



Curriculum Units by Fellows of the National Initiative  
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## **We Are a Family on this Earth through Earth's Resources**

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### **Introduction:**

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This curriculum unit plan is for my sixth grade, Navajo Students at Kayenta Boarding School.

My curriculum unit title is “We are a family on this Earth through Earth’s resources. The students will begin asking wh- questions such as what, where, when, why, and how, which are at a basic level of questioning. With guidance, students will advance to critical-thinking questions, such as analysis, evaluation, and creativity.

In the Next Generation Science Standards, I will be using LS2 Interactions, energy, and dynamic relationships in ecosystems. LS2 disciplinary core idea is divided into three sub-ideas: Interdependent relationships in ecosystems; the cycle of matter and energy transfer in ecosystems; and ecosystem dynamics, functioning, and resilience. These standards will help students better understand ecosystems, the flow of energy in nature, and Earth’s resources.

I need to get students ready to take the Bureau of Indian Education End of Year Summative Assessment using Bureau of Indian Education’s Science Summative assessment for 8<sup>th</sup> grade. This will give sixth grade students enough time to learn about Earth Biomes and their Ecosystems.

### **Rationale:**

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#### **Why am I teaching this unit? Think of a personal hook:**

Have you ever gone on a nature walk with your family or friends where you live or surrounding area and found seashells, sand dollars, anything else pertaining to ocean life? Did you ever wonder how it got there? Or why is it there because the ocean is thousands of miles away?

That is exactly what happened when my son Tyrone went on a nature walk with his grandma Phyllis and his cousins. Back in 2012, we had just moved from Kayenta, Arizona to Tonalea, Arizona. Nothing particular about

the move, because we just moved from one Reservation Community to the next. When Tyrone came home, he was so happy and very excited. He said, “Momma look what I found?” Before I could say anything, he said, “The ocean was so far away! How did these babies show up here on the mesa?” That mesa over there pointing to the Mesa in front of our house.

In his hand were a bunch of seashells and an almost perfect sand dollar. The look on his face was amazing. When he saw the look on my face, he was puzzled. He asked, “why I had a weird look on my face?” As if he thought and he said it too, “all mommas know everything about the world.”

The question is how did those seashells and sand dollar show up in the middle of the desert? It’s plain and simple that it’s in the wrong biome and ecosystem. Is it possible for that to happen? It is possible for that to happen through ecological succession. The land was once an ocean thousands of years or maybe millions of years ago. Think about how many ecosystems and successions that piece of land went through before it became the present ecosystem.

We live in a desert biome/ecosystem in northern Arizona. My students and I live in the desert biome. We live in the higher country of the desert biome near Monument Valley, Utah. We see beautiful sandstone rock formations, and yes, we get very little rain here in Northern Arizona and southeastern Utah. We have a mixture of desert-like landscapes, but we also have some forest areas here. We have a mixture of domesticated animals and some wild animals that live in and around where we live. Animals like coyotes, lizards, horses, sheep, cattle, prairie dogs, chipmunks, squirrels, and bobcats.

## Background Knowledge & Context:

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### Why did I choose this topic?

**Prerequisite:** Students will need to know that there are many ecosystems on Earth, and that one change affects every other ecosystem. There are living and non-living things on this earth that interact with each other. These massive ecological areas span the globe, housing specialized organisms adapted to specific weather patterns, soil types, and environmental conditions.

Climate is the average weather of a place over many years... If you live in a place with a wet climate, you may be unhappy to see rainy weather, because your climate means that you get rain frequently. On the other hand, if you live in a dry climate where water is scarce, you might be very happy to see rainy weather. Earth’s climate causes humans to respond to various elements in a variety of way.<sup>4</sup>

They cover a large geographic area with biotic living things and abiotic factors such as climate, soil, air, altitude, precipitation, temperature, and latitude.

Rain is a form of precipitation, which is water that falls to the ground as rain, snow, sleet or hail. Temperature is a measure of how hot or cold the air is. Precipitation and temperature are the

main ways to describe both weather and long-term climate.<sup>5</sup>

I chose this topic because it is included in the Next Generation Science Standards, which helps students know and prepare for the next grade level. Teaching the Biomes and the ecosystems requires research of the content. Biomes are large areas of the world characterized by their landscapes, animals, vegetation, and climates.

Regions on Earth that are made up of similar communities of plants and animals are called Biomes. An ecosystem is a group of plants and animals that depend on one another and their environment for survival. Biomes may contain a variety of ecosystems. However, biomes are sometimes called ecosystems. There are three types of ecosystems: forest, grasslands, and cold climate types.<sup>8</sup>

There are five major terrestrial biomes: forests, ranging from hot, humid tropical rainforests near the equator to cold boreal forests (taiga) in the north. They cover about 30% of the Earth's surface. Desert- the driest biomes, characterized by less than 50 cm (20 inches) of rain per year. They can be either hot or cold, requiring plants and animals to have high water-retention adaptations. Grasslands: open, flat terrain dominated by grass rather than large trees. Examples include the savannas of Africa and the prairies of North America.

The tropics or low latitudes are the areas between the Tropic of Cancer and the Tropics of Capricorn. In the tropics, the sun is overhead and nearly overhead all year long. In this region it is usually hot.

The temperate zone or middle latitudes are between the high and low latitudes. They have hot summers, a cold winter, and a moderate spring and fall.<sup>7</sup>

Tundra- the coldest biome, found near the poles or at very high altitudes. It features a short growing season, permafrost, and low-growing vegetation like mosses and lichens, and chaparral- regions with hot, dry summers and rainy winters, typically dominated by resilient shrubs and brushes.

Latitude Differences The polar zone, or high latitudes, are the areas north of the Arctic Circle and south of the Antarctic Circle. In the polar zones, the sun is near or below the horizon all year. Temperatures stay cool to bitterly cold.<sup>6</sup>

There are two aquatic biomes: marine- the largest on the planet. They include the vast saltwater oceans, coral reefs, and estuaries, and freshwater biomes- enclosed bodies of water with less than 1% salt concentration. Biomes cover large areas of land with their own climates and vegetation, spanning the globe. Examples include forest and grassland biomes. As I stated earlier, it has its own climate, temperature, terrain, plants, and animals. An ecosystem is a much smaller area within the biome. A biome can contain many different ecosystems. An ecosystem is much smaller and is defined by the plants, animals, and microbes that interact with one another; they also interact with the non-living abiotic components like soil, rocks, air, water, and

other physical elements. An ecosystem involves the populations of different species living within a community. These species interact with one another to survive. There are two aquatic biomes: marine- the largest on the planet. These include lakes, ponds, rivers, and wetlands.

An ecosystem a healthy one can thrive for a long time. A strong healthy ecosystem is one that has a lot of producers at the bottom of the food chain pyramid. It is the producers that make an ecosystem thrive. Producers are the different plant communities that make an ecosystem work and thrive. The plants (producers) get their energy from the sunlight to create photosynthesis to make their own food and sugar to make food for primary consumers. Primary consumers are herbivores; they eat the plants. Then secondary consumers eat herbivorous animals to get energy from them. Then the Tertiary consumers come in and feed off the primary and secondary consumers. Then comes death and decomposition of the animals; fungi, worms, and bacteria help break it down, and the cycle returns to the earth. Death could come at any stage in the life cycle, but it does have to follow the process in death, decomposition so it can break it down and replenish the soil and life starts all over again

This is where the flow of energy in the food web comes into play, as it starts with the producers. Producers are the plant community that makes their own food. Ecosystems are the life-support systems of our planet. They regulate the climate, filter water, provide oxygen, and support biodiversity. Because all elements within an ecosystem are tightly interconnected, changes to even one species or physical factor can cause cascading effects throughout the entire system.

Ecosystems are the life-support systems of our planet. They regulate the climate, filter water, provide oxygen, and support biodiversity. Because all elements within an ecosystem are tightly interconnected, changes to even one species or physical factor can cause cascading effects throughout the entire system. In other words, it's the producers that make it possible for a variety of different species to thrive in an ecosystem.

### **Ecological Succession**

I want my students to understand what ecological succession is, because every year in a certain area in our surrounding areas there are at least one or two forest fires. What will happen when a certain area is destroyed by a fire, flood, tornado and or human activity like deforestation? Ecosystem (or ecological) succession is the progressive, predictable process by which a biological community changes and develops over time. It typically unfolds in stages following the creation of a new habitat or a major disturbance, with each stage creating conditions that allow the next group of species to thrive.

There are several reasons an ecosystem or ecological succession can happen. There are two types of ecological successions one is primary succession and the other is secondary succession. I will describe secondary succession. In secondary succession, that means there was already a thriving ecosystem there before it broke down and was destroyed. The secondary succession is easier to recover from because the destruction is not as profound as starting from scratch like primary succession.

### **Secondary Succession**

In secondary succession, the process to reach full climax community takes a shorter time, about half the time of primary succession. An ecosystem that is in secondary succession may take as little as fifty years to one hundred years to achieve full climax community in an ecosystem. The reason being is that these places already have the soil and the plants to regrow itself. It takes less time to achieve what it needs to than an environment that is starting from scratch. All the same processes in primary succession are the same for

secondary succession. The weather breaks down the rock with rain and wind erodes the rock away. It won't go back to its previous state but will become a different kind of ecosystem with a high level of biodiversity or diversity of species ecosystems. This process doesn't happen overnight; it takes time for an ecosystem to return to a stable ecosystem, and that's called an ecological succession.

Current theories about vegetation succession and food webs assembly are poorly compatible as food webs are generally viewed to be static, and succession is usually analyzed without the inclusion of higher trophic levels. In this study, we present results from detailed analysis of ecosystem assembly rule over a chrono-sequence of 100 years of salt marsh succession. First, using 13 yearlong observations on vegetation and soil parameters in different successional stages, we show that the space for time substitution is valid for this chrono-sequence.<sup>3</sup>

The wind and birds can bring over spores and seedlings and bacteria so moss, lichens, and fungi can grow. Moss, lichen, and fungi are pioneer producers, meaning they are the first producers that regrow and make the environment inhabitable. When these plants reach the end-of-life phase, they die and decompose and make more soil to grow more moss, lichen, and bacteria. They do this repeatedly so that the soil increases, and the environment makes it better for different kinds of small plants to grow. Then comes the small consumers that come with small predators.

The intermediate phase comes with grass, shrubs, plants, and small trees and animals that are slightly bigger than the animals that were in the pioneer producer and consumer stage. The last and final stage is the climax community. That is when an ecosystem is fully thriving again and can support all the consumers' needs and the environment has biodiversity in it. This process takes about one hundred to one hundred fifty years, maybe even two hundred years, to reach a climax community.

Successions can happen from a natural disaster like a tornado, hurricane, wildfire, floods, and human activity like deforestation. An ecosystem is made up of biotic and abiotic factors and in an ecosystem that has been destroyed by natural disasters or human activity. A community must start back all over again starting with lichen and moss with tiny insect and small animals in the herbivores. After lichens and moss grow, small plants and animals start to populate the area.

Early Succession is the only period when tree canopies (including herbs and shrubs), complex food webs, large nutrient fluxes, and high structural and spatial complexity. Different disturbances contract markedly in terms of biological legacies, and this will influence the resultant physical and biological conditions, thus affecting successional pathways.<sup>1</sup>

### **Primary Succession**

In primary succession, an ecosystem is starting fresh with no plants present. Primary succession happens when a volcano erupts and lava spills out over the ground and covers the ground with lava. When that lava dries and cools down, it becomes a bare rock. Or when a glacier melts and land that was once frozen is now able to grow moss and lichens at first, that small plants colonize the lava fields, just like when glaciers melt. It doesn't happen quickly, especially for places that have rocky ground. The weather breaks down the rock with rain and wind erodes the rock away.

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In primary succession, this is where a new piece of land is made from a volcano eruption or a glacier melts, and land is finally exposed. It wasn't there before it was formed like when a volcano erupted lava spilled over it and when it cooled down and hardened it became nothing but rock. They want to see large progress in the replenishment of trees.

The ecological importance of early successional forest ecosystems (ESFEs) have received little attention, except as transitional phase, before resumption of tree dominance. In forestry, this period is often called the "cohort re-establishment" or "stand initiation" stage, with attention obviously focused on tree regeneration and re-establishment of closed forest canopies.<sup>2</sup>

These pioneer producers die and decompose, and more lichen and moss grow the cycle happens repeatedly, again until the soil gets thicker. And other small plants began to grow, and other consumers came along with their predators to come. Little by little as the years and decades pass, the producers grow bigger and more different plants and trees grow. The diversity of the ecosystem grows and becomes solid. This process of ecological succession happens over a course of hundred to one hundred fifty years for it to become a climax community. We should keep in mind that it does not go back to the previous ecosystem, but somewhat the same because it doesn't have the same exact vegetation and consumers. Most of the same consumers returned, but not all. Primary succession takes a lot longer than time to get an ecosystem back to full climax community; it would take twice as long to get in back to full capacity which is 150 to 200 year to get it back to full working order where the ecosystem has biodiversity.

## Teaching Strategies:

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### Using the 5E Instructional Model:

TI looked it up on the internet and found some teaching strategies I can use as teaching strategies. I like my sixth-grade students to grasp ecological succession; I can combine student-centered, hands-on, and real-world approaches that make the concept tangible and memorable. I especially like to use the 5E instructional model. The 5E instructional model is to engage, explore, explain, elaborate, and evaluate effective ways to teach succession lessons.

### **Engage In Prior Knowledge and Sparking Student Learning:**

This is where I am just going to see what students know. What is their prior knowledge about the topic of ecosystem succession? This is where I spark their interest in ecosystem succession. This is where I will give them the passage about my son Tyrone's experience with nature walk, he took with my aunt and his cousins. Engage by starting with a real-world example such as the 1980 eruption of Mt. St. Helens and show before and after images or possibly a video to spark my students' interest at the start of the unit.

### **Students Explore:**

Students will explore this section. They will work with materials, run and observe simple investigations, collect observations, and test predictions. Students will make predictions and hypothesize about succession.

Students will practice core science skills by observing closely, forming hypotheses, communication their finding among their peers. The concrete experience they build here becomes the raw material for the next phase. I will refrain from giving the answer as a teacher. As the lessons progress, I would like to set up a lab station where students can explore by placing cards in the correct order of succession stages, watching a video on forestry recovery, or research primary vs. secondary succession.

### **Teacher Explains and Gives Examples and student will:**

I will show examples of what I need students to know about geosystem or ecological succession. I will provide formal vocabulary terms, definitions, and scientific models. Students need to share their own explanation first. I will explain the proper science terms and connect it to what they have just observed, and this is where I will clear up any miss conceptions. Students will be required to take notes and draw diagrams of their observations. Students will need to explain their understanding using an interactive PowerPoint presentation or digital notebook template to clarify terms like pioneer species, climax community, and the role of abiotic factors.

### **Student will Elaborate:**

Students will get the opportunity to elaborate by being challenged to transfer what they learned to new situations. I will give them a different ecosystem with different problems that require the same concept, connect the idea to another ecosystem. This will deepen their understanding and prevent them from losing the knowledge they have learned which keeps the content knowledge they have learned locked into their learning. I will assign a stem challenge to elaborate asking students to create a succession flipbook predicting future changes in a forest or garden over 100 years.

### **Evaluate:**

I will evaluate students throughout the unit, it isn't just a test at the end. I will assess students throughout the entire cycle as they observe students working, listen to their reasoning, and look for shifts in their thinking. Formal evaluation at this stage confirms whether students can apply concepts independently. I would like to include assessments like CER (Claim, Evidence, Reasoning) questions, or a project presentation.

### **Hands On Activities:**

Ecosystem in a bag to build a small-scale ecosystem with soil, water, and small organism; observe changes over days to model succession finding information. Another hands-on activity I will incorporate is biotic vs. Abiotic students will sort cards into biotic/abiotic categories to reinforce vocabulary before discussing

succession. Last, I want to set up an inquiry lab to have students investigate succession using readings, videos, and reflection questions to differentiate between primary and secondary succession.

### **Real World Connections:**

I will find and use local examples of a recovering desert or forest after a wildfire or a garden recovering from weeds. We will look for link to current events or environmental news to show relevance. I would also take students on a field trip to a park or nature reserve to observe succession in action.

### **Collaborative Learning:**

I will create group work on succession projects encouraging communication and peer teaching and think pair share discussions would help clarify misconceptions early in the lessons. We will use interactive websites or stimulation to visualize succession and incorporate videos and digital tools to make abstract concepts more concrete. I plan to always connect the lesson back to the big idea that ecosystems change over time, and each stage prepares the way for the next. This will help students see why behind the process, not just memorize the steps.

The students will begin asking wh- questions such as what, where, when, why, and how, which are at a basic level of questioning. With guidance, students will advance to critical-thinking questions, such as analysis, evaluation, and creativity. In this unit I want students to take notes of the class discussion and learn the key vocabulary terms such as biotic, abiotic, succession, climax community, Ecological succession, Primary succession, pioneer species and many more

I also want to have students get into groups of three or four and have them research different ecosystem successions and create a board of what they have learned.

Students need to learn vocabulary terms are embedded within the curriculum unit; biotic and abiotic are examples. My students need to know that ecosystems are connected to one another in one way or another, and that if one goes extinct, it affects all the other ecosystems. When extinction happens, organisms have to redefine themselves and find a different way to survive, or die off, and consider how this will affect the food web and the flow of energy.

My research will include stories from tribes that have respect and care for Mother Earth. Stories like *The Earth on Turtle's Back*, *the Onondaga creation story from the Northeast Woodlands*, *The Dine Story of Creation and Southwest Navajo Story*, and *The White Buffalo Calf Woman and the Sacred Pipe by Lakota Sioux- Great Plains*. These stories tie into the creation of life on Earth and how we commune with the animals, plants, and Mother Nature. We must first respect her, keep her clean, and take care of her.

Students need to develop models and construct arguments to deepen their understanding of resources, the cycling of matter, and the flow of energy in ecosystems during succession. They can also study the patterns of interactions among organisms within an ecosystem in a succession. They will compare and contrast ecosystem successions in primary and secondary successions, and the effects these factors have on communities. I know students will see the difference in where they live to compare their learning, which becomes an enduring understanding.

As indigenous peoples, we take care of Mother Earth because we know how important Earth's resources are. I will be using the Navajo Standard for this section and culture stories to support native students' culture,

history, and language. The Dine Story of Creation and Southwest Navajo Story, The Earth on Turtle's Back, an Onondaga creation story from the Northeast Woodland, and The White Buffalo Calf Woman and the Sacred Pipe, a Lakota Sioux-Great Plains Story.

## Classroom Activities:

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### Activity 1: Build an Ecosystem in a Bag:

Students will each get a bag of dirt to hook them into the activity. Students will first build a small-scale ecosystem in a large zip-lock bag.

1. Students will add soil, water, seeds, and small organisms (like a plant clipping or bug) to a clear plastic bag.
2. Hang the bag in a sunny window and observe changes over the next few days.
3. Use their observations to guide a class discussion when introducing ecology for the first time.

This activity will create curiosity and give students something real to refer to as they learn. We will use these changes we see to kick off discussions about ecosystems and interconnected living systems.

### Activity 2: Lima Beans Grow in a Bag:

Each student will get 2 two-quart size lock bags, 2 paper towels, two large lima beans, and students will need a stapler to staple the zip lock bag.

1. Students will staple the zip lock bag about  $\frac{1}{4}$  in length across the bag and fill the bottom part of the bag make sure it's not filled to the top near the staples.
2. Students will then fold the paper towel and wet it. Then place the damp paper towel in the bag.
3. Last, place the large lima bean in the bag with the wet paper towel and close the bag.
4. Hang one bag on the window so it gets plenty of sunlight
5. Repeat the same process with the second bag and hang it in a dark room with little light

This activity is to show how plants need sunlight to grow beautiful green plants. Producers need sunlight to produce their own food, which is photosynthesis. Without producers, primary consumers will have nothing to eat. Students will record their observations in their notebooks.

### Activity 3: Make Vocabulary Stick with a Biotic vs. Abiotic Sorting Station

This is a fun way to get students to learn and memorize the key vocabulary words for succession.

Words like biotic, abiotic, niche, and limiting factors can all be overwhelming to a student learning new vocabulary word. Here is a hands-on visual activity to help these terms and other

ecological terms click.

- Students will get cards showing elements like sunlight, moss, and animals.
- They will collaborate with each other to sort them into biotic and abiotic groups

- I will follow up in class discussion to clarify and deepen understanding
- This activity gives students something visual to connect to new vocabulary
- It also encourages collaboration, conversation, and active learning
- It is a visual observation to let me know who gets it and who still needs a little more support.

This sorting station will introduce vocabulary words in a fun, active way and gives students the opportunity to interact with the content.

#### **Activity 4: Draw it out to Deepen Understanding**

When students create something like a drawing from something they just learned, they will be better able to retain what they have learned. Students will draw what they know about succession. This activity helps them with memory and retention. When students draw their pictures, I can visually see who understands primary and secondary succession. This helps me to see where I need to clarify and revisit and reteach

- Students choose or are assigned a type of succession
- They will draw a scene that visually explains how that process works
- I will observe and walk around and ask questions and instantly see who is getting the concept and who isn't.

#### **Activity 5: Observation Walk to Get Students Talking**

The Students and I will go on a guided observation nature walk. We will observe all the things in nature that we see. Students will write down what they see as we are on our nature walk in their notebooks. During this walk students will need to identify

- The type of ecosystem around our school
- The local climate
- Biotic and abiotic components
- Visual populations, species, and communities' students observe

This activity will help students connect ecological vocabulary to the world around them. Familiar spaces suddenly become alive with meaning. Students will return to the classroom with excitement full of questions and connections.

#### **Native Indigenous Connection**

As indigenous peoples, we take care of Mother Earth because we know how important Earth's resources are. My research will include stories from tribes that have respect and care for Mother Earth. Stories like *The Earth on Turtle's Back*, *the Onondaga creation story from the Northeast Woodlands*, *The Dine Story of Creation and Southwest Navajo Story*, and *The White Buffalo Calf Woman and the Sacred Pipe by Lakota Sioux- Great Plains*. These stories tie into the creation of life on Earth and how we commune with the animals, plants, and Mother Nature. We must first respect her, keep her clean, and take care of her. Here are some activities I will be using to teach about taking care of our ecosystems.

#### **Story 1- *The Earth on Turtle's Back*, *the Onondaga creation story from the Northeast Woodlands*.**

Trace the supplies of food, air, water, and shelter back to their origins in nature. Students need to understand that the air, water, food, and shelter we need each day all come from the earth, like the one created on the

turtle's back. Students need to understand that many important foods originated in North America and are now used worldwide

Nature: Who Needs It? The Turtle's Gift to People

Activity 1: A Simulation of Gas Exchange Between People and Plants

Air Supply: Teacher will explain how plants use photosynthesis (made from light), during which water and carbon dioxide are converted in the green chlorophyll of the leaf into glucose, protein, starch, other nutrients and water. Oxygen too has been released. Animals use this oxygen for respiration, the process during which food is metabolized, to get energy for growth and maintenance. People and animals in turn give off carbon dioxide when they respire, a gas which plants need for photosynthesis.

Use a large plant as an example to reinforce this idea. Tie the end of the flexible rubber hose among the plant's leaves. Whenever a child passes by, she or he can pick up the hose to exhale some carbon dioxide for the plant and inhale some oxygen from the plant. This action symbolizes the life-giving gas cycle between plants and animals.

Activity 2: Making Shelter:

Students will make drawings or models of their home out of cardboard and paper. Then tell them to think of all the materials that the home is made of, such as wood, glass, brick, plastic, cement, and stone. The students and I will figure out which natural resources are used to make the different parts of the home: brick to clay, glass to sand, cement to minerals from rock, plastic to oil, and so on. Students will gather samples of these natural resources, and the materials that they create, and match them up

### **Story 2: *Four Worlds: The Dine Story of Creation and Southwest Navajo Story***

Activity: Students and I will discuss the value of trees and how we can take care of them. Adopt a tree, care for it and plant a tree seed or seedling.

Goal: Students need to understand that trees give us food, oxygen, beauty and wood, among other things, and that they also provide food and shelter for animals. Students need to realize that by nurturing the soil and planting tree seeds and seedlings, we can complete the circle of giving and receiving between trees and people.

I will facilitate a discussion of the value and use of trees and make a list of all those things: wood for building and for heating, beauty, shade, noise reduction; oxygen from the leaves; clean air (leaves filter out particulate pollution); pleasant sound from the wind through the leaves, apples, almonds and other foods for people and animals; homes for animals; erosion protection where roots hold the soil in place; and more.

Activity 2: Adopt a Tree

My students and I will take another nature walk and we will adopt a tree as their very own. During the first visit students will become acquainted with their tree.

- Students will hug their tree to make friends with their tree.
- Students will make bark rubbing using crayons or charcoal and blank newsprints.
- Student will create a leaf print by painting one side of the leaf with tempera paint and then pressing it

down gently and thoroughly onto paper to form the leaf pattern

- Students will spend some time blindfolded with their tree to feel the bark, branches, leaves and roots, and listen to the birds and wind overhead. Imagine you are a bird in your tree's branches. What is it like? Find out about the birds and animals living in your tree
- During each visit for this activity, the students can care for the tree by bringing leaves to feed the soil near its roots, by watering the tree, or by cleaning up litter discarded by people in the area around the tree.
- Each time students visit their trees, they will record their observations in their science notebooks.

### **Story 3: The White Buffalo Calf Woman and the Sacred Pipe by Lakota Sioux- Great Plains.**

#### Activity 1: The Time of Our Lives

Walk a geologic timeline to visualize the great age of the earth and to discuss the immense impact people have had on the environment in a short time that they have walked the earth. Discuss our ability to destroy the Earth with nuclear weapons.

Goals:

Visualize how short human history is relative to earth's geologic past. Understand what a powerful impact people have had on the earth during the relatively short time that we have existed, and the potential destructive power of nuclear weapons.

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## Appendix on Implementing District Standards

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As indigenous peoples, we take care of Mother Earth because we know how important Earth's resources are. I will be using the Navajo Standard for this section and culture stories to support native students' culture, history, and language. The Dine Story of Creation and Southwest Navajo Story, The Earth on Turtle's Back, an Onondaga creation story from the Northeast Woodland, and The White Buffalo Calf Woman and the Sacred Pipe, a Lakota Sioux-Great Plains Story.

Spring Season: Natural and Traditional Events

6DCC4 PO1 - I will explain ways to be thankful for the land and its resources.

6DCC4 PO2 - I will show respect for and take care of natural resources.

6DCC4 PO3- I will describe ways to appreciate the natural elements of earth and sky

The science standard I will be using is the Next Generations Science Standards. The Bureau of Indian Education has decided to use the Next Generations Science Standards to teach our students. I will be using

the middle school standards LS2: Interactions, Energy, and Dynamics Relationships in Ecosystems helps students formulate an answer to the question. How does a system of living things and non-living things operate to meet the needs of the organisms in an ecosystem? Students can and will analyze and interpret data, develop models, construct arguments, and demonstrate a deeper understanding of resources and the cycle of matter and the flow of energy in ecosystems. They will also consider biotic and abiotic factors in an ecosystem and the effects these factors have on population. The Standards I will be using are.

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resources available on organisms and population of organisms in an ecosystem.

MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

LS2.A: Interdependent relationships in Ecosystems.

Growth of organisms and population increase are limited by access to resources. (MS-LS2-1)

LS2.C: Ecosystem Dynamics, functions, and resilience

- Ecosystems are in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its population. (MS-LS2-4)
- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure to its health. (MS-LS2-5)

LS4.D Biodiversity and Humans

Change in biodiversity can influence human resources, such as food energy, and medicines, as well as ecosystem services that humans rely on, for example, water purification and recycling, deforestation. (second to MS-LS2-5)

EST.1.B: Developing Possible Solutions

There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (second to MS-LS2-5)

I will be using some ELA standards for these science projects. The first ELA standard I will use is 6.RI.1, 6.RI.2, 6.W.1 and 6.W.2, 6.RI.1, 6.RI.2, 6.RI.6, and 6.RI.7. These standards are an important part of this curriculum unit because students will need to cite text evidence when they are writing their papers. Students will also need to find the central ideas and their supporting details to support their findings. They will also write an argument to support their claim with clear reasons and relevant evidence. They will also need to introduce a claim and organize their reasons and evidence clearly. Students will also write and explanatory/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. All these ELA standards will be used in their writing

process when we are experimenting in this curriculum unit.

6.W.1- Write arguments to support claims with clear reasons and relevant evidence.

6.W.a- Introduce claim(s) and organize the reasons and evidence clearly.

6.W.b- Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.

6.W.c- Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons.

6.W.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

2.W.A- Introduce a topic; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

2.W.B- Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.

2.W.C- Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.

2.W.d- Use precise language and domain-specific vocabulary to inform about or explain the topic.

2.W.F- Provide a concluding statement or section that follows from the information or explanation presented.

6.RI.1- Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

6.RI.2- Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgements.

6.RI.7- Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

6.RI.8- Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.

## Notes:

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### **(Example Footnote)**

<sup>1</sup> The statement is about early succession on page 117 Mark E. Swanson et al. The forgotten stage of forest succession: early successional ecosystems on forest sites[1]

<sup>2</sup> The statement is about how in early succession forest ecosystems give little attention to the early succession phase. The statement is about early succession on page 117 Mark E. Swanson et al. The forgotten stage of forest succession: early successional ecosystems on forest sites [1]

<sup>3</sup> Vegetation succession and food web assembly. Maarten Schrama, Matty P. Berg, and Han Olff, "Ecosystem Assembly Rules: The Interplay of Green and Brown Webs during Salt Marsh

Succession.

<sup>4</sup> Climate is the average weather of a place over many years. <sup>5</sup> talks about precipitation and temperature. <sup>6</sup> Latitude Difference. <sup>7</sup> The Tropics and the Temperate Zone. <sup>8</sup> Biomes and Ecosystems. My World Interactive: World Geography – Western Hemisphere, by Gregory H. Chu, Don Holtgrieve, and Susan Hardwick, copyright 2019, Savvas Learning Company.

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