

“Solutions-Oriented Learning” Storyline

5-Regenerative Agriculture (Western Washington)

Storyline introduction and overview:

Soil quality is an important aspect of growing food. In this storyline, students will discover what soil is made of and how carbon is an important part of soil quality as well as how carbon moves between plants, soil, and air. Students will learn how Indigenous people used practices such as composting. Finally, students will explore what regenerative agriculture practices are and how they can be a solution to how the climate is changing over time.

NGSS Learning Progression for this Storyline: The 5th grade storyline is part of a larger learning progression that includes students mastering standards pre-K to 12th grade. Look at how the 5th grade performance expectations fit in a continuum of learning for your students.

<p>Placemaking:</p> <p>Western Washington is home to many farms that grow a diverse number of crops. This farming, known as agriculture, can change and impact the land, soil, water, air, plants, and animals around it.</p>	<p>Anchoring phenomenon:</p> <p>Soil is made up of many different organisms and materials.</p>	<p>Drawdown:</p> <p>Regenerative Agriculture Nutrient Management Conservation Agriculture Composting</p>
<p>Indigenous and other relevant cultural connections:</p> <p>Show the Honorable Harvest by Robin Kimmerer and read The Legend of Wountie.</p>	<p>NGSS PEs (progress towards):</p> <p>5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.</p> <p>5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.</p>	

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Estimated time required to implement this storyline: 3 weeks (approximately 12 hours)

NGSS PEs:

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.

Science & Engineering Practice (SEP)	Disciplinary Core Idea (DCI)	Cross Cutting Concept (CCC)
<p>Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.</p>	<p>For 5-ESS3-1. ESS3.C: Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.</p>	<p>Systems and System Models A system can be described in terms of its components and their interactions.</p>

Learning Sessions

Materials List:	
Learning session	Materials
1.	The Honorable Harvest - Robin Kimmerer The Legend of Wountie
2.	<ul style="list-style-type: none"> Jars of sand, clay, silt and compost What’s the Dirt on... Dirt?
3.	Copy of pre-assessment for each student
4.	<ul style="list-style-type: none"> My American Farm Games
5.	Greenhouse in Jar <ul style="list-style-type: none"> Two thermometers A notebook Pencil or pen

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	<ul style="list-style-type: none"> • A clear container, such as a jar • Watch or clock • A sunny area, either outside or inside
6.	Think Regeneratively
7.	<ul style="list-style-type: none"> • What Contains Carbon? • Carbon Cycle Role Play <ul style="list-style-type: none"> ○ 14-28 of a small, lightweight object to represent carbon (e.g. ping pong balls.) ○ Carbon Cycle Role-Play Cards (7 total, one per group) ○ Chalk, if needed for drawing regions • Soil Solutions to Climate Problems • Keys to Stewardship
8.	<ul style="list-style-type: none"> • Secrets to Healthy Soil <ul style="list-style-type: none"> ○ Ziploc bags for collecting soil samples ○ Soil sample from top layer of a soil high in organic matter, 1 per group ○ Funnel and capture containers, 1 per group ○ 1½" square piece of coarse screen, 1 per group ○ Wet paper towels, 1 per group ○ Light source with a shade (direct light) ○ Hand lenses ○ Soil nutrient testing kit (optional) ○ <i>Creatures in the Soil</i> handout • The Rotten Truth
9.	Dependent on teacher choice- see options in the learning session
10.	Copy of post assessment for each student

1.	Grounding Native Ways of Knowing: The Honorable Harvest	Estimated time: 30 minutes
	<ul style="list-style-type: none"> • Students write the guiding question “What are the ideas of the honorable harvest?” in their science notebooks. • Pre-teach vocabulary from the video: <ul style="list-style-type: none"> ○ <u>Reciprocity</u>: giving one positive action for another positive action ○ <u>Protocol</u>: the way something is normally done • Elicit student ideas for the meaning of the phrase “honorable harvest.” Based on the title 	

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	<p>and the vocabulary, what do students think the talk might be about?</p> <ul style="list-style-type: none"> • Explain that anytime we are talking about the environment and our place in it, it’s important to talk about Indigenous ways of knowing. This is because Indigenous peoples were here long before settlers, and they were and are taking care of the environment. Tell students they are going to listen to “The Honorable Harvest”, a talk about one way some Indigenous peoples think of their relationship with the environment. • Show The Honorable Harvest, a three-minute talk by Dr. Robin Wall Kimmerer. It may be helpful to play this video twice: once just for listening, and a second time for taking notes. • Elicit student responses to the guiding question, “What are the ideas of the honorable harvest?” Facilitate a discussion on the protocols of the honorable harvest and why these are important: <ul style="list-style-type: none"> ○ Never take the first of something so you’ll never take the last ○ Before you take something: <ul style="list-style-type: none"> ▪ Introduce yourself. ▪ Ask permission. ▪ Explain why you want to take it. ▪ Listen for an answer – look around at whether it has enough to share ○ If you take it, do so in a way that causes the least harm and even benefits the being. Use everything you take. ○ Share with others. ○ Leave a gift behind • Read The Legend of Wountie to the students. Facilitate a discussion about similarities and connections between the Squamish legend and The Honorable Harvest. <p><u>Additional resources on working with Indigenous students and tribes:</u> To access information on how to reach out and build relationships with local tribes, visit the OSPI Office of Native Education: Partnering with Tribes, and contact your district’s tribal liaison/Title VI coordinator.</p> <p>To learn more about respecting and building upon Indigenous Peoples’ Rights visit the Learning in Places website, a project led by Dr. Megan Bang then read Practice Brief #10: Teaching STEM In Ways that Respect and Build Upon Indigenous Peoples’ Rights and Practice Brief #11: Implementing Meaningful STEM Education with Indigenous Students & Families published on the University of Washington’s STEM Teaching Tools website.</p>
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2.	Examining phenomenon: What is soil?	Estimated time: 50 minutes
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	<ul style="list-style-type: none"> • Students take the The Importance of Soil Survey to get a sense of why they think soil is important. • Divide students into pairs or small groups and give each group a cup full of soil and paper or something to dump the soil on. Students examine and explore the soil. If possible, provide loops or small magnifying glasses. While they are examining the soil, students list everything they think is in the soil. • Once groups have a list, students share with the whole group. Teacher creates a class list and students add/remove items from their group lists as they want. • Show What's the Dirt on ... Dirt?. While watching, students list what makes up most soil (minerals, water, air, organic matter). Facilitate a discussion about what, if anything, was missing from the class list. Help students classify any “extra” list items as well (for example, if students had “bugs” on their list, that would be classified as “organic matter”).
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3.	Pre-Assessment	Estimated time: 30 minutes
5-Regenerative Ag Pre-Assessment 5-Regenerative Ag Assessment Rubric		

4.	Guiding questions: What is agriculture? What role does it play in our daily lives?	Estimated time: 50 minutes
<ul style="list-style-type: none"> • Ask students if they’ve heard the term “agriculture.” Elicit ideas for what it means. Do not correct any misconceptions at this point. • Tell students they are going to watch a video that shows agriculture in Washington. Show Washington State Agriculture. • Students play Spin-N-Solve on My American Farm. • Students participate in a discussion answering the question “What role does agriculture play in my life?” Encourage students to be specific and record their responses in their science notebooks. 		

5.	Guiding question: What is climate change and how does it affect the environment?	Estimated time: Two 50-minute sessions
<ul style="list-style-type: none"> • Students watch the video What's the Difference Between Weather and Climate? NASA Climate Kids and explore the difference between weather and climate through whole group discussion. • Students will explore how the climate has changed over time by reading the Big Questions posed in NASA's Climate Kids website. There is also a game that students can play to try to capture CO2 from the atmosphere. • Students make observations about climate in the Observe the Greenhouse Effect in a 		

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	<p><u>Jar Activity.</u></p> <ul style="list-style-type: none"> ○ Complete the activity in one sunny location and one shady location. ● Have students answer the question, how does climate change affect agriculture and the foods we eat? They can answer and discuss as a group, if time allows, or write their responses in their science notebooks.
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6.	Guiding Questions: What is regenerative agriculture? How does regenerative agriculture improve soil quality?	Estimated time: Two 50-minute periods
	<ul style="list-style-type: none"> ● Explain that regenerative agriculture is not new. Indigenous people have been practicing these principles for thousands of years to sustain the health of the environment while providing food for their communities. Watch What is Regenerative Agriculture? to introduce regenerative agriculture and its principles. ● Students study the graphics shown in Think Regeneratively and discuss the difference between the 3 models from the graphic in terms of soil. (Degeneration makes soil quality get worse, sustaining keeps the soil the same, regeneration improves the soil) ● Students will watch short videos to show different practices used for regenerative farming. https://youtu.be/Eul6x1lomns (hedgerows) https://youtu.be/3j5MRJeCoYs (cover crops) https://youtu.be/CvCXQgLhCm4 (crop rotation) https://youtu.be/V5uK-1dclRY (no till) https://youtu.be/EfmDmta57-c (composting) Each student will choose one practice to create a poster to show how this practice improves soil quality and the benefits to the community. Students can then present this work to the class. ● Post the following claim: ‘Regenerative agriculture is a solution to drawing down carbon through improving soil quality’” Students use the information in the resources above to evaluate this claim. Respond to this in your science notebook/journal. 	

7.	Guiding Question: How is carbon stored and released from soil?	Estimated time: Four 50-minute sessions
	<ol style="list-style-type: none"> 1. Students investigate what common items contain carbon. What Contains Carbon? 2. Students participate in the Carbon Cycle Role Play to understand how carbon cycles through biosphere and atmosphere. 3. Watch Soil Solutions to Climate Problems 4. Play games Keys to Stewardship and Thrive on My American Farm 5. For a wrap up: Watch regenerative agriculture video about carbon sequester. https://youtu.be/HuRpEA1sFow 	

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8.	Guiding Question: What role does composting have in improving soil quality?	Estimated time: Two 50-minute sessions
<ol style="list-style-type: none"> 1. Students will explore how the diversity of life in soil contributes to soil fertility using Matrix Lesson (agclassroom.org) 2. Students will observe and explain the decomposition process using Matrix Lesson (agclassroom.org) and learn the methods and ingredients for making compost. 3. The Indigenous Peoples were also active composters and used three methods of composting. <ol style="list-style-type: none"> a. Sheet Composting where compostable materials were layered with soil. Composting while planting. Uneaten fish parts or other animal parts were planted with seeds as a nutrient source. b. Seed balls. Seeds were balled in clay and compostable materials. The seed balls were then thrown to plant the seeds. The seeds were protected by the clay balls which kept them moist, while the compost provided nutrients as the germinated and grew <p>Each student practices one of the three traditional methods used by Indigenous Peoples.</p> 4. Students use their compost model to describe how carbon moves between the plants, soil, and air. 5. The Importance of Soil Survey 		

9.	Possible Extensions and Career Connections:	
<p><u>Career Connections:</u></p> <ul style="list-style-type: none"> • Students pick a local crop and list all the people (jobs) that are involved to get that crop to a family. Bring in (or show) a drone and have students guess how a drone is used in agriculture. • Ag Classroom Careers page: Career Seeker (agclassroom.org) • My Little Ag Me game: My Little Ag Me Social Science Learning Game • Your Life - Your Agriculture - Bing video 		

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	<p><u>Possible Extensions:</u></p> <ul style="list-style-type: none"> ● Buy the following books from Epic - a source of online books as classroom copies to support the storyline: <ul style="list-style-type: none"> “Green Gardening and Composting” pages 12-19 “From Garbage to Compost” “Soil” ● Discuss riparian buffers to protect streams on farmlands or invite your local conservation district representative to discuss this with students. ● Show students an infographic on water uses by agriculture. ● Practice a sit-spot after using “The Honorable Harvest”, honoring the plants/soil/etc. around you. ● Soil Conservation District, Water Conservation District “Wheat Week” (great connections) ● More connections: Farmers! (Career connection, help with content), bring into classroom / ask to visit field to see and touch the soil ● Pen-pal classroom across the state, data collection connected to this storyline (even do a soil shipment trade!) ● Have access to other demonstrations / labs from the upper grades. ● Compost in a bottle 35-minute-compost-in-a-bottle-lesson.pdf ● Farm, Soil Health, Agriculture games My American Farm Agricultural Games and Educational Resources <p><u>Resources:</u></p> <ul style="list-style-type: none"> ● Erosion and Weathering Article ● How to Prevent Erosion Activity ● Buffer Strips: Common Sense Conservation
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10	Post Assessment:	Estimated time: 30 minutes
	5-Regenerative Ag Post-Assessment 5-Regenerative Ag Assessment Rubric	

[OER Tracker - 5th Grade Regenerative Agriculture](#)

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