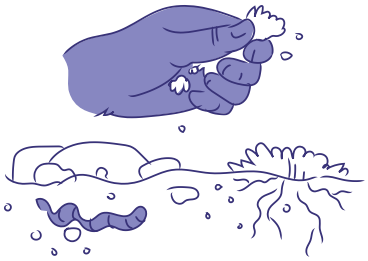
Garden Task

Soil Health

Healthy soil is critical if you want to grow healthy plants. Healthy soil is full of nutrients, microorganisms and organic matter. Gardeners build healthy soil by composting, mulching, amending soil, planting cover crops and more.



Connections to Science Content

What do we need to know in order to do the garden task?

Needs: Knowing about soil/compost needs can help us determine how to support soil/compost communities.

- *For example, healthy soils have pore space (pockets of air), minerals, water and organic material. By looking at the physical properties like texture, compaction and color I can select appropriate plants.*

Soil Food Web: Soil is teeming with life! Understanding the soil food web can help to determine if the existing soil food web in the garden is stable and how to promote life in soil.

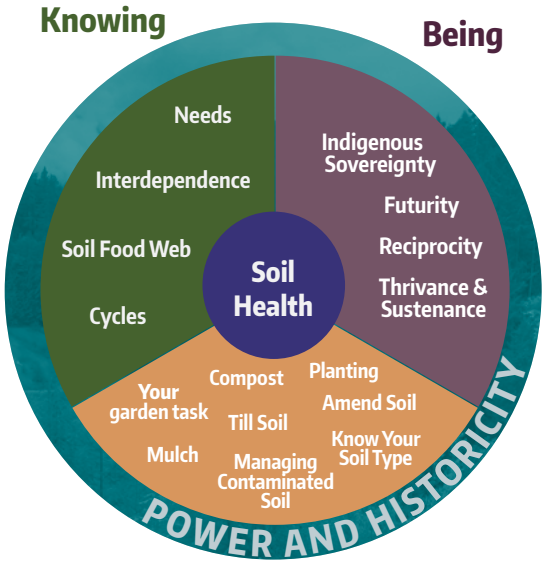
- *For example, understanding the role that soil microbes play in soil health, leads me to avoid tilling and spraying chemicals in the garden (which can reduce the number of soil microbes).*

Interdependence: Soil and plants are interdependent. The health of the soil directly impacts the health of the plants. A diversity of plants above ground means a diversity of organisms below ground.

- *For example, the presence of some "weeds" may indicate soil deficiencies. Moss in the garden may indicate compacted soils, low soil pH, or poorly drained soil.*

Cycles: Understanding cycles may help us make decisions about timing; when to add amendments, when to plant cover crops, when to cover beds with mulch to prevent erosion or nutrient leaching from rain, etc.

- *For example, Decomposers recycle nutrients from dead plant or animal matter back into the soil for plants to use. Understanding decomposition cycles can help when predicting how long materials may take to decompose, methods to speed up the process and when compost is ready to apply to a garden bed.*



Garden Methods

What are methods we use to do this garden task?

Compost:

- Types of compost bins:
  - *City compost*
  - *3-bin system*
  - *Worm bin*
  - *Food waste digester*
  - *Hot and cold compost*
  - *Leaf Mold*
  - *Maintaining compost through feeding, turning and monitoring moisture and temperature levels*
- Applying finished compost to the garden

Mulch:

- Wood chips and/or cardboard
- Compost and/or leaf mulch
- Burlap
- Black plastic
- Cover crops

Till Soil:

- Aerate soil
- No till methods

Amend Soil:

- Take a soil test to determine soil pH and available nutrients
- Determine soil texture (sand, silt, clay) through soil jar test or ribbon text
- Add soil amendments (lime, rock phosphate, gypsum)
- Side dress plant with compost tea or foliar feed
- Other fertilizers (vegan vs animal-based; dry vs. wet)

Planting:

- Cover Crops: summer and turn under in winter (e.g. buckwheat, calendula);Winter and turn under in spring (e.g. vetch, rye grass)
- Nitrogen fixers like beans, clover, etc
- Dynamic accumulators: plants that draw up nutrients from soil and make them more available to other plants, like dandelions.
- Diversity of crops and rotating crops: to promote soil nutrition, deter pests and diseases, and/or support soil ecosystems

Managing Contaminated Soil

- Replace topsoil
- Plant in raised beds or containers
- Add organic materials
- Avoid root crops or leafy vegetables
- Remediate the soil with plants or fungi that remove toxins

Know Your Soil Type:

- Clay
- Loam
- Silt
- Sand
- etc.

GRANT #1720578 LEARNING IN PLACES COLLABORATIVE, BOTHELL, SEATTLE, WA AND EVANSTON, IL

Importance/Intent

Why does it matter to me/my family/our broader community to do this garden task? How does this garden task affect people outside of my community?

Our garden decisions are driven by the values of our communities and families:

Indigenous Sovereignty:
How is the way you are gardening supporting Indigenous livelihoods and rights? Whose land are we on? What is our ethical responsibility to Indigenous peoples and relationships to this land?

- *Many pesticides degrade soil and harm the communities of organisms living in soil. Soil communities have been significantly altered due to these practices over time. How can we support soil communities? How does supporting soil communities connect to Indigenous Food Sovereignty in the place you live?*

Futurity:
It is important to consider the lasting impacts of the garden method (5 years, 20 years, 100 years). Are you gardening in a way that ensures soil communities will thrive into the future?

- *For example, A typical Coast Salish harvesting technique for camas is to do a quick burn after harvesting the bulbs. This results in ash falling into the soil and providing fertilizer to the camas. This method of harvesting promotes future growth of the plants.*

Reciprocity:
Soil is alive and benefits from active care. If you want healthy food you need healthy soil. Healthy soil makes for happier roots and nicer homes for our garden friends, who may then return with gifts in kind.

Thrivance & Sustenance
Gardeners make many decisions to balance soil inputs and outputs as they work towards long term productivity of soil in order to create a healthy and productive environment for plants and people. Gardeners may make decisions to find dual purpose crops that both benefit the soil and contribute to sustenance.

- *For example, cover crops can amend and protect the soil while providing food (e.g. fava beans, oats) and aesthetics (e.g. calendula, marigold)*

CONNECTING TO OTHER GARDEN PRACTICES

- **Garden Planning**: planning for crops that match the soil type, planning for crop rotation, planning for crops that amend the soil (cover crops, nitrogen fixers, etc)
- **Watering**:A soil's texture influences its ability to drain water. Rain that falls on exposed soil may run off and erode the soil and nutrients. Planting rain gardens can help absorb and filter storm runoff.

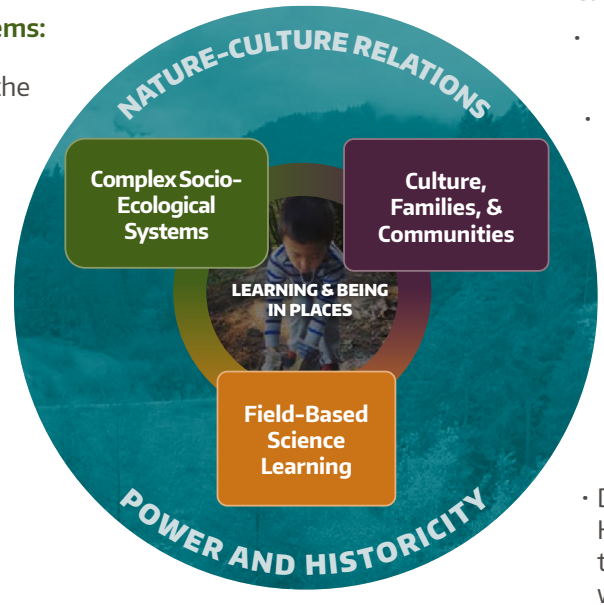
Engaging the Learning in Places Rhizome with Practice

Power and Historicity; Nature-Culture Relations:

- What are people's relationships with soil communities? How has that relationship changed over time?
- What is the history of soil over time? How has settler colonialism stripped topsoil and changed soil dynamics in your place?
- Where are there contaminated soils in your community? Where are areas that have contaminated groundwater (often from pesticides or chemical fertilizers)? Who is most affected by the contamination?

Complex Socio-Ecological Systems:

- Histories of Places: what are the histories of soil in this place? How have people cared for soil communities? Or not?
- What are the socio-ecological relationships around composting? How do gardeners enter into intimate relationships with profound natural cycles of life, death, and rebirth by composting?



Culture, Families, and Communities:

- How does this soil grow community? Who works this soil?
- How have communities used this land over time?
- How does healthy soil support healthy communities?

Field-Based Science Learning:

- Data & Modeling: How can we observe and monitor soil to help us determine if the soil communities are healthy and balanced?
- Decision Making & Making Change: How do we decide what actions to take to improve soil health? How do we make equitable and just decisions for now and in the future?

Storyline Examples for Soil Health

LE 2: Common "Should We" questions

» Should we amend the soil?
» Should we till (disturb) the soil?
» Should we incorporate or remove mulch/cover crop/ leaves/burlap from previous season?
» What composting system should we use?

LE 4: Garden Methods

» Identifying needs of soil: soil test (send a soil sample to a lab), pH measurements
» Soil texture tests
» Soil Jar Test
» Water percolation test to determine drainage
» Composting methods (3 bin, worm bin) and how to build a bin.
» Early vs finished compost (time lapse of decomposition)
» Feeding, turning, monitoring compost (contents, temperature, moisture etc)

LE 6: Data Collection Connections

» Soil "squeeze" test to determine soil composition and/or level of moisture
» Seasonally: observing the top layer of soil for signs of-- mulch? Humus? Compost? Bare soil?
» Moisture level of the compost.
» "Sniff test" of compost
» How does compost respond to daily changes in temperature/precipitation?

LE 6: Sample Investigation questions

» What types of soil are in my garden? How does soil type relate to moisture? (Soil Moisture Protocol)
» What is the soil like in our garden? What kinds of relationships can we observe in soil? (Soil Observation Protocol)
» How many worms are in this garden bed (with leaves) versus that garden bed (without leaves)? (Biodiversity Species Type Protocol)
» Compare compost in two locations = biodiversity species type and abundance or soil observation