Learning in Places

Learning Frameworks

Socio-ecological Histories of Places Framework

Why is thinking about histories of places important?

There are many time scales that make places what they are today, and what they could be in the future. Histories span across land, plants, animals, and human communities over time. Thinking within and across many time scales is necessary to understand the complexity of socio-ecological systems more deeply. Research shows that thinking across time scales is an important practice of scientists, and that they need to understand the geologic and past social contexts of the land they are studying in order to understand the land as it is today (and what it might become in the future). Understanding social systems also requires thinking across scales. For example, understanding socio-ecological decisions that people make requires integrating different layers of time with respect to how social systems intersect with ecological systems. Similarly, structural inequalities in our society are historically rooted and accumulate across different scales of time. Grappling with these layered histories and the way they continue to shape the present is critical in order to create ethical, just and sustainable futures. *Providing a framework for thinking across multiple time scales supports learners in being able to think about past, present, and future impacts to our lands and waters when engaging in outdoor and indoor learning.*

How to use this framework

Learner Sense-Making: Plan learning activities that purposefully ask learners to sense-make at one or more time scales using stories, knowledge, and evidence from field observations, family knowledge and practice, and scientific research.

Planning and Implementation: Plan for and teach place-based sense-making and investigations across multiple time scales and places. What place-based explorations across multiple time scales have you conducted (e.g., related to your school yard and neighborhood, a place-based issue in your city or the broader region in which your school is situated)?

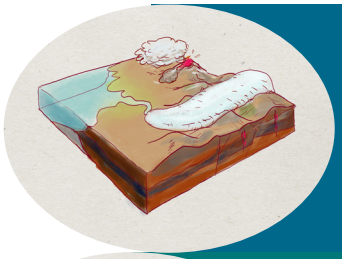
Collaborative Practice: Support field-based science practices that help learners explore one or more time scales and deepen their socio-ecological sense-making and decision-making. These field-based practices include observation, designing field-based investigations forming explanations with evidence, collaborative discussion and question asking, and engaging in deliberation and decision-making.

Educator Reflection: Reflect on your own knowledge, values, identities, and experiences in place and the ways they shape your instruction and interaction with learners.

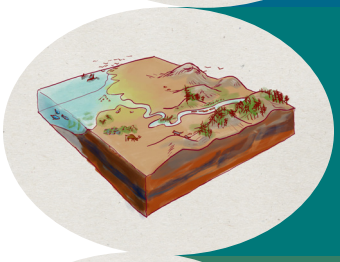
Co-Design and Assessment: Co-plan with other educators and families to transform social systems of power in ways that help learners from different cultural communities sense-make at different time scales. Design and use formative assessment tools that help you understand how learners are sense-making across scales of time, incorporating their familial and communal knowledges, and how you can use these understandings to refine your instruction to better support their socio-ecological sense-making and decision-making.

Socio-Ecological Histories of Places Framework

The socio-ecological histories of place framework involves thinking across **six time scales**. These provide a framework for supporting learner sense-making within and across time and place. A key reason to engage learners in this thinking is that it will support them in understanding how things may have changed slowly or rapidly. Learners should also reason across multiple time scales to understand the impacts of how slow or rapid change in any one of these scales affected/affects another. For example, learners can wonder about how rising temperatures (compared across geologic, nation-state, and global histories, for example) have impacted and are impacting plant, animal, and soil time (through extinction and adaptation).

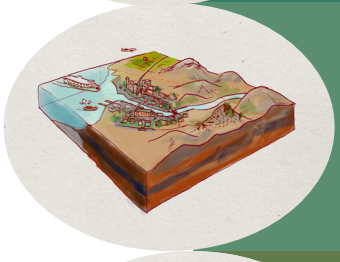


Geologic Time includes the histories of lands, oceans, and other water processes.



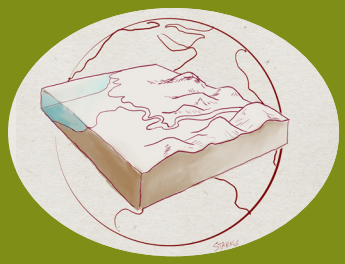
Plant, Animal, & Soil Time includes the histories of plants, animals, and soils and their relationships to lands and waters.

Indigenous Peoples' Time recognizes First Peoples' histories, presents, and sovereignties in places and across time.



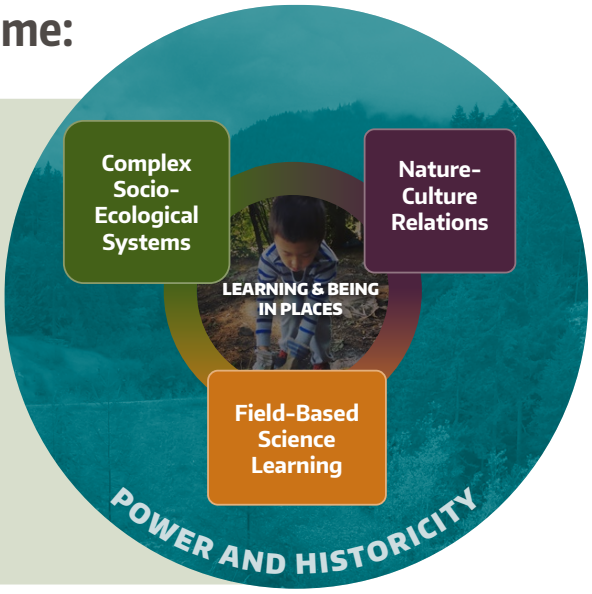
Nation-State Time refers to global shifts in political and economic structures that often include human movements across continents, powered shifts in technology, language, culture, and human relationships with the natural world.

Global Time includes how our local places are connected to, impact, or are impacted by other places across the earth and interact with other time scales.



Living Ethical Responsibilities and Possibilities Time includes the possible stories for places in the future.

Connections to the Learning in Places Rhizome:



Complex Socio-Ecological Systems: 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 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, and organizational scales, and learners must be supported in sense-making at different levels of scale.

Nature-Culture Relations: Complex socio-ecological systems can also be thought of as factors and relations, such as natural, socioeconomic, and cultural relations, whose flows and uses are shaped and regulated by a combination of ecological and social systems. There is evidence that when people reason about humans as part of the natural world, reasoning and decision-making are more complex. Learners must have opportunities to think across scales of time and space and to learn to take the perspectives of humans and more-than-humans (e.g., plants, animals, land, water) related to those different scales.

Field-Based Science Learning: Emerging research demonstrates that there is cultural variation in the coordination of attention in observation practices, and this variation could serve as a resource for more equitable and expansive field-based science learning. This suggests that learning outdoors in places that matter for learners, their families, and their communities, that is, in complex socio-ecological systems, may enhance reasoning and decision-making.

Power and Historicity: Socio-ecological histories of place are political, contested, and intimately linked with ways of knowing and being in the world. Supporting learners in perspective taking and reasoning through contradictory histories of places are equity practices that allow for multiple and diverse stories to be told, honored, and incorporated in science learning. Often times, science education in the U.S. has positioned humans as separate from the natural world, which renders the intersections of social and ecological systems invisible and ensures that learners do not have access to powered and historical analyses of these intersections. For example, in school, science learners are used to learning about geologic time, but do not often have opportunities to explore geological time in relation to plant, animal and soil, and indigenous peoples' time, and what those explorations highlight about living ethical responsibilities and possibilities through ethical decision-making.

Connections to expert thinking:
When scientists study complex systems phenomena in places, they need to understand those places across different scales of time and space. For example, when engaging in restoration, scientists need to first understand the history of a place and the various historical decisions that have been made to shape the land and waters of a place. They need to think across timescales–from geologic time to nation-state time to global time to the future–to understand how natural processes intersect with human decisions and the effects those might have on the future health of a place for all of its inhabitants.

Appendices

The following appendices provide examples and other supports to help educators use and then deepen their use of the Socio-Ecological Histories of Places Framework over time. Appendix A is a vignette that showcases one example of how a teacher used this framework in a Kindergarten class. Appendix B provides an example of learner sense-making related to socio-ecological histories of places. Appendix C provides example prompts, questions, and scaffolds that educators can use to support learners' sense-making and decision-making within and across timescales, in a variety of places, and across multiple ways of knowing and doing. Appendix D is a self-assessment that educators can use to reflect on their thinking over time about socio-ecological histories of places and their use of these ideas in instruction.

APPENDIX A

A Vignette: How Mr. Eli Used the Socio-Ecological Histories of Places Framework to Support His Implementation of the Learning in Places Seasonal Field-Based Science Storyline

PLANNING FOR INSTRUCTION:

Mr. Eli, a kindergarten teacher in a Spanish language immersion classroom, is planning to implement the Learning in Places seasonal field-based science storyline next week. **In preparation, he researches the history of the land his school sits on and the surrounding neighborhoods** and learns that this land was once under a huge glacier 15,000 years ago. After the glaciers receded, the land was a tidal zone, and the land around his school was excavated and used to shore up the tidal zone to build highways and waterways to transport logs from nearby rivers out to the ocean where they could be exported. His school stands on a ridge that is partly the result of this excavation. Indigenous peoples and native forests were displaced from this land, and while Indigenous people still inhabit and have rights on this land, he knows that his students need to know more about how Indigenous people have shaped and continue to shape the local fishing and forestry industries, as well as language and culture of the area. In his research, he learns that the history of this place is a mixture of scientific, oral, and written history, and that with the exception of the glacial times, humans have had a deep connection to what happens to this land, but that his students think about "nature" as if humans are removed from it. He knows that his school is adjacent to a city park, and this means that there are wetlands next to tennis courts and grassy fields. He realizes that this is a perfect setting to help his students wonder about how this place came to be the way it is: why does the wetland/forest stop so abruptly? What did this place used to look like? Therefore, he decides to begin the seasonal field-based science storyline with a discussion of the history of the place around the school and how humans are connected to it.

LAUNCHING INSTRUCTION:

On the first day of instruction, he asks the students to sit in a circle for their morning meeting. He explains, "This class meeting is going to be a little different. I'm going to speak a bit of English so I can explain things the best that I can." He goes on to say, "These lands that we're on were once occupied by the Duwamish and Suquamish people. We didn't ask for permission to build this school here. We didn't ask for permission to build the park and the playground, and I want to recognize that now." He asks them, "Do you know what happened to the people who lived on this land a long time ago?" One student answers, "They died?" Mr. Eli says, "Well, at some point, their bodies died, and they buried them in the ground. Their bodies were absorbed into the earth. The nutrients from their bodies absorbed up into the trees." One student says, "Just like my grandma!". Mr. Eli says, "Just like your grandma when she died. That's what I'm talking about! Then these trees can absorb those nutrients to grow. When we cut them down to build the school, I like to think that it is actually made from the old inhabitants of this land. So when we meet in a circle like this, maybe we're better understood by the nature around the school." He then asks students, **"Where are your families from? Just like the**

ancestors of this land are maybe a part of this school, where do you feel connected to? If you don't know, that is a great thing to ask your families about and come back and share with us."

The next week, Mr. Eli takes students on a learning walk around the school to discover what plants, animals, and water they share the land with. He takes them to the wetland on the school grounds and points out the cedar trees and talks about how important the cedar trees are to the Indigenous people who live here still. He asks them, "How do you think the wetland will look different in a different season? Do you think we'll be able to tell it's a different season just from observing the wetland?"

CONNECTING TO FAMILY AND COMMUNITY KNOWLEDGE AND PRACTICES

Mr. Eli remembers that he asked students during a discussion where their families are from and what places they feel connected to and why. **He creates a learning activity for students and their families to engage in together to make sure that classroom learning is supported and informed, in part, by family and community knowledge and practices because he knows that research has shown that students are more likely to engage in science sensemaking, and identify with science and science-related activities when it is taught in a way that connects to their lived experiences.** In addition to asking students and families to identify and discuss a place that is important to them and pose questions and wonderings about that place, Mr. Eli asks them to think about that place across the six time scales detailed in the Socio-Ecological Histories of Places Framework. Once all families have had an opportunity to complete this learning activity, Mr. Eli synthesizes families' ideas, questions, and wonderings. He then asks students to add to his synthesis with ideas, questions, and wonderings from their walk last week.

REFLECTING ON INSTRUCTION:

Mr. Eli reflects on how he could deepen students' engagement with various time scales that comprise the Socio-Ecological Histories of Places Framework over the course of the seasonal field-based science storyline. For example, he remembers one conversation with students about Indigenous Peoples' Time, but when one of the students responded to the question about what happened to people who lived on the land long ago with, "They died?," Mr. Eli realizes that this response implies that Indigenous peoples no longer exist. To help students recognize the "They died" comment as part of a dominant narrative, **Mr. Eli returns to the Socio-Ecological Histories of Places Framework to explore nation-state time and global time and how they have impacted the area, as well as to explore the fact that Indigenous Peoples continue to inhabit the land in the region in which the school is situated. Also, Mr. Eli wonders when reflecting on the synthesis of family ideas, questions, and wonderings about places of importance to them, what students know and wonder about related to plant, animal, & soil time, and also the futures that they imagine for themselves and the places they care about.**

In this vignette, Mr. Eli first informs himself about the complex histories of place of the land around his school and realizes the close connection between human action and the local ecology (socio-ecological connections). He realizes that there are many ways to support students in thinking across timescales, from wondering about who and what used to inhabit the land, to observing changes outside, to using various resources in his classroom (e.g., videos, family members who have experiences and expertise that will support students in thinking about place across timescales), to thinking across timescales as an integral part of field-based science learning.

APPENDIX B

Examples of Student and Family Thinking Related to Histories of Places

The following two transcript segments (example 1 and example 2) are from two separate interviews with elementary school students. During both interviews, the interviewer showed students a photograph of a nurse log in a forest and asked various questions about the photograph (for example, what students observed in the photograph, what season they thought it was in the photograph and why, what they would be doing if they were in the place in the photograph and why). In the following examples, students responded to the question, "How do you think this place came to be like this?," which is a socioecological histories of place question.

Example 1: 2nd Grade Student

1	Interviewer:	And how do you think this place came to be like this.
2	Student:	**I think part of the glacier that Washington was made on melted and then it made a lake.**
3	Interviewer:	So you said there was a Washington glacier?
4	Student:	Yeah.
5	Interviewer:	And can you tell me more about that?
6	Student:	**The glacier that formed the United States made all of the oceans and stuff, and water, because there's**
7		**lots of hills and it just filled into the hills and made streams and lakes and stuff.**
8	Interviewer:	And how do you know that?
9	Student:	**Because I heard it from Bill Nye.**

Notice that in line 2, the student started to talk about glaciers, which speaks to a sense of **geologic time**. In lines 6 and 7, the student then expanded on their concept of glaciation and its impacts related to land formation and re-formation. The student also remarked that they learned about glaciers from watching the TV show, *Bill Nye the Science Guy*.

There are important implications from this exchange for instruction. First, it is important to know what ideas learners already know and are wondering about relative to the time scales in the Socio-Ecological Histories of Places framework. Once you know this information, you can use it during instruction to further learners' thinking, and position them as people with expertise and ideas to share. How do you plan to better understand what your learners know about the six time scales in the Socio-Ecological Histories of Place framework? What questions do you plan to ask and why? Second, it is important to better understand how learners know what they know. Notice the question that the interviewer asked, "And how do you know that?" This is an important question to consistently ask learners because it invites them to say more about the sources of their ideas and practices (for example, TV shows and movies, family members, books they are reading, and websites they have explored). You can then use these various sources as part of instruction, in part to show learners that you value their sources of information and are interested in learning more about them.

Example 2: 3rd Grade Student

1 Interviewer: Okay. So, how do you think that this place came to be like this?

2 Student: **Well, it's probably pretty old. It's probably pretty old, and there's a lot of animals that have had a lot of**

3 **impact on the environment, and people have come through here and put a pipe in there, and there's a**

4 **lot of [inaudible].**

This student begins by mentioning that the place in the photograph looks "old." What follow-up questions would you ask next? For example, you could ask, "How do you know that this place is old? Can you show me something in the photograph that tells you that this place is old? When you say that this place is 'pretty old,' what do you mean by that? How old do you think it is?"

In lines 2 and 3, notice that the student makes mention of **plant, animal, & soil time** ("...there's a lot of animals that have had a lot of impact on the environment..."), as well as **nation-state time** ("...and people have come through here and put a pipe in there..."). What would you ask next? For example, you could ask, "How have animals impacted the environment? Can you give me a few examples?" You could also ask about the relationship between the pipe and the environment. For example, you could ask, "What do you think the role of the pipe is in this photograph? Why do you think people put it there? Do you think it's helpful or harmful to this place and why?" In order to try to more fully understand learners' ideas, get into the habit of asking during instruction for more information and for sources of information.

APPENDIX C

Examples of Supporting Histories of Place

There are many opportunities for supporting learners in thinking across timescales. Here are some ways to start:

1. Using the six time scales as a guide, do some research on the histories of places related to your school or other learning environment (e.g., a museum, a community-based organization), its surrounding neighborhoods, and the region more broadly.
2. Walk around the neighborhood and lands directly surrounding your school or other learning environment and record some observations and wonderings you have about how the land came to be the way it is. What decisions do you think were made about the land that impacted its current features? What evidence can you locate of those decisions?
3. Contact community organizations and families who might be able to visit your place of learning (or otherwise communicate with learners, through video, for example) and/or share resources that help learners start to understand the various histories of the land surrounding their place of learning.
4. Keep the multiple timescales in mind as you support learners' field-based investigations and sense-making. The table below provides some specific strategies for supporting learners' sense-making and decision-making within and across timescales, in a variety of places, and across multiple ways of knowing and doing.

Time Scale	Collaborative Discussion	Outdoor Learning	Indoor Learning	Family & Community Knowledge & Practices	Formal Scientific Knowledge & Practices
Geologic Time	**Past - Present - Future questions and prompts:** "How did this place come to be?" "What do you think it will look like in 100 years?" "In 1000" years? Why/How?	During a walk, point out different features of the land or water and talk about the geologic history of the place.	Show pictures and use other media (e.g., video) of the land and water over time (e.g., slow versus rapid changes to place and why).	Ask families to share creation stories. What do these stories tell you and learners about big changes in the land and waters related to where families' places?	Secure books on the geology of the place. Talk to geologists or hydrologists about the history of the place and/or ask them to talk with learners about this history. Ask them to talk with you and/or learners about how they do their work (how they've learned what they know).
Plant, Animal, & SoilTime	**Perspective Taking:** Ask learners to think about why they might find certain plants, animals, or soil in particular places. **Causal Reasoning:** Ask learners to consider what would happen to a system if one or more animals/plants were removed, or if soils were replaced with other types of soils. How and why do they think that might happen?	Help learners track seasonal changes to plants or animals throughout the storyline. Help learners observe the form and function of particular species to consider how they evolved to thrive in this place. Ask learners to explore the soils in a place and wonder about why the specific type of soil is important for the place.	Support learners to read books or magazines about particular species or ecological systems Help learners make models about relationships between plants, animals, and soils over time.	During the seasonal field-based storyline, families may collect field data about seasonal changes to plants, animals, and soils, and it will be important for you and learners to consider these data in relation to the data you and learners are collecting (i.e., what might family data help you "see" and question in your classroom data)? Talk to local hunters, fisherman, herbalists, and gardeners, for example, in the community about plants, animals, and soils in the area. Share these people's knowledge, expertise, and ideas with learners (or ask these people to share with learners directly).	Support learners in using local plant,animal, and soil guides to learn more about specific species of plants and animals and specific types of soils. Talk to local ecologists, zoologists, or soil scientists about plants, animals, and soils in the place and/or ask them to talk with learners about this history. Ask them to talk with you and/or learners about how they do their work (how they've learned what they know, and what tools and practices they use to investigate their questions). Read scientific publications about particular plant and animal behaviors or relationships, as well as about specific soils.

Time Scale	Collaborative Discussion	Outdoor Learning	Indoor Learning	Family & Community Knowledge & Practices	Formal Scientific Knowledge & Practices
Indigenous Peoples' Time	**Perspective taking:** Imagine what a life completely connected with lands and waters might be like. How might we adapt to our changing landscapes and climate?	When exploring outdoors, help support learners to develop relationships with plants and animals. What are the plants' and animals' stories? How are they related to each other?	Explore STI (Since Time Immemorial) curriculum and look for relationships within and around your institution. https://www.k12.wa.us/student-success/resources-subject-area/time-immemorial-tribal-sovereignty-washington-state Look for stories and videos telling stories of how Indigenous peoples are currently interacting with places.	Support learners in thinking about what land their family/ ancestors are indigenous to. Reflect on this yourself with respect to your own family (in whatever ways you define family). Ask learners to share examples and/or stories of their own connections to place.	Engage learners with stories about Native leaders in science and technology. Help students to explore how scientists who are Native weave their own identities into their work.
Nation-State Time	**Perspective taking:** What are some choices and decisions people, such as leaders, might have had to make? How did these choices and decisions impact our current history in this area?	Support learners in exploring the local ecology in the area. Help learners look for signs of logging, heirloom fruit trees and flowers planted by settlers, etc. Create a large map of your area and help learners populate it with neighborhood observations from their families. What stories do learners see emerging?	Read stories with learners about the immigration history of this place. Investigate the history of how economic choices impacted the current health of the ecosystem in your place(s).	Talk to families about how they and/or their ancestors came to be in this place. If they are willing to do so, ask them to share the details about why they and/or their ancestors came to be in this place. Invite local community-based organizations to speak with learners about how they serve the community/ communities. What was the need they were responding to when they established their organization?	Explore the history of how current scientific policies were put into place. How do these choices impact the health of our ecosystem today? Support learners in learning about these policies and their impacts. Connect with local ecologists to learn more about the impacts of logging, forest succession, and the management of invasive species.

Time Scale	Collaborative Discussion	Outdoor Learning	Indoor Learning	Family & Community Knowledge & Practices	Formal Scientific Knowledge & Practices
Global Time	Why is it important to explore our local places but also think about how our local places are connected to, impacted by, and/ or impact other places across the earth? What data could we collect, and what other types of research might we do, to explore how our local places are connected to other places across the earth?	Ask learners to look for evidence of global impact on a local place (for example, there might be evidence of species that are native to another place but are found in the local place). Ask learners to think about the histories of what they find using other time scales (for example, how did the species learners locate get from one place to another?).	Set up communications with other learners in other parts of the country and the world to share observations, wonderings, models, "Should We" questions, and investigations of focal phenomena. Compare and contrast. Reflect why there are similarities and differences about what you share.	If families are willing, ask them to share their ideas about, and their experiences related to, how local phenomena are connected to phenomena in other places across the earth.	Locate resources that help learners situate what they are observing, wondering about, investigating, explaining, and/or deliberating about more globally (for example, find videos, talk to experts, find newspaper articles).
Living Ethical Responsibilities and Possibilities	What are some choices we are making right now? As a learning community? As an institution? How do/ will those choices impact our future? Should we_____? What data do we need to collect to inform our potential decision making about places where we live and learn? How do we collect these data? How should we present our learnings to our institution, family, and community? What will help them understand what we've learned and how we are thinking about our learning for our future?	Walk the land around your institution. Help learners look for clues as to what is happening right now, and then help them think about why those things might be happening. Help learners collect data to look for subtle changes in temperature, and growth and diversity of plants, for example. Ask learners how they might engage with their places (e.g., school grounds, neighborhood) into the future, and why and how? Support learners in thinking about how they can help future learners learn from and grow from what they are learning?	Ask learners what questions and wonderings they continue to have as they engage in the seasonal field-based storyline. Specifically, ask them to articulate wonderings their current explorations are surfacing for them related to the future and decisions they might have to make in the future. Explore current climate science research. Identify some of the pressing issues, and brainstorm some ways you and learners might help at local, regional, national, and global levels.	Support learners and families to think about their planning for the future. What are they most excited about in this place and why? Support learners in thinking about what they can do to help the community continue to grow healthy and happy while still being mindful/ respectful of home lands and waters.	What are the latest scientific investigations happening in our community today? How might we connect to those investigations if applicable? How might we collect data to support those investigations? What might those investigations mean for future decision making with respect to the place?

APPENDIX D

Self-Assessment for Educators

Use the following self-assessment to reflect on the educational practices you currently use related to the Socio-Ecological Histories of Places Framework, and to identify those practices that you want to begin to use. Return to this self-assessment periodically to continue to reflect on your educational practices as a way to deepen them.

Dimension of Practice	I do this well!	I do this but want to get better	I have not yet tried this	If I have done this, what worked particularly well? What challenges did I encounter?	What supports might be helpful to me as I continue to deepen my practice?
I research the histories of my workplace, my home, my neighborhood, etc.					
I make sure that I have researched my place(s) from the vantage point of: • **Geologic Time** • **Plant, Animal & Soil Time** • **Indigenous Peoples' Time** • **Nation-State Time** • **Global Time** • **Living Ethical Responsibilities and Possibilities Time**					
I make connections between and among various time scales (versus always thinking about each of them separately). For example, I make connections between Plant, Animal, & Soil Time and Nation-State Time to think about how decisions made by nation-states impact plants, animals, and soils. I make connections between Global Time and the local place I am exploring in order to understand how patterns I think I see locally might be visible globally and/or vice versa.					
I walk around outside my workplace, my home, and my neighborhood, **and document observations and wonderings that I have.**					

self-assessment continued next page...

Dimension of Practice	I do this well!	I do this but want to get better	I have not yet tried this	If I have done this, what worked particularly well? What challenges did I encounter?	What supports might be helpful to me as I continue to deepen my practice?
I think about **what decisions might have been made in these places**, by whom, and for what possible reasons.					
I try to **find evidence of those decisions.**					
I build relationships with families and others in my local communities who are willing to speak with learners about specific places and their histories (and/or otherwise support their learning).					
I collect books, maps, videos, and other media that learners can use in their own research about histories of places.					
I support learners I work with to research and use histories of place in their sense-making and field-based science practices.					
I support learners in imagining the futures of places that they care about--and what decisions they should make now that connect to those futures.					

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