Family Science Learning Engagement

Complex Socio-Ecological Systems

Nature–Culture Relations

LEARNING & BEING IN PLACES

Field-Based Science Learning

POWER AND HISTORICITY

LE 6.B "Should We" Questions, Models, and Preparing to Investigate!

Activity Purpose

The purpose of this set of activities is to help your family prepare everything you will need to deeply explore your family's "Should We" question. This includes getting ready to investigate events, processes, and relationships in LE 7.

Activity Overview

This is a two-part activity.

- **Part 1 (LE 6.B.1):** Return to the work you did in LE 5.C, and decide which "Should We" question your family wants to focus on (or, decide on a new one!). Then, explore the question more deeply, and then create an initial model that shows your thinking about all of the different parts of your "Should We" question and how those parts are related. (NOTE: if the initial model you created in LEs 5.C or 6.A is related to your "Should We" question, you can use it and revise it.)

- **Part 2 (LE 6.B.2):** Using your "Should We" question and your initial model of that question, select **at least two** events, processes, and/or relationships that you need to better understand in order to deliberate about your "Should We" question. Then pose investigation questions that would help you explore the events, processes, and/or relationships that you chose.

What can you do to support learning?

- LE 6.B.1 and LE 6.B.2 both have two or three mini-activities to work on. Family members might want to work on parts of these activities over the course of several days so that no one becomes bored or overwhelmed.

- Because there are numerous parts, you might consider having a family member summarize what your family has accomplished so far before starting a new part to help everyone remember what you have already done.

- For each mini-activity, there are prompts written in the activity sheets that you can ask to help everyone participate and contribute ideas. More general prompts you can use are: How do you know? Why do you think that? I'd love to hear more about that – say more! How could we do that? Why is that important?

Connecting with other families

» Share your "Should We" question, explorations of that question, initial model, and investigation questions with other families, friends, and neighbors. You can ask them for their feedback. Ask them if they know of any resources you might find helpful as you keep exploring your "Should We" question and investigate parts of it!

Disciplinary Core Ideas

Depending on the "Should We" question your family chooses to explore, there are a lot of science-related ideas you could learn about related to structure and function, the growth and development of organisms, interdependent relationships in ecosystems, social interaction and group behavior, and cycles of matter and energy transfer in ecosystems.

Science Practices Emphasized

· Asking Questions
· Developing and Using Models
· Planning and Carrying Out Investigations

YOUR PLACE IN THE SEASONAL STORYLINE

Key Ideas

"Should We" Questions

Asking "what should we do" and then making a decision is something that we all do everyday. Deciding what we should do involves using knowledge, clarifying values and goals, and exploring potential impacts. "Should we" questions sometimes have clear answers but often do not. "Should We" questions involve (1) exploring relationships between humans and the natural world, (2) recognizing how our decisions impact families, communities, and the natural world, and (3) understanding how we can be more thoughtful and accountable in our roles within the natural and social world. "Should We" questions ask us to think about scales of time, including seasons, and processes of change. "Should We" questions require deliberation and action even with uncertainty.

Modeling

Working with models helps scientists and science learners visualize their thinking and better understand the kinds, relationships, behaviors, and various scales being explored. Scientific models are dynamic and change based on new information learned through investigations of phenomena, discussions and deliberations with others like family and community, and media of various types.

CONNECT TO OTHER ACTIVITIES

· Learning Engagement 5.C: Modeling a Neighborhood "Should We" Question
· Learning Engagement 6.A: Observing and Modeling Specific Relationships

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LEARNING IN PLACES FRAMEWORKS TO CONSIDER

· Socio-Ecological Deliberation and Decision Making
· Modeling Socio-Ecological Phenomena
· Asking Powerful Questions in Field-Based Science

Pick a "Should We" Question, Explore It, and Model It

Part A: Pick a "Should We" Question

Look back at the "Should We" questions your family came up with in LE 5.C. **Your first task is to pick a "Should We" question from that list to focus on, or your family might choose to come up with a new "Should We" question.** The "Should We" question that you choose is important because you will be using it to guide the rest of your work. Here are some things to think about to help your family pick a "Should We" question:

- Your "Should We" question should be socio-ecological, meaning it should involve interlinked human and natural parts of systems.
  - "Should we try and identify the type of bird that visits our bird feeder?" **is not** the type of "Should We" question we are talking about. This is a yes/no question that no one needs to investigate to respond to.
  - "Should we remove or add more bird feeders to our backyard or neighborhood garden?" **is** the type of "Should We" question we are talking about. There is not a "right" answer and in order to make a sound decision, there are various investigations that would be helpful.
- Your "Should We" question should not have an obvious right answer. It is the type of question that your family can deliberate about.
- Your "Should We" question should be specific to your neighborhood (your yard, your apartment complex, your block).
- Your "Should We" question should be interesting and important to your family. You should be interested and excited to learn more about it.

Complete the chart on the next page. Recreate the chart on another page if you have more than two "Should We" questions that you want to consider. Once you've explored your "Should We" questions using the various criteria, identify the one "Should We" question that your family wants to use to guide the rest of your activities.

"Should We" Questions from LE 5.C (or new ones)	Which of these criteria does the "Should We" question meet? (Check all that apply!)
	☐ involves relations between humans and more than humans (like animals, plants, rocks) ☐ involves multiple base relationships (like animal-plant, plant-plant; see LE 6.A) ☐ involves multiple socio-ecological timescales (see LE 1.C) ☐ we could collect data about this ☐ requires us to think about how our decisions would help create different social structures and futures ☐ no obvious right answer ☐ connected to your neighborhood ☐ interesting, important, and exciting to us
	☐ involves relations between humans and more than humans (like animals, plants, rocks) ☐ involves multiple base relationships (like animal-plant, plant-plant; see LE 6.A) ☐ involves multiple socio-ecological timescales (see LE 1.C) ☐ we could collect data about this ☐ requires us to think about how our decisions would help create different social structures and futures ☐ no obvious right answer ☐ connected to your neighborhood ☐ interesting, important, and exciting to us
Which question did you end up choosing and why?	

Part B: Explore Your "Should We" Question

Now that you've decided on a "Should We" question, make some notes about how your question involves the different aspects of socio-ecological systems below (you saw some/all of these dimensions if you went on any of the focused walks in LE 3). Use the prompts in the chart to help you think more deeply about your "Should We" question (every prompt might not apply).

5 Dimensions of Socio-Ecological Systems	*Our Notes*
Species, Kinds, and Behaviors ● What species (plants and animals, including humans) and kinds (things like water, rocks, the sun) are involved in your "Should We" question? 　○ Consider the different time scales in LE 1.C. Would the same species and kinds you identified show up in all the various time scales or might there be other species and kinds present? Is that important for your "Should We" question, and if so, how? ● Describe any plant and/or animal (including human) behavior that is involved in your "Should We" question. ● What species and kinds have power over others? How does that power play out? Why might that be important to understand given your "Should We" question?	

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Relationships ● What relationships between species, kinds, places, lands, and/or waters are involved in your "Should We" question? ● Who benefits from these relationships? Who might not benefit? Why? ● If you consider the different time scales in LE 1.C, how might the relationships you identified stay the same or change across time?	
Places, Lands, and Waters ● What places, lands, and/or waters are involved in your "Should We" question? ● Who is involved in making decisions about these places, lands, and/or waters? Who is not involved in decision-making, and is that problematic? How so? ● How have these places, lands, and waters changed over time?	
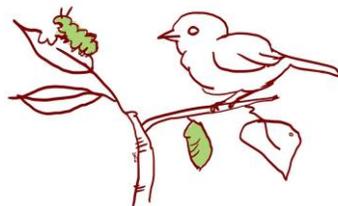
Thinking Across Scales (Time, Space, and Perspective) ● What different time scales are important to think about related to your "Should We" question? (Look back at LE 1.C for some time scales you might consider.) ● What different scales related to space might be important to consider given your "Should We" question (looking at something from above or below, for example)? ● Try and take the perspective of species and kinds that you listed. Would doing that help you think about your "Should We" question differently?	
Human Decision-Making ● What evidence of human-decision making is important to take into account given your "Should We" question? ● Who gets to make the decisions and why? Would different decisions be made if others were making the decisions? ● How could you find out the history of decision-making related to your "Should We" question? If you can find that out, what is that history?	
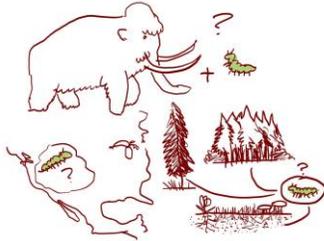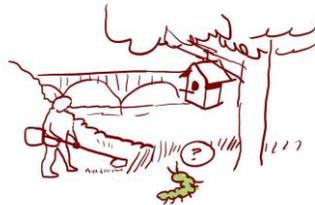
Part C: Create an Initial Model of Your "Should We" Question

Now you are ready to create an initial model of your "Should We" question. You can use the next page to create your model or use a blank sheet of paper. Use drawings, words, diagrams, and arrows (and other symbols) to represent your family's initial thinking about the dimensions of your "Should We" question that you noted in the chart in Part B. If you want to look at some examples of initial models, check the example guide.

If your "Should We" question is related to the initial model your family created in LE 5.C and/or LE 6.A, you can use that model and revise it, if needed, to reflect the thinking you have done in parts 1 and 2 of this activity.

After you create your initial model, you are ready for the activities in LE 6.B.2.

Our Family's Initial Model of Our "Should We" Question

Asking Investigation Questions Related To Your "Should We" Question

Now that your family has picked a "Should We" question and created an initial model of that question, your next step is to identify events, processes, and or relationships from your initial model that you can investigate. To investigate, your family will collect data outside to learn more about your chosen events, processes, and relationships *AND* your family is going to gather information from community members, and from other sources, like the Internet, books, podcasts, and magazines.

Part A: Identify Events, Processes, and/or Relationships from Your Initial Model of Your "Should We" Question
Scientific practices and ways of thinking can help people explore why or how events and processes (what scientists call "phenomena"), including those bound up in relationships, happen.

Use your thinking about and modeling of your "Should We" question from LE 6.B.1 to help you select events and/or processes that you want to learn more about. You will pick at least two of them. **Look at your initial model to think about what events, processes, and relationships you need to learn more about in order to deeply understand your "Should We" question.** *The thinking you did to complete the table in Part 2 of LE 6.B.1 might help you too. Once you have selected at least two events, processes, and/or relationships, you are ready to move to Part 2!*

Look at your initial model of your "Should We" question from LE 6.B.1. What do you need and want to learn more about (events or processes)? For example, do you need to better understand aspects of the relationships that you've shown in your initial model?

1. **List everything you need and want to learn more about in the table on the next page.** (You can print this page or copy this table onto a blank sheet of paper.)
2. **For each thing you list, fill in the blanks of the "if/then" statement to help you continue to think about your "Should We" question.**

Event or Process or Relationship	If we learn more about _____ [event, process, or relationship], then we think _____ about our "Should We" question.

Now, select at least two events, processes, or relationships that you want to investigate (you can put a check-mark or a star next to them, for example, to remember which ones you chose).

Part B: Asking Investigation Questions
You've done so much important work already. Hopefully your family has had fun doing it too! You have chosen a "Should We" question and created an initial model of it. Then you have selected at least two events, processes, and/or relationships that are important ones to understand given your "Should We" question. Your next step is to decide on how you can investigate the events, processes, and/or relationships you've picked. Use the following table to help you think about that. Once you have asked some investigation questions, you are ready to move on to LE 7.

Your focal events, processes, and/or relationships from part A. (Write each one in a box below.)	Questions that would help us investigate outside. (For each event, process, or relationship, ask questions that you could investigate by collecting data [qualitative or quantitative] outside.)	What specific data would we need to collect to investigate our question? (For example, species counts, soil temperature, air temperature)
Besides collecting data outside, what other kinds of information might we need? List your thoughts about: (a) community members you could talk to, and (b) other kinds of sources you could use to find out what others already know about the events, processes, and/or relationships you chose.		