

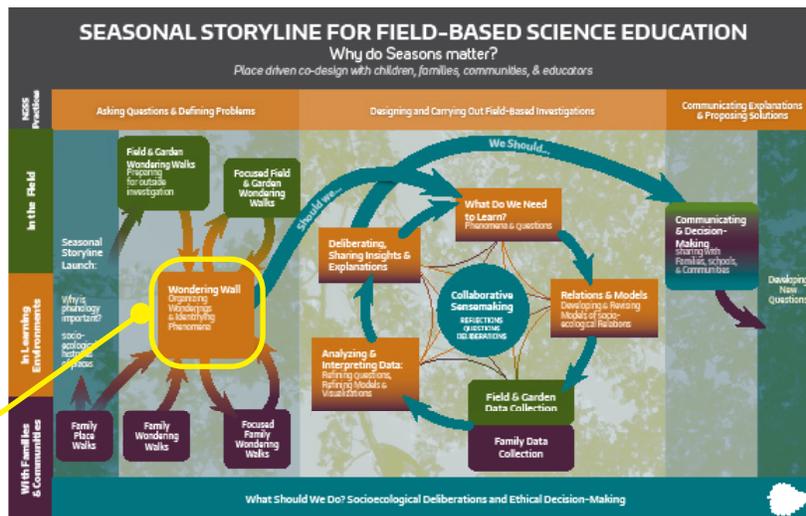
Focusing and organizing phenomena that emerge from student and family wonderings

Synthesizing Wonderings and Organizing Phenomena:

This learning engagement helps students make sense of their wonderings generated during their classroom and family wondering walks in LE2. Through individual, small group, and whole group activities, students are encouraged to share their observations and wonderings, as well as family ideas and wonderings, with one another. These wonderings are put on a Wondering Wall, where students have the opportunity to see how their ideas begin to drive additional field-based experiences and investigations later in the storyline. For example, through small group and whole group activities, students take part in organizing their wonderings first across the **five socio-ecological dimensions** from LE2 and then under umbrella “phenomena” to help the class work toward a “Should We” question and investigation questions that will guide their inquiry during the next part of the Seasonal Storyline.

Big Ideas About Nature-Culture Relations To Have In Mind As You Plan For this Learning Engagement

This learning engagement begins the work of focusing students' and families' observations and wonderings along five socio-ecological dimensions. By bringing together all of their wonderings under phenomena across the five socio-ecological dimensions, students come to see the relationships between, for example, **human decision making** and **relationships**, or **places, lands, and waters** and **relationships**. These connections form an important foundation for ethical deliberation and decision-making. As students start to see humans as a part of the natural world along multiple **scales**, they will start to consider the multiple dimensions of their decisions and actions within socio-ecological systems.



LE 3 LEARNING GOALS

This learning engagement incorporates wonderings from both school and family Wondering Walks and the five dimensions of socio-ecological reasoning. By the end of this learning engagement, students will be able to:

- » See patterns in their own and others' wonderings along the five socio-ecological dimensions
- » Organize those patterns into groups of phenomena

CONNECTIONS TO NGSS/ FIELD-BASED SCIENCE

- » **Crosscutting Concepts:** Patterns; Cause and Effect; Scale, Proportion, and Quantity
- » **Science Practices:** Asking questions; Engaging in Argument from Evidence; Obtaining, evaluating, and communicating information
- » **Disciplinary Core Ideas:** ESS3.C: Human Impacts on Earth Systems (K-2)

ASSESSMENT OPPORTUNITIES

- » Whole-class discussions
- » Student discussions in partners around their wonderings
- » Wondering wall

Learning Engagements in LE3

- **LE 3.1 Organizing Phenomena Overview:** In this lesson, you will work with your students to organize wonderings first within and across the 5 socio-ecological dimensions from LE2, and then into phenomena that students will use to generate “Should We” questions in LE4.



Engaging the Rhizome

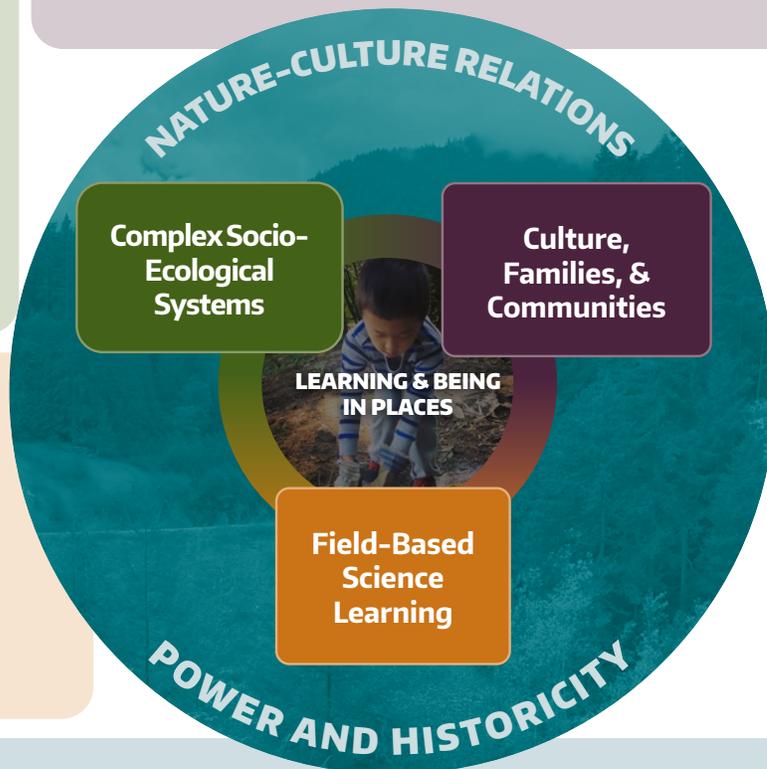
Complex Socio-Ecological Systems: LE3 continues to engage students with the 5 socio-ecological dimensions. As they sort their wonderings within and across these dimensions, they will start to see that one wondering can be sorted into multiple dimensions. This will start to solidify the idea that socio-ecological systems involve multiple layers and scales.

Field-based science Learning: LE3 gives students the opportunity to find patterns in their wonderings and to generalize those wonderings to suggest **phenomena** that they might be interested in learning more about. Students then plan their next set of focused wondering walks based on the phenomena that most interest them.

Power and Historicity:

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. This also signals to students that science does not stop when they leave school, and that the phenomena they notice in their neighborhoods and communities with their families are important to science sensemaking.

Culture, families, and communities: The family wonderings from LEs 2.2-2.4 will become an important part of the Wondering Wall, where ideas from both families and students will be organized around key phenomena. Students will continue to add to their Wondering Wall throughout the next part of the Seasonal Storyline. Incorporating family ideas into the classroom positions families' ideas and practices as being valuable, relevant for science learning, and important resources for sense-making.



LE3.1: Organizing wonderings on a Wondering Wall

Purpose

When you launch LE3 in your classroom, your students will have completed wondering walks both at school and at home. You will have LEs 2.2-2.4 as sources of wonderings and questions from both the classroom and families and now have quite a bit of “observation data” across many places. In this learning engagement, you and your students will organize observations into themes on a **“Wondering Wall.”**

Why this is important

The Next Generation Science Standards highlight the importance of building classroom knowledge from student ideas and observations. This allows for a collaborative science classroom that both keeps students engaged and is reflective of authentic science practices. In addition to student ideas, you and students have also collected ideas from their families. Ultimately, through these diverse contributions, the Wondering Wall and organization of student and family ideas and wonderings in LE 3 will provide a foundation for further investigations throughout the storyline. Also, when scientists collect observations, they organize them into questions or themes that become the focus of their studies. You and your students and their families have been engaged in investigating the schoolyard and students’ neighborhoods and have now collected enough wonderings that you will now use to find themes that will drive the generation of a “Should We” question, more focused Wondering Walks, and investigations.

Engaging family and community knowledge and practices

As you did in LE1.5 and LE1.8, this is an opportunity for you to put family noticings and wonderings alongside classroom noticings and wonderings. When you do this, two important things happen: (1) you have a richer dataset for considering themes for further investigation, and (2) you position students and their family knowledge at the center of classroom science learning, thus helping students see that their families’ ways of knowing and doing can make important contributions to science.

LEARNING GOALS

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

1. Organize wonderings in terms of five socio-ecological dimensions
2. Notice phenomena in wonderings

CONNECTIONS TO NGSS

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

ASSESSMENT OPPORTUNITIES

- » Whole-class discussions
- » Student discussions in partners around their wonderings
- » Wondering wall

Teacher background information

This lesson is an important step in preparing you for the next phase of the storyline. Because the design of the storyline is dependent on you noticing and organizing student and family ideas in order to decide on the “Should We” questions, the direction of walks, and field-based investigations, there will be some preparation that you should do before this lesson to anticipate the types of themes that might emerge and to see the phenomena in students’ and families’ wonderings (see below).

Two important ideas to keep in mind for this lesson are **phenology** and **phenomena**. The **phenology framework** will give you guidance on phenology and how it intersects with the storyline (you can use ideas that you, students, and families explored in LE 1.B). **Phenomena** (plural) are observable events, behaviors, relations, or ideas that can be investigated. When we apply that idea to field-based science learning, phenomena are observable events, like trees budding, water flowing and pooling, leaves falling, bees on flowers, human allergies, concrete getting hot to the touch when it’s in the sun, etc. Notice that all of these phenomena can be tied to the seasons (phenology) somehow, and we can use field-based investigations to study and explain them. We will be using the word “phenomena” (plural) or “phenomenon” (singular) throughout the rest of the storyline, depending on if we are describing multiple phenomena or one phenomenon.

Centering equitable practices:

- **Take a sensemaking stance to students’ and families’ noticings and wonderings:** Avoid making the assumption that because student and family wonderings might not sound like wonderings scientists would have, they are automatically less sophisticated, silly, or wrong. Student and family wonderings will likely not look and sound like how a scientist or textbook would phrase a wondering and then state a related phenomena. This can be a reason why some teachers discount students’ ideas as not being “scientific” or “sophisticated” enough. It is also one reason why certain students’ voices—voices that are more consistent with white, middle class renderings of ideas—get elevated and many students’ voices—those of ESOL, special education, or BIPOC (Black, Indigenous, People of Color) students do not. Learning to see the sensemaking in students’ and families’ ideas means **assuming a sensemaking stance**—in other words, assuming that students and families are **always** trying to reason about the world, and are expressing their ideas in ways that make sense to them.

To prepare for this lesson

Because this lesson requires you and your students to organize wonderings and noticings into the 5 socio-ecological dimensions and then into phenomena, you should do some organizing on your own first in order to plan how to do this with your students.

1. Gather the student and family tools from 2.2 wondering walks, 2.3 family walk around scale, and 2.4 student and family walks around relationships. Regardless of how many family tools have been returned to you at this point, include them into your planning.
2. Use the chart below to organize the wonderings under each socio-ecological dimension and by emerging phenomena.

Noticing/wondering	Socio-Ecological dimension present (species, kinds, behaviors; relationships; places, lands, waters; human decision making; scale)	Emerging phenomena
We notice spider eggs in the tree and wonder what kind of spider it is.	Species, Kinds, Behaviors (kind of spider) Relationships (spider in the tree)	Life cycles Role of trees in ecosystems (as shelter/habitats, food, etc.)

Organizing student and family wonderings in this way allows you to make some inferences about which dimensions are (or could be) in students' thinking as they share their wonderings and their families' wonderings. Remember that the goal is for you to build toward groupings of phenomena, so you can say things like "These wonderings all seem to be part of X phenomenon."

MATERIALS

- » LE2.2 student wondering walk
- » LE2.2 family wondering walk
- » LE2.3 Family wondering walk on scale
- » LE2.4 student wondering walk on relationships
- » LE2.4 family wondering walk on relationships
- » LE2.3 Five socioecological dimensions graphic organizer
- » LE2.3 Socioecological dimensions packet (1 per group)

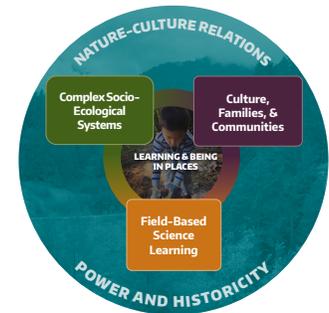
TIME

40 min



Instructional Sequence

1. Have the LE2.3 Five socio-ecological dimensions graphic organizer visible and use it to remind students of the 5 dimensions of socio-ecological reasoning and how they defined each one.
2. Read some of the wonderings on the graphic organizer out loud. Point out that some of the wonderings could belong in more than one row, and that is ok--we are beginning to see that these are connected in some way.
3. Explain to students that today, they are going to take all of our wonderings and noticings and try to organize them somehow. Explain to students that when scientists start to gather a lot of questions and observations, they have to pause and see what they have collected in order to figure out what their next steps should be. This is the purpose of today's lesson!



Finding patterns is an integral way to organize thinking and to describe phenomena.

Small group organizing of wonderings

4. Explain to students that this is going to be a 2-step process:
 - a. First, they will look at their tools from LEs 2.2-2.4 (both classroom and family) and find the place where they filled out "I wonder". Have them write their wonderings on sticky notes--1 per sticky note. Remind students to put wonderings from **both** family and classroom walks.
 - b. Next, they will take their 5 socio-ecological dimensions packets and separate the pages.
 - c. They will then put their sticky notes on the page of the packet that matches the dimension that they think most fits their wondering. Explain that they'll have some wonderings that could go on more than one page. That's ok--but they should choose one page to put it on.
5. Allow students about 20 minutes to do this activity. As you walk around the room, some questions you can ask are:
 - a. did that wondering come from your family walk or from our classroom walk?
 - b. which page of your packet will you put that wondering on? why?
 - c. why do you think that wondering goes on more than one page?
 - d. now that you are revisiting these wonderings, do you have new wonderings?

By giving students ownership over their ideas and their families' ideas, you are sharing power within the instructional space with students and families.

Asking students how they are categorizing their ideas will allow you an opportunity to see their understanding of the 5 socioecological dimensions.

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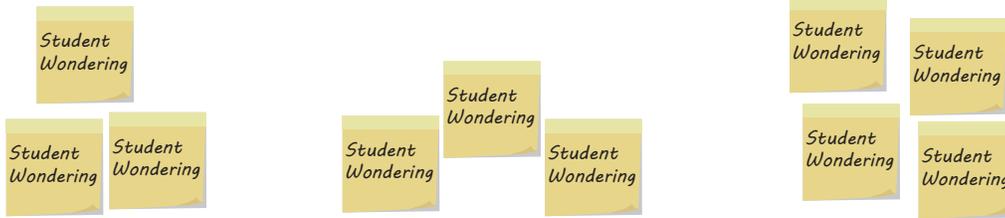
Whole class discussion

6. Back as a whole class, have a piece of butcher paper for each of the 5 socio-ecological dimensions. Ask students, as a group, to place their wonderings on each of the corresponding dimensions.
 - a. You may want to begin to propose, or ask students to propose, more general wonderings under which several wonderings can be grouped. You can label each of those topics with a sticky note. For example, you may have this group of wonderings:
 - i. We wondered what the buds on the trees will turn into
 - ii. We noticed flowers blooming on the sidewalk
 - iii. We noticed buds on the trees and wondered when they would open
 - iv. You might group all of those wonderings under a “trees and flowers budding” phenomenon.
 - b. Individual students and/or small groups can affix their wonderings to the Wall, and share out what those wonderings are (they can read them aloud to the rest of the class). **These wonderings should be from both class and family wondering walks.**
(See “Round 1” below)
7. Once students are done placing their wonderings on the appropriate dimensions, choose one socio-ecological dimension that has a larger concentration of wonderings. Say, “We’re going to start with this one because it seems like, as a class, we and our families had a lot of wonderings about this.” Read the wonderings aloud and ask students if they see any patterns in the wonderings. Ask students, “if you were to group this according to patterns that you see, how would you group them? For example, I see a group of wonderings that all have to do with [fill in a pattern you see]. So I’m going to move all of the stickies that I see in that pattern over to this group here [move the stickies on the page].” Ask students for their input until all of them are sorted. Start to group them by phenomena with students’ input.

Asking students to describe patterns in terms of phenomena is an important scientific practice.

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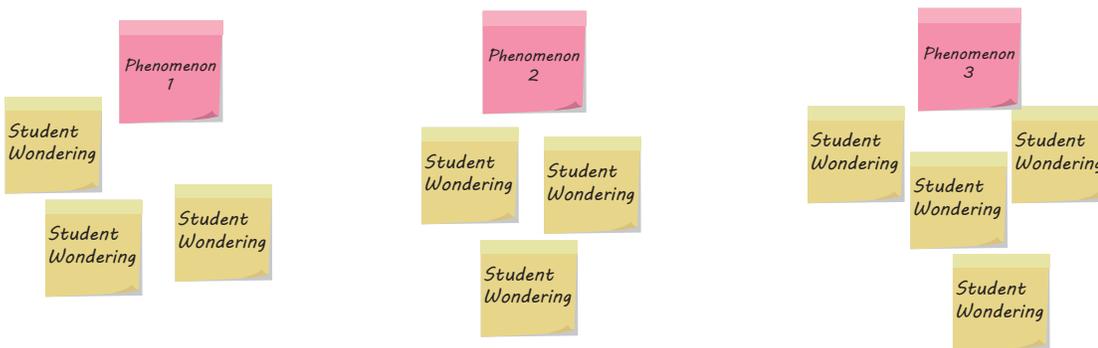
GROUP WONDERINGS:



8. As you group the sticky notes with students' input, ask them, "how should we name that group of wonderings? What do these wonderings all seem to be about? Or what do they seem to have in common?" As students name the group, label them with a different colored sticky note with the name that students come up with.

As students group their wonderings into phenomena, this is the beginning of engaging in the NGSS practice of Engaging in Argument from Evidence. They are using the wonderings as evidence to back up claims about how to group the wonderings.

GROUP WONDERINGS BY PHENOMENA



9. Repeat steps 9 and 10 for at least one other socio-ecological dimension (do as many as your class has the stamina or time for). This is important because it will allow you and your students to see phenomena that are common across socio-ecological dimensions.
10. As a class, decide on 3-4 of these phenomena to focus on. Students will generate "Should We" questions about these 3-4 phenomena in LE4.