classroom learning. Especially if you use the same spaces outdoors that students also use for recess, it will be important to allow time to prepare for a different way to interact with those spaces. This lesson will give you and students an opportunity to think about their own and others' needs outdoors, and also to think about how to respectfully interact with outdoor spaces. This begins with the understanding that outdoor spaces are not just for humans' enjoyment and use; they are also homes for more-than-humans such as birds, worms, the soil, and trees. Taking on the perspective of these outdoor neighbors is an important type of complex socio-ecological reasoning, and will be important for students to consider as part of the decisions they make everyday while outdoors.

Why this is important

Many times, students might engage with the outdoors purely from their own points of view--their own needs and wants for play, exercise, space, or even food in gardens. In this lesson, students will be asked to take the perspectives of others who they share outdoors spaces with in order to understand that their own actions outdoors have consequences for these more-than-human others. Because of this, humans are closely connected to, but not dominant over, outdoor spaces.

Engaging family and community knowledge and practices

This lesson asks students to specifically reflect on their own family's needs in terms of food, air, shelter, and water, as a way of connecting to those same needs of their outdoor neighbors. Be broad in the ideas that are included in this discussion: students and their families may have very different needs from each other and from you. This will be a good way of thinking about the diverse needs of outdoor neighbors as well. Just as families all over the world have different needs for survival and thriving, so too do plants, animals, the soil, etc.

LEARNING GOALS

By the end of this lesson, students will be able to:

1. Describe their and their families' own needs in terms of food, air, water and shelter
2. Describe, from the perspective of outdoor neighbors (plants, animals, etc.) what their needs are in terms of food, air, water, and shelter
3. Imagine more-than-human uses of places

CONNECTIONS TO NGSS

» **Crosscutting Concepts:** Cause and Effect

» **Science Practices:** Asking questions; Obtaining, evaluating, and communicating information

» **Disciplinary Core Ideas:** ESS3A: Natural resources (K-2)

ESS3.C: Human Impacts on Earth Systems (K-2)

ASSESSMENT OPPORTUNITIES

» Whole-class discussions

» LE2.1 Student tool

Teacher background information

The **Ethical Deliberation and Socio-Ecological Decision-Making framework** and the **Relationships framework** will be useful here as a way to get you started in thinking about how perspective-taking and reasoning from more-than-human points of view are important for ethical deliberation and decision-making. When we can imagine the needs of others besides ourselves (especially more-than-human others), we start to understand the connection between our own decisions and consequences for others that we share outdoor places with.

Centering equitable practices:

- **Encourage more-than-human perspective taking:** Avoid describing ecosystems only in terms of how ecosystems are useful for humans. In order to engage in ethical deliberation and decision-making about places, we need to support students in taking the perspective of more-than-humans in natural systems. How is this decision good for the trees? How is this place good for the worms? for the soil? Beginning to ask these questions will encourage students to take on broader perspectives when engaging in ethical deliberation and decision-making around ecosystems.
- **Encourage human connections to ecosystems**: Avoid positioning humans as disconnected or apart from nature. This activity encourages thinking about connections between humans and the rest of the natural world and starting from assumptions of complex interdependence instead of human-centric or dominance.

To prepare for this lesson

Fill out the tool yourself in terms of your own family's and outdoor neighbors' needs for food, air, water, and shelter. This will help you both model and anticipate some of the ideas that students will bring to the discussion. You will need to do some **place mapping** to understand some of the outdoor neighbors that you share your schoolyard space with, and do some research on what their needs are. For example, what do cedar trees need to survive in terms of food, air, water, and shelter? How do humans affect the food, air, water, and shelter of the bees that we share our outdoor places with? These kinds of questions will support your students in taking the perspectives of specific more-than-humans outdoors. The **Place & Place Designing: Mapping Opportunities to Learn framework** will be a helpful resource as you plan your outdoor instruction.

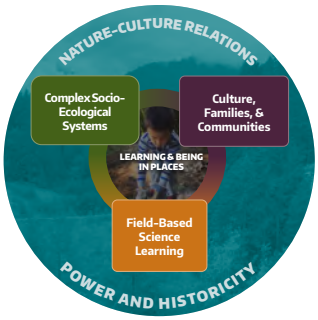
MATERIALS

» LE2.1 student tool

TIME

40 min

Instructional Sequence



1. Ask students: remember when we went on a walk around your schoolyard to see who we shared that place with? What did we find? Who do we share our places with?

2. Explain to students that today, they are going to be thinking about what those outdoor neighbors need to survive. Ask: why is it important to consider what they need to survive?

3. Ask students to think about one plant or animal that they share the outdoors with. Ask: what does that plant or animal need for food? for water? for air? for shelter? As students share their ideas, fill out a chart that mirrors the LE2.1 tool:

This kind of perspective-taking is important for students to consider ethical relationships between humans and more-than-humans in ecological systems.

What do animals or plants need to live a healthy life?

What are their needs for **food**?	What are their needs for **air**?
What are their needs for **water**?	What are their needs for **shelter**?
How do they use **soil** for a healthy life?	

4. Ask students: now think about your families. What do your families need in terms of food, air, water, or shelter? How is soil important to your life? Give students a chance to individually write or draw some ideas about each of these. Share out as a class: what were your ideas about what your families need in terms of food, air, water, or shelter?

Putting family knowledge alongside classroom knowledge is a way to share power in the classroom.

5. Compare and contrast your two charts, the one for "plants and animals" and the one for "our families". Ask students: what do you notice is **the same or similar** between the two charts? What do plants and animals need and what do our families need? What is **different** between the charts? What do you think that means in terms of how we're connected to plants & animals outside?

Seeing similarities between the needs of their families and the needs of more-than-humans is a way for students to see themselves as a part of socioecological systems.

6. Now move on to the final chart: preparing for outside. Explain to students that in the next lesson, they will be taking a walk outside to see what they notice as they walk. Ask students: why do you think we thought about what our families, plants, and animals need to survive as we prepare to go outside? Can you think of ways that we can respect plants and animals' needs while we are outside? What do you think we'll observe about their needs when we go outside? Let's think about that together as we think about how to respect their food, air, water, and shelter. What is an example of respecting plants' and animals' food?

   - Go through the chart, filling in students' ideas.

This discussion is asking students to think about the decisions they can make when they're outside in terms of more-than-human others who live outdoors.

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7. Explain to students: tomorrow we'll be going on a walk outside to see what we notice outside. Ask students: what do you usually do in the schoolyard outside? *Students will probably say "play, run, go to recess."* Ask students: if we're going to go outside to learn, how is that different from going outside to play? You can use a t-chart like the one below to compare and contrast going outside to play vs learn.

What do we do outside when...

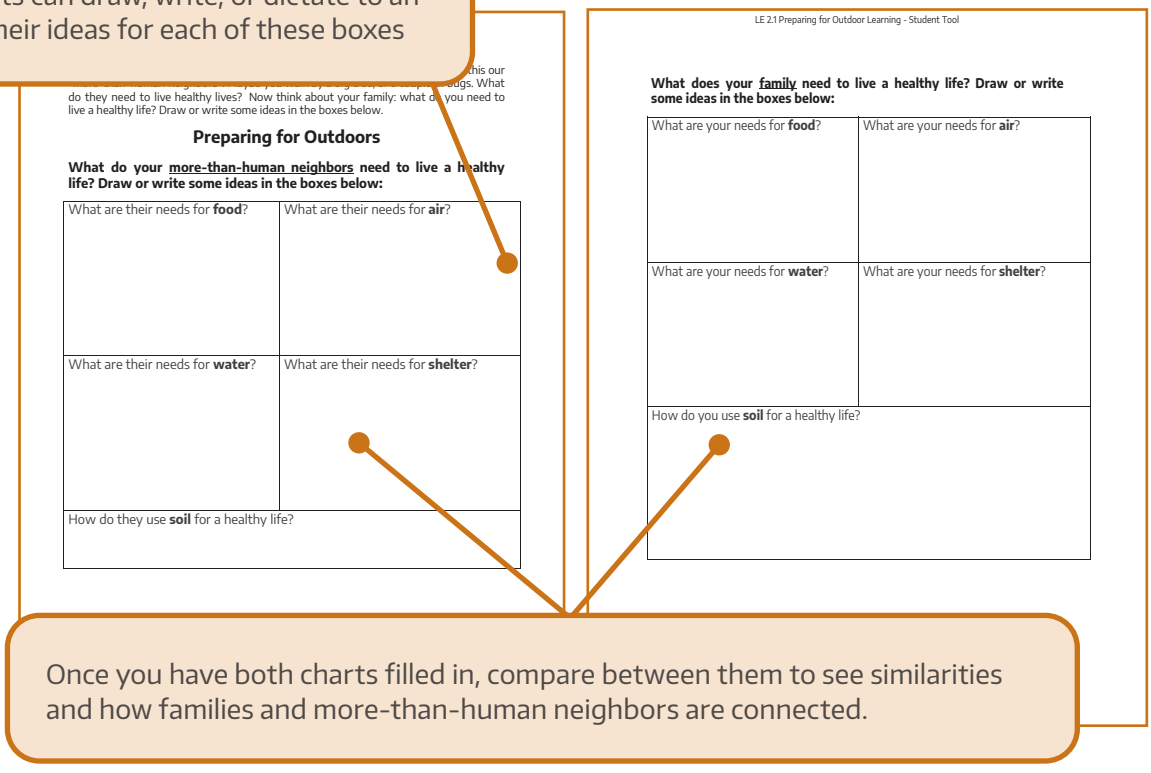
We are playing?	We are noticing and wondering?

Students will need practice learning how to learn outdoors, especially in settings where they usually play.

Hopefully students will say "have fun" in both places. You can ask guiding questions like, "what do you think about when you play? What do you think you'll think about when you're going outside to notice and wonder? What do you look at when you play? What do you look at when you're making observations? Is there a difference between how you look at those things?" Why or why not? You can also ask students which of the things they list (in either column) are **also** respecting plants' and animals' food, water, shelter, and air.

8. Tell students that you'll be keeping this list visible in the classroom so that each time they go outside, they are reminded of what they should be thinking about and looking at as they go outside to learn.

Students can draw, write, or dictate to an adult their ideas for each of these boxes



LE 2.1 Preparing for Outdoor Learning - Student Tool

What does your family need to live a healthy life? Draw or write some ideas in the boxes below:

What are your needs for **food**?	What are your needs for **air**?
What are your needs for **water**?	What are your needs for **shelter**?
How do you use **soil** for a healthy life?	

do they need to live healthy lives? Now think about your family: what do you need to live a healthy life? Draw or write some ideas in the boxes below.

Preparing for Outdoors

What do your more-than-human neighbors need to live a healthy life? Draw or write some ideas in the boxes below:

What are their needs for **food**?	What are their needs for **air**?
What are their needs for **water**?	What are their needs for **shelter**?
How do they use **soil** for a healthy life?	

Once you have both charts filled in, compare between them to see similarities and how families and more-than-human neighbors are connected.

Think about a plant or animal that lives around your school or home. We will call this our "more-than-human neighbors". Maybe you walk by a big tree, or a couple of bugs. What do they need to live healthy lives? Now think about your family: what do you need to live a healthy life? Draw or write some ideas in the boxes below.

Preparing for Outdoors

What do your <u>more-than-human neighbors</u> need to live a healthy life? Draw or write some ideas in the boxes below:

What are their needs for **food**?	What are their needs for **air**?
What are their needs for **water**?	What are their needs for **shelter**?
How do they use **soil** for a healthy life?	

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What does your <u>family</u> need to live a healthy life? Draw or write some ideas in the boxes below:

What are your needs for **food**?	What are your needs for **air**?
What are your needs for **water**?	What are your needs for **shelter**?
How do you use **soil** for a healthy life?	

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Preparing for Outdoors

When we are outside, what can we do to make sure we are respecting our more-than-human neighbors?

Draw or write some ideas in the boxes below:

Respecting their food	Respecting their air
Respecting their water	Respecting their shelter
Respecting their soil	

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Learning in Places

Lesson Plan

LE2.2: School Wondering Walk

Purpose

During this activity students will take a "Wondering Walk" to generate observations about phenomena of interest to them and to generate "I wonder" questions that can fuel their "Should-We" questions and investigations during the seasonal storyline. Students can draw or take pictures of their observed phenomena in the field. Students will also have an opportunity to generate wonderings that they will continue to explore during future learning engagements with increasing specificity and to drive sense-making. As you collect these wonderings in LEs 2 and 3, you will begin to see themes that will lead to "Should We" questions, more focused walks, and modeling in LEs 4 and 5.

Why this is important

When outdoors, students have opportunities to experience and make direct observations of natural phenomena, such as changes in weather over time, life cycles of plants and animals, and shifts in hours of daylight. Deep learning happens when learners' observations, wonderings, and questions are centered. Keeping these wonderings and questions at the forefront of classroom activity creates space for ethical, equitable and effective science learning. Research has shown that when learner questions are central to science activities, those questions can drive sense making and guide the formation of field-based investigations. Additionally, learner questions can offer insight into how they understand scientific concepts, and importantly, how they are making connections to personal experiences and/or family and community knowledges and practices. Making these connections visible is critical in the design of effective and equitable science learning environments. In order to support this, educators can model and scaffold how to ask questions that lead to ethical deliberations and decision-making about socio-ecological systems.

Engaging family and community knowledge and practices

As you launch this lesson, you can discuss that students will take "Wondering Walks" as a way to ask questions about the places that matter to them and their families. You can review the practices and places that are important to the classroom community (including families), and continue to raise questions that students and families have after finishing LE1. A goal of the wondering walks in this learning engagement is to generate a series of student-developed questions directly related to their outdoor observations of phenomena that are intriguing to them. At the end of this lesson, you will send home a family Wondering Walk so that students and families can continue noticings and wonderings in their own neighborhoods.

LEARNING GOALS

By the end of this lesson, students will be able to:

1. Describe what they observe in places around the school
2. Describe wonderings in terms of various timescales

CONNECTIONS TO NGSS

- **Crosscutting Concepts:** Patterns; Cause and Effect; Scale; Systems and System Models, Stability and Change
- **Science Practices:** Asking questions; Obtaining, evaluating, and communicating information
- **Disciplinary Core Ideas:** ESS3A: Natural Resources (K-2)
  ESS3.C: Human Impacts on Earth Systems (K-2)

ASSESSMENT OPPORTUNITIES

- Whole-class discussions
- Noticing student talk during wondering walk
- Student discussions in partners around their wonderings
- LE2.2 Student tool
- LE2.3 Family tool

Teacher background information

Wondering is central to sophisticated scientific field-based observation and questioning. Observations generate curiosity, wonderings, and questions that open up opportunities for learners to engage in speculative thinking about possible relationships, drawing their attention to the unknown. Wondering helps learners consider a broader range of human and more-than-human perspectives when making sense of the values underlying deliberation and decision-making processes. Who gets to wonder, and whether or not these wonderings are taken up in a learning environment, is deeply powered and historicized. Paying attention to wonderings and letting them guide classroom activities makes space for learners to not only be heard and centered in investigations, but also leads to ethical deliberations that are personally meaningful to learners' and their families and communities. A focus on wondering in field-based science contexts opens up space for learners to deliberate and ask questions about the roles and responsibilities of humans within the natural world. Wondering is essential to ethical decision-making and considering what possible futures we imagine, what actions we should take, and what values guide those actions. In this way, and with facilitation, wonderings lead to questions that form the basis for a "Should We" question.

Centering equitable practices:

- **Provide equitable access to outdoor learning experiences:** It is natural to be nervous about students' behavior while outdoors. This might come from concerns about safety while outside, but it often results in policing of children of color more often and more harshly than white children. Students **will** be excited to be outside. They **will** speak in louder voices than they normally would in the classroom. They **will** spread out but will come back together as they share their ideas. Allow them both emotional and physical space to do this. Consult the Supporting Learning Outdoors Framework for strategies you can use to support students in their learning and sense-making.
- **Encourage more-than-human perspective taking:** Descriptions of ecosystems are often framed in terms of how ecosystems are useful for humans. In order to engage in ethical deliberation and decision-making about places, however, we need to support students in taking the perspective of more-than-humans in natural systems. As you go on your wondering walk, try to model wondering in your questions, such as "I wonder what is beneath this leaf litter?" Pick up some seeds off the ground and ask, " I wonder where these came from? I wonder who eats these?" Look closely at leaves and as, "I wonder why the leaves are curled up like this? I wonder why there are these holes in these leaves? I wonder who or what might be in relation to these leaves?" Beginning to ask these questions will encourage students to take on broader perspectives when engaging in ethical deliberation and decision-making around ecosystems
- **Encourage human connections to ecosystems**: It is common for science learning to position humans as disconnected or apart-from nature. This activity encourages thinking about connections between humans and the rest of the natural world and starting from assumptions of complex interdependence.

To prepare for this lesson

» The **Wonderings, "Should We", and Investigation questions framework** will be helpful to you as you think about the different kinds of questions at play in the Seasonal Storyline for Field-Based Science Education.

» Make sure you do some **place mapping** to plan the best place to take your students on the wondering walk. **The Place & Place Designing: Mapping Opportunities to Learn framework** will be helpful to you as you plan your outdoor instruction.

» Because you want to make the most of your time, make sure that you identify both a final destination and a good route to take to that destination. Plan what you will point out (make sure you look at different levels--on the ground,even below ground, at eye level, and above), look for signs of seasonal change, or evidence of plant and animal neighbors. Plan out ways that you will ask students to identify and debrief their wonderings with each other as they walk.

MATERIALS

» LE2.2 student tool (students do in the classroom)

» LE2.3 family tool (students and families do at home)

TIME

60 min

Instructional sequence

Lesson launch: In the classroom

1. Remind students: we have done a lot of work to explore who we share our schoolyard and neighborhoods with, and we have asked a lot of questions that we are curious about from that work (point to the questions from LE1 that students and their families raised). We have also learned a lot about histories of places (refer back to the framework and the questions and noticings on it).
2. Discuss that today, we will take a "Wondering Walk" to keep thinking about these questions and ask new questions about the places that matter to us. Our goals of the wondering walks are to (1) notice things around the schoolyard that are interesting to us and (2) come up with questions or "wonderings" about things that we notice outside.
3. Hand out the Wondering Walk sheet to students.
    a. On the first page, explain to students that they'll have two ways to record what they're noticing: they can draw and describe in words what they noticed. For every noticing, they should come up with a "wondering", or a question that they have about what they're noticing.
    b. Students can start by trying to find a plant and an animal outside (they will have opportunities to observe other types of events, processes, humans, and more-than-humans in later wondering walks). Remember that an animal can be a squirrel, bird, insect, worm, another human, or something completely different! A plant can be grass, a flower, a bush, or even a huge tree!

Encourage students to draw things in relationship with each other–so, not just a single leaf, but a leaf on a branch. Not just a tree, but what is on the ground next to and around the tree. This will help students start to notice and wonder about relationships in socio-ecological systems.

Going outside: Taking a wondering walk:

4. Based on your place mapping, go on your wondering walk. Encourage students to observe at multiple spatial levels: below, at, and above eye level.

The outside walk is a place where anti-Blackness can arise in how students' behavior is policed outside. Pay attention to encouraging and supporting students' sense making first. The Supporting Learning Outdoors framework is helpful in giving you tips for anti-racist support of students' learning outdoors.

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1. Some questions from LE1.3 that might be helpful to ask while students are walking and observing and generating wonderings:

	Species & Behaviors	Relationships	Lands & Water
Observations	What do you see, hear, smell, or feel outside today? You noticed lots of holes in the ground. Who do you think might have made those? Prompt students to use all their senses and to look up, down, and around.	You found flowers! Who else besides humans do you think would like to find flowers and why? Prompt students to consider web-like relationships about species or kinds they find.	Why do you think you noticed flowers growing in this place? Do you see water or evidence of water? Where?
Connections	Do you notice the same animals or plants here as in your neighborhood? Does this remind you of a place that you go to often? What are the similarities and differences?	Why do you think some animals are easy to observe by humans and others are harder to observe by humans?	Does the land and/or water here look the same or different than the land and/or water in your neighborhood?
Purpose	Why do you think it's important to learn about who we share this place with?	What role do you think ___ plays in this place? What are they doing? Why is what they are doing important?	How did this place come to be this way? Why do you think it's important for us to learn about this place and who we might share it with?

Back in the classroom: sharing observations and wonderings

6. As students return to the classroom, have them partner up to share what they observed. Ask students to share their wonderings and observations with each other, circling the wonderings and noticings that were **similar** to what their partners wondered about, and underlining the wonderings and noticings that were **different** from their partner's.
    a. The partner groups should decide which wonderings they want to share with the rest of the class.
    b. Partners can either write them on sticky notes or just share in a whole-group discussion.
    c. However you choose to facilitate this, make sure that you document and/or collect all student wonderings because you and students will use them in LE 3 to create a Wondering Wall.

Bringing students back indoors is a transition. Allowing time for this transition and re-engagement with classroom learning should be scaffolded. Use the Supporting Learning Outdoors framework to intentionally plan how you will support students' transition from one place of learning to another.

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7. As a whole group, record some wonderings on a list in front of the room. You will eventually want to be able to move these around and organize them under themes. It might be helpful to write them on sticky notes and post them on a large sheet of paper at the front of the room. You will add to this from the family walks and as you go on more walks later in LE 2.

    a. As students share their wonderings, you can ask follow-up questions such as, "what relationships are you wondering about here? where did you notice that? what was around that? How do you think X will change in another season?" These questions will help students connect their wonderings to larger socio-ecological systems.

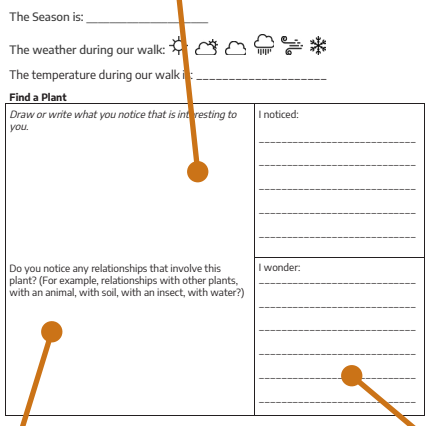
8. Hand out the LE2.2 family tool (Family Wondering Walk) and explain:

    a. You'll have an opportunity to go on a wondering walk with your family! This is the same sheet we just filled out. Try to walk around your neighborhoods with your families and notice and wonder about places where you live.

    b. Once you and your family have taken a wondering walk and filled out this sheet, bring them back to class! As we get these back, we will include your family wonderings with our class wonderings and keep building our wonderings list until we come up with some investigations that we want to do based on what we're wondering about.

Students should be encouraged to either draw or write their noticings during the walk.

Students should be encouraged to write down as many wonderings and noticings as they can!

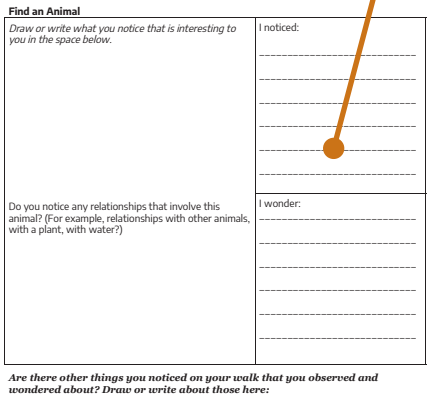

The Season is: _____

The weather during our walk:

The temperature during our walk is: _____

Find a Plant

Draw or write what you notice that is interesting to you.	I noticed:
Do you notice any relationships that involve this plant? (For example, relationships with other plants, with an animal, with soil, with an insect, with water?)	I wonder:


Find an Animal

Draw or write what you notice that is interesting to you in the space below.	I noticed:
Do you notice any relationships that involve this animal? (For example, relationships with other animals, with a plant, with water?)	I wonder:

Are there other things you noticed on your walk that you observed and wondered about? Draw or write about those here:

Relationships are very important in these walks, as they form the basis for modeling and investigations. Make sure that students notice what is above, below, and around their plants and animals.

Wonderings will be the basis for finding themes that lead to more focused wondering walks later in LE 2 and "Should We" questions in LE 4.

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The Season is: _____

The weather during our walk: 

The temperature during our walk is: _____

Find a Plant

Draw or write what you notice that is interesting to you.	I noticed: _____ _____ _____ _____ _____
Do you notice any relationships that involve this plant? (For example, relationships with other plants, with an animal, with soil, with an insect, with water?)	I wonder: _____ _____ _____ _____ _____ _____

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Find an Animal

Draw or write what you notice that is interesting to you in the space below.	I noticed: _____ _____ _____ _____ _____ _____
Do you notice any relationships that involve this animal? (For example, relationships with other animals, with a plant, with water?)	I wonder: _____ _____ _____ _____ _____ _____

Are there other things you noticed on your walk that you observed and wondered about? Draw or write about those here:

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LE 2.2 Taking A Family Wondering Walk

Please return this by _____

Activity Purpose: Our class is starting to notice and wonder about the places around our school. We would love to know what your family notices and wonders about around your neighborhoods! Take a family walk outside. Talk about, draw, and write what you are noticing AND what questions you have about what you are noticing -- your wonderings! You can look for plants, animals, water, or land features to focus on, or focus on whatever you notice and share what you are wondering about with your family.

Activity Overview: As you walk outside, make observations of what is around you and share these with each other. Observe what you see, hear, smell, or feel. When you find something that is interesting to you, draw or write what you notice and wonder about.

Outdoor learning tip:

- If it's raining or you forget something to write on, you can take pictures of what you notice or simply remember them. You can then draw and write about your noticings and wonderings when you get back inside.

What can you do to support learning?

- Before you go outdoors, make some predictions about what you think you'll observe. What do you think we'll see outside and why? What signs of the season do you think we'll notice?
- Allow time for open exploration. In this walk, the most important thing is to observe the world around you! You may start to notice patterns and make connections, which are both important science practices.
- Ask questions! Sharing ideas is an important part of collaborative learning.As you walk, ask family members questions to support detailed noticing and wondering and offer your own wonderings:
    - What are you noticing? How do you think it came to be like this? What do you think it will look like if we came out tomorrow or next week? Do you think we'll notice the same thing if we walk to another part of our neighborhood?
    - I wonder…. [bring up your own wondering or question]
    - Does this remind you of anything that we've seen before?

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The weather during our walk (you can circle more than one):

The temperature during our walk is: _____

The place we walked is: _____

Find a Plant

Draw or write what you notice that is interesting to you.	We noticed: _____ _____ _____ _____ _____
What relationships involve this plant? (For example, relationships with other plants, with an animal, with soil, with an insect, with water?)	We wonder: _____ _____ _____ _____ _____ _____

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Find an Animal

Draw or write what you notice that is interesting to you in the space below.	We noticed: _____ _____ _____ _____ _____ _____
What relationships involve this animal? (For example, relationships with other animals, with a plant, with water?)	We wonder: _____ _____ _____ _____ _____ _____

Are there other things you noticed on your walk that you observed and wondered about? Draw or write about those here:

Learning in Places

Lesson Plan

LE2.3: Introduction to five socio-ecological dimensions

Purpose

During this activity, you will teach your students about "socio-ecological systems" and the "five socio-ecological dimensions" that students and families can use to learn more about and deepen their wonderings. Research has shown that the places in which people engage in learning about complex ecological phenomena shape sense-making and can support engagement with complex scientific phenomena in authentic and tangible ways. **Socio-ecological systems** refer to the **interactions between human (social) systems and ecological systems.** The underlying premise is that **humans are part of the natural world**, and all of our systems (e.g. social, political, institutional) are always in relationship with ecological systems. Complex socio-ecological systems are characterized by several spatial, temporal, perspectival, and organizational scales, and students must be supported in sense-making at different levels of scale.

Why this is important

Human communities have always made socioecological decisions, from choices about what to eat, to where to live, how to get around, to what homes to build with what materials, amongst many others. These choices are shaped by our values and cultural practices and fundamentally reflect what we call **construals of nature-culture relations**. That is, how do human communities construct their relations (everyday, institutional, legal, ethical, communal, etc.) with the natural world? Importantly these relational construals have evolved over time in different ways and are often significantly shaped by the technologies and uses of energy we make central to human life. Since the industrial revolution there has been global scale change to these relationships in many places in the world. These changes are also correlated with the development and proliferation of modern nation-states and the histories and dynamics that created them. This lesson will outline 5 ways you can engage your learners in complex socio-ecological systems thinking.

Engaging family and community knowledge and practices

Humans across the globe develop **culturally varied relationships with the natural world** that reflect our 1) values–what we hold to be right and ethical; 2) knowledges–what we hold to be true; and 3) being–how we live our lives. While nature-culture divides proliferate in Western industrialized societies, they are not universal. In this lesson, the 5 socio-ecological dimensions provide a framework for studying and seeing our place in the natural world. Families will also take a wondering walk specifically focused the idea of **scale**, and how it relates to the places that are important to them.

LEARNING GOALS

By the end of this lesson, students will be able to:

1. Describe what different "scales" are–of time, space, size, population, and perspective
2. Describe wonderings in terms of these various scales
3. Describe wonderings and noticings in terms of five socio-ecolgical dimensions

CONNECTIONS TO NGSS

» **Crosscutting Concepts:** Patterns; Cause and Effect; Scale; Systems and System Models, Stability and Change

» **Science Practices:** Asking questions; Obtaining, evaluating, and communicating information

» **Disciplinary Core Ideas:** ESS3A: Natural Resources (K-2)
ESS3.C: Human Impacts on Earth Systems (K-2)

ASSESSMENT OPPORTUNITIES

» Whole-class discussions

» Socioecological dimension classroom chart filled out

» Noticing student talk during focused walks

» Student discussions in partners around their wonderings

» LE2.3 Student tool

» LE2.3 Family tool

Teacher background information

Below is a description of the five socio-ecological systems that students and families use in this lesson. The corresponding graphics are ways for you to help your students and families make sense of and explain each dimension.

Species, Kinds, and Behaviors: This includes different species of plants, animals and bugs. Kinds are the abiotic beings such as rocks, water, soil, etc. Behaviors are the many different ways species and kinds interact with the environment.

Relationships: Relationships are the ways in which beings interact with each other. For example, how does the behavior of water change with the weather? Which plants do you typically see caterpillar munching on?

Places, Lands, and Waters: This includes looking at the landscape and noticing where the water is, where the land dips and rises, where the people, animals and plants tend to gather.

Thinking across scales: This includes thinking through different time and space scales, as well as observing using different perspectives (taking the perspective of a plant, or an animal, or a rock, for example). Thinking across scales is particularly helpful when thinking about life cycles, energy cycles, water cycles, etc.

Human Decision- Making: Humans have had, and will continue to have, important relationships that shape places. Be sure to think about Indigenous Peoples' Time, Recent History, and the Future when listening to student wonderings. Also, listen to how students position humans in relation to the natural world. Do they position humans as part of the natural world or apart from (i.e., separate from) and/or dominant over the natural world? Help support students' sense-making using position of humans as part of the natural world.

One entry point into a discussion about these dimensions is asking students to **notice** and **wonder** about the various elements in each of the pictures for each dimension. For example, for the "relationships" picture, you can ask, "What relationships do you notice in this picture? Who is the bird in relationship with, why,and how? Who is the tree in relationship with,how, and why? Who is the caterpillar in relationship with, how, and why?" You can also find other pictures and/or use examples from the Wondering Walk you took in LE 2.2.

Centering equitable practices:

- **Provide opportunities for students to reason across scales. Avoid keeping sensemaking along just one temporal, spatial, or size scale:** Complex socio-ecological systems are made up of multiple sub-systems operating across temporal, spatial/ geographic, size, perspectival, and population scales. It is very important for students to understand how decision-making within socio-ecological systems can have effects on multiple scales at once.
- **Encourage more-than-human perspective taking. Avoid describing ecosystems only in terms of how they are useful for humans:** In order to engage in ethical deliberation and decision-making about places, support students in taking the perspective of more-than-humans in natural systems.
- **Encourage human connections to ecosystems. Avoid positioning humans as disconnected or apart-from nature:** This activity encourages thinking about human decision-making as integral to systems and as key connections between humans and the rest of the natural world. The challenge is to not position humans as dominant to more-than-humans in systems. This is why more-than-human perspective taking and thinking across scales is so important. As we consider more-than-human needs on the same level as humans needs, we start to see complex interdependence within socio-ecological systems.

To prepare for this lesson

It will be very important for you to do some background research and place mapping on your own to understand the ways in which each of the five socio-ecological dimensions shows up around your school. The LE2.3 slides on the 5 socio-ecological dimensions will also be helpful in your planning. On the following page are some examples of questions you can ask and answer as you do this research and place mapping.

Socio-Ecological dimension	Background research questions	Place mapping questions
Species, Kinds, Behaviors (SKB) 	» What species, kinds, and behaviors exist around our school? » Who used to be here? Who is here now? » Make sure to include humans	» What SKB can I observe around my school? » What is a good time of day to explore/observe SKB around the school? » What kinds of behaviors can we realistically expect to see? When?
Relationships 	» What relationships occur between the species and kinds around the school? Why might those relationships be important? Who benefits from the relationships, how, and why? » When in the year do these relationships become visible (if at all)? » What are human relationships to these species and kinds?	» What relationships can we observe around the school? What relationships exist at different scales(for example, a tiny spider web on a leaf vs. trees in relation with each other in a forest)? » What nature-human relations can we observe around our school?
Places, Lands, Waters (PLW) 	» What is the topography of the land around the school? What did it used to look like? How is it different now? » What waters does the land around the school interact with? What are significant water-land relationships in the area? » How is human activity or human decision-making affected by the lands & waters in the area?	» Walk around your school and see how the land dips and rises. Notice what happens to the water when it rains--where it puddles, where it drains. » Walk around your school and notice if there are different kinds of soil and plants in different parts of the school and where the land is higher vs. lower.
Human decision-making 	» How is human activity or human decision-making affected by the lands & waters in the area? » What decisions were made about the land to build the school? What did the land around the school look like before the school was built?	» Walk around the school grounds and notice what evidence of human decision-making you can collect. What kinds of decisions were made? What kinds of decisions are still being made? » What decisions do you (and students) make every day around the school? Where and what are they?
Thinking across scales 	**Temporal scales:** » What are **Histories of Places** around your school (temporal scales)? » Also thinking shorter and longer temporal scales: how do places change from morning to night? from hour to hour? from minute to minute? **Size scales** » What are examples of different **scales of size** that you can think of? How do these show up in your own life? » How does your perspective on something change as you look at it under a microscope, then gradually look at the entire object, and then the object in its natural environment? **Spatial and perspectival scales** » How do your perspectives change when you learn about what is above, below, and under focal objects? **Population scales** » What are examples of different **population scales** that you can think of? What is the difference between studying 1 tree vs. a group of trees, or 1 bird vs. a group of birds vs. a population of birds that inhabit a large region?	**Temporal scales:** » Connect to Histories of Places framework and see what evidence you can collect of the different timescales. » Think about how the school grounds change over the school year, across one season, across a day/ week/month? **Size scales** » What are different scales of size to notice outside, from a grain of sand to the whole beach, from a small tree to a towering cedar? **Spatial and perspectival scales** » Go outside and notice the different spatial scales at which you can observe. How do you understand a place differently when you only look at eye level vs. when you look above your heads, at your feet, and even dig beneath the ground? **Population scales** » How will you support your students in observing and wondering about **aggregate** groups of kinds (groups of plants vs. just 1)? What species and kinds are in your area where you can ask population-level questions?

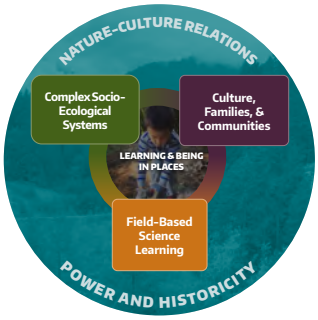
MATERIALS

- LE2.3 family tool (Taking a focused walk together: Thinking across scales)
- LE2.3 Five socioecological dimensions graphic organizer
- LE2.3 Socioecological dimensions packet
- LE2.3 slides (slides 11 & 12) to analyze for **scale**
- Laminated pages of the book *Zoom*, by Istvan Banyai (Picture Puffin Books, paperback published July 1, 1998).

TIME

40 min

Instructional Sequence



1. Ask students to share some of their wonderings or noticings from either their classroom wondering walks **(LE2.2 student tool)** or their family wondering walks **(LE2.2 Family tool)**. As they share their wonderings, have the blank socio-ecological dimensions chart visible and record students' wonderings and noticings in the appropriate rows.

2. Point out to students that you are filling in their ideas into this chart that has different pictures for each row. Show the images, one by one, of the 5 socio-ecological dimensions from the **LE2.3 Socioecological dimensions packet**. As you go through each one, ask students to notice and wonder about each picture. Ask questions like, "what is going on in this picture? What do you notice? Who is interacting with whom? What is this picture trying to communicate?"

    a. As they share their ideas, add students' noticing and wonderings to the graphic organizer.

    b. After you have gone through each of them, ask students to come up with a definition or way to describe each of the dimensions based on their noticings and wonderings. Ask them, "based on all of the things we're noticing and wondering about Species, Kinds, and Behaviors, how would you describe this row? What does this mean to you?

3. Explain to students that they have been noticing and wondering about places around the school, and places around their neighborhoods where they live. Explain to them: This chart allows us a way to organize our thinking and try to also expand our thinking in different directions. When scientists study places, they actually study many of these aspects of places all at once. For example, maybe there are a lot of wonderings about "species, kinds, and behaviors", but not a lot about "thinking across scales". This chart allows us to see what areas of thinking we might still need to explore by going on a few more wondering walks.

Analyzing pictures and other sources of information for scientific concepts (such as socioecological dimensions.)

Continued next page...

4. Now focus on the dimension called "thinking across scales". Explain to students that this is often one of the hardest aspects of places for people to think about because it's hard to imagine things that are either too big or too small to see, or things that are too high up or too low to see, or how things that happened in the past are still happening now and will continue happening in the future. These are big ideas!

5. Ask students to brainstorm different kinds of "scales"–when we talk about "scales", we're really talking about different ways to describe time, size, groups of species, perspectives of species and kinds, or where we are in space. Make a chart like the one below and allow students to brainstorm each row. The chart below is partially filled out for you to see some possible student examples.

    a. You can make up actions and movements for these scales too--you don't have to just use words!

    b. You can also draw pictures to describe the different scales.

    c. For the "time" row, remind students of the Histories of Places framework as a way to describe different time scales.

Thinking across scales is an essential part of reasoning and decision-making about socioecological systems.

Assessment Opportunity: Allow multiple ways for students to show their understanding of different scales.

different "scales"	our pictures, actions, or words to describe scales	examples from our lives?
time scales	future a long time ago now	Indigenous Peoples Time Plant, Animal, and Soil Time
size scales	teeny tiny huge! gigantic!	dinosaurs ants fleas bacteria
groups of species population scales	single tree forest school of fish	my dog vs. a pack of wolves 1 flower that I picked vs. a bunch in the garden
where we are in space spatial scales scales	low high under over	
perspective/perspectival from whose point of view are we seeing things?		imagining being a worm when it rains

Allow a broad range of answers here to invite students to think about how these ideas are present in their own lives.

Continued next page...

6. Zoom book analysis

a. There are several ways to do this activity: (1) You can keep it as a whole-group activity, but if you do this, it is best to do it under the doc cam to make viewing the details of the pictures easier. (2) You can separate out the pages and laminate them (optional). Then, keeping them in order, divide the pictures into 5 or 6 groups (depending on how many small groups you have). Each group of students should have a group of pictures that are all from the same part of the book. For example, group 1 gets pages 1-8, group 2 gets pages 9-16, etc. Once you have the pages separated, mix up the pages within each group so that the students receive their pages NOT in order (so group 1 gets pages 1-8, but they are mixed up so that they are not order; likewise, group 2 gets pages 9-16, but not in order). Have the small groups order them. Once the groups have their pages in order, discuss what order the groups should be in. (3) If you have a smaller class, give each student a picture and ask them to work together to put them in order.

    i. As students analyze the pictures, ask, "what scales are going on in these pictures? How do you know when you're going from one scale to the next? What evidence do you have from the pictures?"

Analyzing pictures for meaning and scientific concepts is integral to the NGSS cross-cutting concept of Scale, Proportion, and Quantity.

b. Discuss: Why is this book called *"Zoom"*? What is "zooming"?

    i. What does this book have to do with the idea of "scale"? Refer back to your chart from step 5 and to remind students of words and pictures that might help them.

    ii. Show two pictures from the LE2.3 slides (slides 11 & 12): one of the birch tree and one of the ants. Ask: what scales are happening in these pictures?

Use the **Zoom** book and the scale pictures to assess students' understanding of "scale."

Thinking across scales family walk

7. Explain to students that they are going to get to go on another wondering walk with their families, this time focusing on this idea of **scale**. They're going to walk around a place of their choosing (their yard, their city block, a larger section of their neighborhood, for example) and notice and wonder across scale. For example, imagining what life is like for a teeny tiny bug or a huge, gigantic tree, or noticing and wondering about a single ant and a mound of ants. It's up to them to decide what kind of scale they're going to notice and wonder about, and it will also depend on what is in their neighborhood!

8. Hand out the **LE2.3 Family tool: Taking a walk together-focused on scales**

9. Give families time to return the tools (about 5 days).

10. Once the tools are returned, these noticings and wonderings will be added to the Wondering Wall in LE3, along with noticings and wonderings from LE2.2 and from LE2.4.

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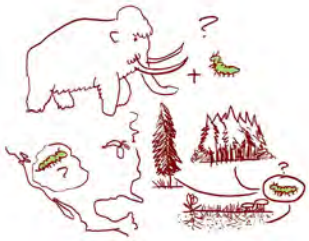
Socio Ecological dimension	What do we notice?	What do we wonder?
 Species, Kinds, Behaviors (SKB)		
 Relationships		
 Places, Lands, Waters (PLW)		
 Thinking across scales		

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 Human decision-making		

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Species, kinds & behaviors

Observing species and their behaviors is important for understanding components of socio-ecological systems.

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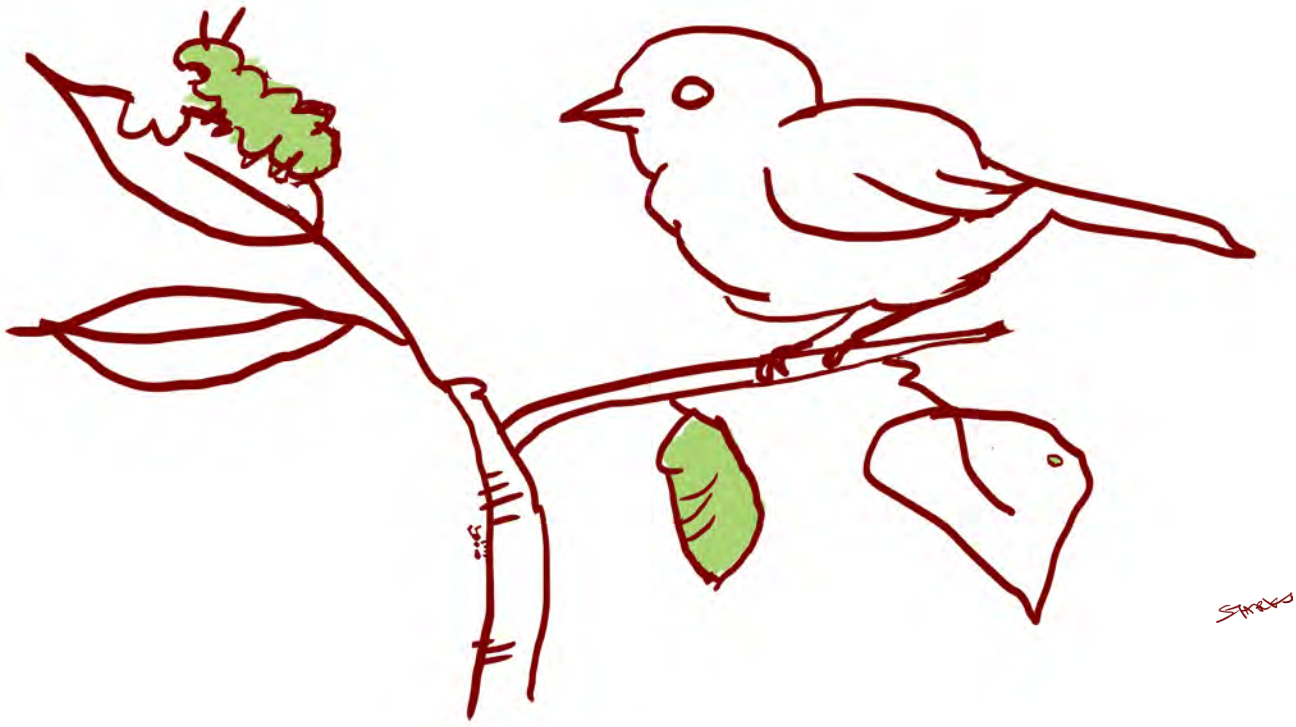
Relationships

Learning to notice relationships in the natural world is important for understanding science concepts to focus on connections among different parts of a system.



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Places, lands, & waters

Noticing how observed phenomena are connected to place is important for field-based science learning.

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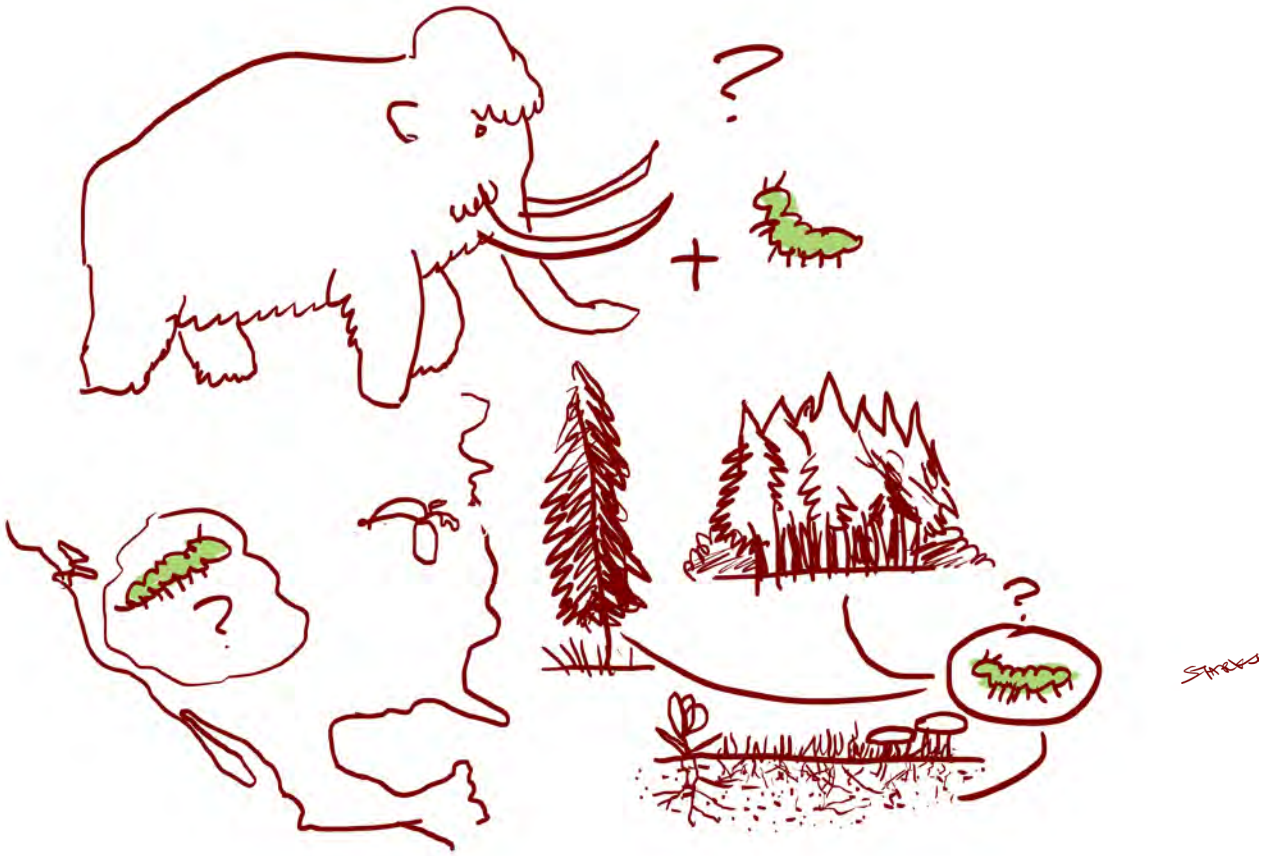
Thinking across Scales:

Time, Space, & Perspective

Thinking across scales is essential for understanding complex socio-ecological systems. This includes temporal scales, spatial scales, being able to take the perspective of others.



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Human Decision-Making

Humans have had, and will continue to have, important relationships that shape places.

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Five socio-ecological dimensions

Organizing Student Wonderings and

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Overview

This slide deck will help you orient to the 5 dimensions of Socio-ecological reasoning. You will use these 5 dimensions with your students in LEs 2.3 and 2.4, and return back to these in LE3.1 to organize students' and families' wonderings.

Overview, continued

This slide deck is organized around five “socioecological dimensions” that are important elements of socio-ecological systems and of sensemaking when conducting field-based science. You will see these dimensions repeated throughout the storyline in various ways. They are:

1. Species, kinds, and behaviors
2. Relationships
3. Places, lands, and waters
4. Thinking across scales: time, space, and perspective
5. Human decision-making

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Species, Kinds, and Behaviors

Observing species and their behaviors is important for understanding components of socio-ecological systems. Some questions to keep in mind as you listen to student wonderings are:

- *What species are students noticing?*
- *What are the noticing about them?*
- *Who or what are these species in relation with?*
- *Are there different scales that students are noticing? For example, are they focusing on a single species or a group? Part of a species or whole?*

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Species, Kinds, and Behaviors

Some Examples:

- *Spiders spinning webs in trees*
- *Leaves on a tree*
- *Changing leaf colors*
- *Big Leaf Maple with ferns*
- *Hummingbird flying over blackberries*

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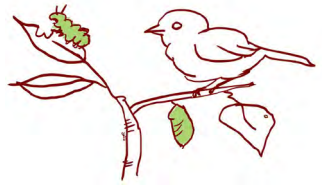
Relationships



Learning to notice relationships in the natural world is important for understanding science concepts because there is a focus on connections among different members and parts of a system. Some questions to consider:

- *What kinds of relationships are students noticing?*
- *Who is in relationship with whom?*
- *Who benefits from the relationship, how, and why?*
- *What are the connections to place, time, and humans?*

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Relationships

Some Examples:

- *Eating relationships*
- *Pollinating relationships*
- *Life Cycle (time relationships)*
- *Helping or harming relationships*

Places, Lands & Waters

Noticing how phenomena is connected to place is important for field-based science learning. Some questions to consider:

- *What is similar/different about phenomena across places?*
- *How is the shape of the land (or what's on the land) related to water that is here now or was here?*
- *Where are students doing most of their observations? Above, ground level, or below ground? How is that impacting what they are observing?*
- *How did this place come to be like this?*
- *What would this place be like in a different season?*

Places, Lands & Waters

Some Examples:

- *Plants are greener in some places than others.*
- *There are mushrooms growing in some places and not others.*
- *There is a ravine here where water is flowing.*
- *There are a lot of worms in the soil by dead logs.*
- *Some parts of the place are flat and some parts have hills.*

Thinking across Scales: Time, Space, Population, and Perspective

This includes thinking through different time, population, and space scales, as well as observing using different perspectives (taking the perspective of a plant, or an animal, or a rock, for example). Thinking across scales is particularly helpful when thinking abouabout life cycles, energy cycles, water cycles, etc.

- *What are students saying about time - a long time ago, recently, or in the future?*
  - *Are students using what they learned about Histories of Places in LE 1.A to think about place?*
- *Are students thinking about how places, animals, and/or plants have changed over time?*
- *Ask students to take the perspective of other species, kinds, lands, and waters.*
- *Ask students to make observations using different spatial scales (e.g., above, below, behind, across)?*

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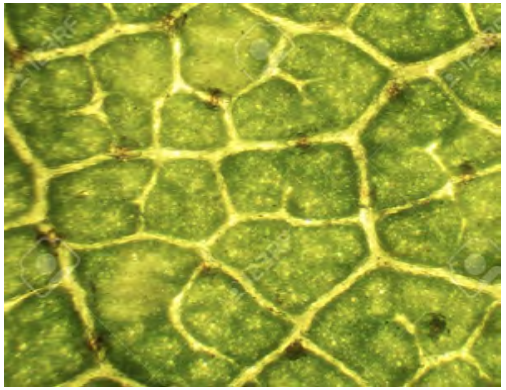


Birch leaf under a microscope

Single birch tree

What different scales do you see in this group of pictures?

What other scales can you use when looking at these pictures or imaging yourself in these places?

Birch leaf

Birch tree forest

What different scales do you see in this picture?

What other scales could you use when looking at this picture or imagining yourself in this place?

Thinking across Scales: Time, Space, Size, and Perspective

Some Examples:

- *I wonder what this place looked like a long time ago.*
- *How long has this log been here?*
- *What could this place look like in the future?*
- *How did this boulder come to be here?*
- *If I take the perspective of this log, what do I wonder and what questions do I have?*
- *What is under this boulder? What is behind the log? If I look above, what do I notice?*

Learning in Places

Human Decision-Making

Humans have had, and will continue to have, important relationships that shape places. Be sure to think about *Indigenous Peoples' Time*, *Nation-State Time*, and *Living Ethical Responsibilities and Possibilities* when listening to student wonderings. Also, pay attention to whether students are positioning humans as part of nature or apart from (i.e., separate from) and/or dominate to nature. You want to support student sense-making in directions that help them position humans as part of nature. Some questions to consider:

- *What are students noticing about human impacts and decisions?*
- *Are they narrating them as helping, harming, or neutral relations?*
- *How do the decisions we make today impact the future of this place?*

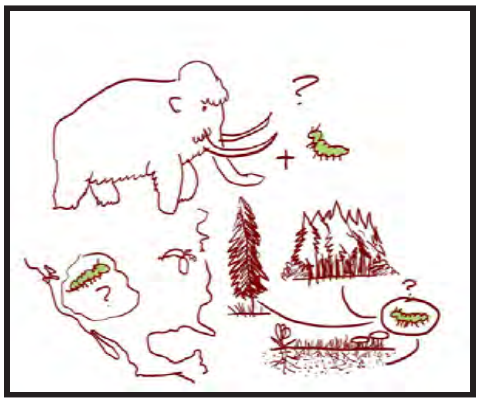
Learning in Places

Human Decision-Making

Some Examples:

- *No one has cleared the ivy from the wetlands and it's taking over everything.*
- *There is a tennis court right next to the wetlands.*
- *Indigenous peoples have fished in this stream since time immemorial.*
- *Who made the trails here?*

LE 2.3 Taking A Focused Family Walk Together: Thinking Across Scales



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Activity Purpose:

Our class spent the day talking about the idea of **scale**. Discuss as a family what that word means to you! This guided walk will help focus your thinking across scales while observing your place. This helps us to develop a deeper understanding of our socioecological systems. We often observe what is in front of us, but there is so much more to notice and wonder about! Consider the history of the place where you live. What does it look like vertically, horizontally? How does it change across seasons? Across years?

Activity Overview:

- Use the activity sheet to guide your thinking while you walk.
- Look for something interesting you notice while thinking across scales and draw or write what you see.
- If any new questions come up, write them down and come back to them later.
- Extension ideas: Try taking a hand lens and go for a "micro-hike". Take a length of string and stretch it out on the ground. Pretend you are a tiny bug going for a hike.

What can you do to support Learning?

- Before you head out on your walk, do some research about the place you are in. *What did this place look like before animals and humans? What will it look like in the future?*
- *What is life like for this tiny bug? Who is this tiny bug in relationship with?* Stand under a tall tree and look up towards the sky. *What has that giant tree lived through?*
- Ask questions that draw attention to seasonal time scales. *What will this place look like in the winter? How will it change as we move into the summer months?*
-

LE2.3 Family tool: Thinking across scales

Thinking across scales while observing helps us to develop a deeper understanding of our socio-ecological systems. This includes considering different time and space scales, looking for signs of life cycles, energy cycles, water cycles, etc. Some questions to consider while you are walking with your family:

- *What did this place look like before animals and humans? What will it look like in the future? (time scale)*
- *What is life like for this tiny bug? What has that giant tree lived through? (size scale)*
- *Why do we see this swarm of ants in the crack in the sidewalk? Why is one ant by himself? (population scale)*
- *Where has this water been before it came here? Where will it go from here? (time scale)*

*Draw or write down any signs you notice while thinking **across scales** What scales have you used to think with? What do your observations make you wonder?*	We noticed: _____ _____ _____ _____ _____ _____ _____ _____

	We wonder: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Learning in Places

Lesson Plan

LE2.4: Taking a relationships wondering walk

Purpose

During this activity, you build on the last lesson where you learned about the 5 socio-ecological dimensions and focused on **scale** as one of those dimensions. In this lesson, you will go on an outdoor wondering walk to focus on another of the socioecological dimensions, **relationships**. Both **scale** and **relationships** take into account the other **species, kinds, and behaviors , human decision-making**, and **places, lands, and waters** because they direct students' attention to not only individual objects but how they are interacting with each other. Research has shown that the places in which people engage in learning about complex ecological phenomena shape sense-making and can support engagement with complex scientific phenomena in authentic and tangible ways.

Why this is important

Field-based science practices help to identify and explore socio-ecological relationships. Learners can observe plants, animals, other people, and kinds (such as water for example) in specific places, and focus their observations on understanding what relationships they can observe among who and what are in the environment. For example, perhaps a family might be out for a walk and they notice a sidewalk that is cracked and elevated, and then they notice a tree about six feet from the sidewalk. What relationship might there be between the tree and the sidewalk? Are there other kinds that are involved in that relationship but that can't be observed with one's eyes? How could that relationship be characterized and why? In another example, if a teacher and learners are observing fallen trees in a forest and see bite marks on the trees, and then they notice some water in the same area, what might they predict about the relationships in the area? Who and what is in relationship with who and what? How could they investigate their ideas and make further sense out of their observations?

Engaging family and community knowledge and practices

Relationships are not only between (or among) plants, animals, and other kinds, such as water, the sun, or soil. Humans are in relationships with these other kinds too. For understanding relationships in complex socio-ecological systems, it is important to begin with the premise that humans are part of the natural world (not separate from it). What roles do humans (including human artifacts) play in various socio-ecological relationships? How do human structures change the behavior of species and kinds in a system? How does human decision-making impact these relationships? How does a better understanding of the various relationships in specific places impact human deliberation and decision-making relative to those places? Why is it useful to take the perspectives of other kinds involved in relationships-in-place (as opposed to only exploring these relationships from human-centered lenses)?

LEARNING GOALS

By the end of this lesson, students will be able to:

1. Describe the "relationships" dimension of the five socio-ecological dimensions
2. Describe wonderings in terms of relationships

CONNECTIONS TO NGSS

» **Crosscutting Concepts:** Patterns; Cause and Effect; Scale; Systems and System Models, Stability and Change

» **Science Practices:** Asking questions; Obtaining, evaluating, and communicating information

» **Disciplinary Core Ideas:** ESS3A: Natural Resources (K-2)
ESS3.C: Human Impacts on Earth Systems (K-2)

ASSESSMENT OPPORTUNITIES

» Whole-class discussions

» Noticing student talk during focused walks

» Student discussions in partners around their wonderings

» LE2.4 Student tool

Centering equitable practices

- **Provide opportunities for students to reason with relationships:** Avoid noticing single objects or naming objects as you walk outdoors. When students reason with single objects or rush to just name objects, you foreclose opportunities for students to reason about interactions between species and kinds, or interactions between structure and function. When something is simply named, the wondering often stops and students rush to name the next object. Encourage wondering by modeling asking questions and wondering about what relationships might be in play. Guiding questions are in the instructional sequence below.
- **Encourage more-than-human perspective taking:** Avoid describing ecosystems only in terms of how they are useful for humans. In order to engage in ethical deliberation and decision-making about places, we need to support students in taking the perspective of more-than-humans in natural systems.
- **Provide equitable access to outdoor learning experiences:** It is natural to be nervous about students' behavior while outdoors. This might come from concerns about safety while outside, but it often results in policing of children of color more often and more harshly than white children. Students **will** be excited to be outside. They **will** speak in louder voices than they normally would in the classroom. They will spread out but **will** come back together as they share their ideas. Allow them both emotional and physical space to do this. Consult the Supporting Learning Outdoors Framework for strategies you can use to support students in their learning and sense-making.

To prepare for this lesson

It is very important that you do **place designing and place mapping** before students take their relationships walk. Make sure that you have identified some places around the school that will provide rich opportunities for students to observe different types of relationships. Refer to the **Place & Place Designing: Mapping Opportunities to Learn framework** for guidance on planning your outdoor instruction.

Teacher background information

This lesson will focus specifically on relationships and ask students to collect evidence of relationships. The Relationships in Socio-Ecological Systems Framework will be very helpful because it provides some background on the different types of relationships in socio-ecological systems. Interdependent relationships undergird all aspects of socio-ecological systems, are dynamic and shift across time, space, and levels of organization. Research shows that sensemaking across these multiple shifting scales requires intentional scaffolding, particularly for young learners. NGSS practices such as observing, modeling, and data collection can support learners' attention to webs of relationships in and across places. This framework features two aspects of interdependent relationships in socio-ecological systems sensemaking: 1) quality of social and ecological relationships that expert scientists, policymakers, and communities think about; and 2) the base relationships of species and kinds that undergird interactions in a system. This framework is intended to develop learners' relational habits of mind - that is the routine sensemaking about interdependent relationships - and support educators, students, and their families to develop a language for attending to powered and historicized relationships at the intersections of social and ecological worlds.

MATERIALS

- LE2.4 student tool (students do at school),
- LE2.3 Five socio-ecological dimensions graphic organizer
- LE2.3 Socioecological dimensions packet

TIME

60 min

Instructional Sequence

1. Have the LE2.3 Five socio-ecological dimensions graphic organizer showing and use it to remind students of the 5 dimensions of socio-ecological reasoning they defined in their last lesson.
2. Ask students to share their wonderings from their LE2.3 family tool (Taking a focused walk together: Thinking across scales). Even if not all of the students have returned this, give students a few minutes to share their wonderings and noticings from their family tools with each other and then share as a whole class. Add the noticings and wonderings to the graphic organizer from LE2.3. Many of these will fall under the "reasoning across scales" row, but some may fall under "relationships" or "species, kinds, and behaviors". Be intentional about putting these noticings in other rows and saying something like, "I appreciate how you were reasoning about scale AND relationships, so I'm putting that in the relationships row. Many of your wonderings can fit under more than one of these! They are connected!"
3. Explain to students that today, they are going to explore another of these rows, the **relationships** aspect of places as they go on an outdoor walk. Remind students of the definition of **relationships** that they came up with in the last lesson. Ask: what relationships do you think we'll see when we're outside today?
4. Show the **LE2.4 student tool** on the doc cam and explain to students that this is going to be like their family walk around **scales,** except this time, they are going to be noticing and wondering about relationships. Explain to students that they may see all kinds of relationships outdoors and that you are really interested in seeing how many different kinds of relationships they can notice and wonder about.

Giving students a chance to share their family knowledges and practices is an important part of signaling to students that the family tools will be an important part of classroom knowledge-building.

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Going outside

5. As students go outside, give them a question to wonder about as they walk with each other. This is a way to invite sensemaking immediately. For example, you might have them discuss the types of relationships they predict they are going to find and why they think that.

6. Even though this walk is focused on relationships, you might want to prompt students to think about some of the other socio-ecological dimensions if you think it will deepen their sense-making and discussions. Below are some examples of prompts you can use to engage and extend your learners' thinking.

Making predictions is an important scientific practice. It attunes students to the observations that they will make, and also helps them connect their prior knowledge to new observations.

Keeping these 5 dimensions visible and present in your teaching through questions will support students in thinking across the dimensions. Notice that the question prompts all have to do with relationships.

Species, Kinds & Behaviors (SKB	Relationships (REL)	Places, Lands, and Waters (PLW)	Thinking across scales (Time Space and Perspective	Human Decision-Making (HDM)
What species are learners noticing? What are they noticing about them? Are there different relationships they're noticing? Where did the bird land? Why? Where is that plant or tree growing? What is below and around it?	What kinds of relationships are students noticing? Who is in relationship with whom? What are the connections to place, time, and humans?	Who is in relationship with the land and water here? Where are students doing most of their observations? Above, ground level, or below ground? How are humans in relationship with this land? What would this place be like in a different season?	What are students saying about time - a long time ago, recently, or in the future? Are students thinking about how places, animals, and/or plants have changed over time?	What are students noticing about human impacts and decisions? Are they narrating them as helping, harming, or neutral relations? How do the decisions we make today impact the future of this place?

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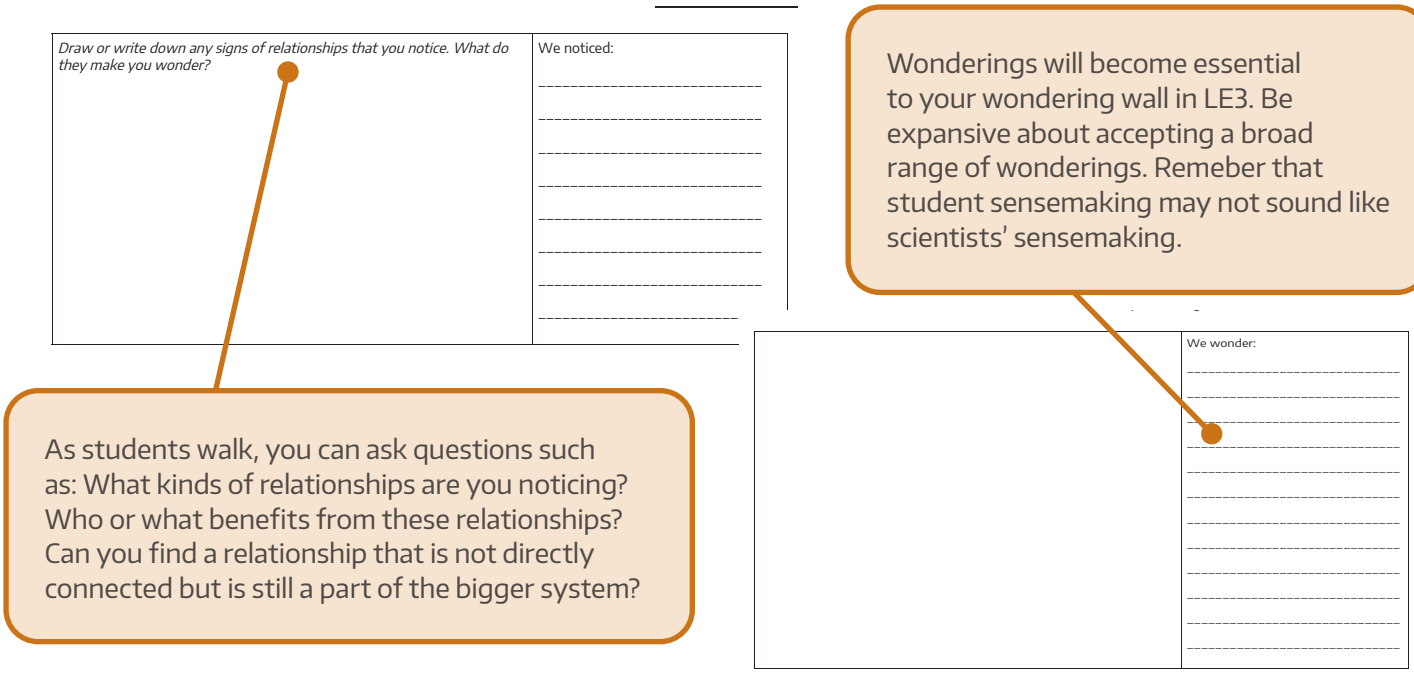
Back in the classroom: sharing observations and wonderings

7. As students return to the classroom, have them partner up to share what they observed, what relationships they noticed, and what they wondered about. Ask students to share their wonderings, observations about relationships with each other, circling the wonderings and noticings that were **similar** to what their partners wondered about, and underlining the wonderings and noticings that were **different** from their partner's.
    a. The partner groups should decide which wonderings and relationship observations they want to share with the rest of the class.
    b. Partners can either write them on sticky notes or just share in a whole-group discussion. These wonderings will be added to your wondering wall in LE3.

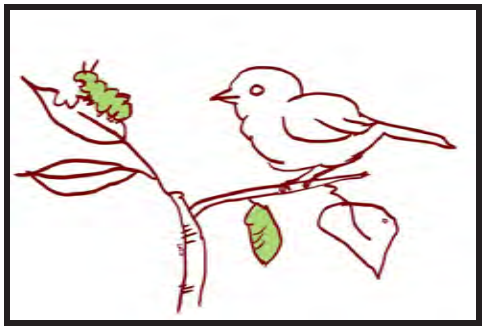
Assessment Opporunity: Listening to students discuss their wonderings is a good opportunity for you to understand what their understanding of "relationships" is.

Relationships family walk

8. Explain to students that they are going to get to go on another wondering walk with their families, this time focusing on this idea of **relationships**. They're going to walk around their neighborhoods and notice and wonder about relationships. For example, they might notice that certain birds are in relationship with certain trees or with each other. They might notice that certain kinds of plants attract pollinators and others do not.
9. Hand out the **LE2.4 Family walk–relationships** handout.
10. Give families time to return their notes, pictures, wonderings, etc. from their relationships walk (about 5 days).
11. Once the tools are returned, these noticings and wonderings about relationships will be added to the Wondering Wall in LE3, along with noticings and wonderings from LE2.2, 2.3, and from LE2.4.



LE 2.4 Relationships wondering walk



Relationships: Relationships are the ways in which beings interact with each other. For example, how does the behavior of water change with the weather? Which plants do you typically see caterpillar munching on? What plants do people step on and which ones do they protect?

Draw or write down any signs of relationships that you notice. What do they make you wonder?	We noticed: _____ _____ _____ _____ _____ _____ _____ _____

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	We wonder: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

LE 2.4 Focused wondering walk: Relationships
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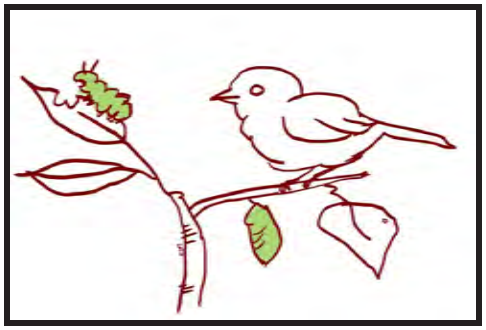

Relationships: *Relationships are the ways in which beings interact with each other. For example, how does the behavior of water change with the weather? Which plants do you typically see caterpillar munching on? What plants do people step on and which ones do they protect?*

Activity Purpose:

We are investigating **relationships** in the natural world around the school. Learning to notice relationships in the social and natural world is important for thinking about socio-ecological systems. Focusing on relationships among different members and parts of a system helps us understand the many ways in which everything is connected. You might notice relationships between humans and plants, directly or indirectly, when you notice things humans have built. For example, you might notice plants growing in the cracks of sidewalks or in yards. Or you might notice relationships between animals, like a dog chasing a squirrel. You can also look for relationships between the land and water.

Activity Overview:

- Use the activity sheet to guide your thinking while you walk.
- Look for signs of relationships and draw or write anything interesting that you see.
- If any new questions come up, write them down and come back to them later to see if you have additional thoughts about them.

What can you do to support learning:

- Talk about relationships in your own family, and don't forget to mention neighbors, teachers, pets, plants, etc. Ask children what they think is important about those relationships. While you walk, look for examples of relationships in the neighborhood. *Who is in a relationship with whom? Why? What does it remind you of?*
- Pay attention to what captures your family's interest. Look above, below and around to discover what might be in relation with each other. *What kinds of relationships are you noticing? Who or what benefits from these relationships?*

- *Can you find a relationship that is not directly connected, but still part of the bigger system?*

Draw or write down any signs of relationships that you notice. What do they make you wonder?	We noticed: _____ _____ _____ _____ _____ _____ _____ _____

	We wonder: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____