Four Winds Nature Program – Earth and the Environment

Connections with Farm to School and Forest Days/Outdoor Learning Programs

To develop a sense of place, we need an understanding of the Earth itself – the ground beneath our feet, the air we breathe, the water that fills our lakes, streams and oceans, and the other living things that share our planet. Throughout the year, we will study the physical environment that supports life on Earth and the forces that shape the ever-changing landscape in which we live. We'll look at the Earth's *geosphere* when we study rocks and erosion, at the *atmosphere* when we learn about the blanket of air that surrounds us, and at the *hydrosphere* when we learn about the water cycle, winds, clouds and weather. We'll consider the *biosphere*, the living things in our world, and explore the interactions between the living and non-living components of the world around us. Students will also practice important skills including: listening actively, asking questions, making and recording observations, and communicating findings.

Sunlight and Shadows

Students will: learn why the sun is important to life, how it warms the Earth, fuels the water cycle, and generates weather systems; model the rotation of the Earth on its axis and explore how its tilt influences the seasons; investigate light and shadows; compare the intensity of angled and direct sunlight; and investigate how the sun's energy can be stored as heat or converted to electricity.

Farm to School

- Visit a local farm using high tunnels; learn about the importance of angled and direct sunlight and how these structures extend the growing season.
- Create a map of the school garden charting how sunlight changes over a period of hours; continue to map over a period of weeks to observe seasonal change.
- Follow the cycle from sunlight to plant to animal to plate, understanding the importance of sunlight in our everyday diets.
- Visit a farm producing some of its energy from solar panels.

Forest Days/Outdoor Learning

- Explore light and shadows, noticing which plants grow in partial sun or full sun, and patterns of their growth.
- Study the ability of water to store the sun's heat- fill three clear containers with water at the same temperature; place one container of water in full sun, one in partial, and one in shade for an hour; afterwards, record the temperature of each container.
- Experience the intensity of angled and direct sunlight by going outdoors at different times during a sunny day to record air temperature and feel the effects of the sun upon our bodies.
- Experience the relief of shade provided by trees on a warm, sunny day.

Erosion

Students will: learn how the agents of erosion (wind, water, ice, gravity) shape and form the land; explore the effects of water drops falling on bare soil, the erosion of rocks carried by moving water, and the effects of wind erosion on loose sediments; consider human impact on erosion, deposition, and changing landscape; and design and build a system to prevent erosion and loss of topsoil on a bare hillside.

Farm to School

- Visit a local farm using cover crops and other methods of erosion control to prevent loss of topsoil.
- Measure topsoil depth in multiple locations and consider what may influence its depth, including factors such as land slope, soil type, and soil saturation.
- Cover crop or mulch the school garden in preparation for winter.

Forest Days/Outdoor Learning

- Explore a nearby stream and consider the importance of riparian buffers in preventing erosion of stream banks.
- Look for evidence of rocks being eroded by wind and water, as well as human activity influencing erosion.
- Visit a nearby stream after a storm or period of heavy rain, and conversely, during a dry period, to record observations of stream speed and turbidity.
- Experiment with how water runs over bare soil, comparing it to water's movement over soil stabilized by plant growth.

Rocks and Minerals

Students will: learn about the geosphere and how it has changed over time; examine rocks formed by three different processes; use sense of touch to differentiate rocks by texture and shape; examine pure minerals and identify by characteristics; model formation of igneous and metamorphic rock; view fossils; look for evidence of minerals in our everyday lives; and examine and compare rocks on school grounds.

Farm to School

- Examine different soils and consider how parent rock determines soil type.
- Find rocks in or around the school garden and record observations about texture, formation, and presence of minerals.
- Consider the importance of minerals for plant growth and in our diet.
- Visit a local farm and observe how rocks are used; look for evidence of old farms in the woods in the presence of rock walls.
- Collect favorite rocks to save for building an herb spiral in the spring.

Forest Days/Outdoor Learning

- Explore rocks around the school, recording observations of their size, texture, hardness, color, and composition; consider how they were formed and why rocks found in various locations differ from each other.
- Use the geologists' "acid test" to check for presence of carbonate minerals- place a few drops of vinegar on different rock specimens; bubbles signify the release of carbon dioxide from minerals such as calcite and dolomite.
- Select a favorite rock, make observations about how it may have formed, and take turns telling stories about how that rock came to be where it is now.

Blanket of Air
Students will: learn how the Earth's atmosphere makes life possible; model how our lungs work; model behavior of molecules in solid, liquid, or gas; use models to learn that air has weight and exerts pressure on a surface, takes up space and can be compressed, and seeks to equalize pressure; investigate what happens when air is heated or cooled; and explore outside for evidence of air in motion.

Farm to School

- Consider the importance of air to plants and the importance of plants to us, especially the cycle of oxygen and carbon dioxide.
- Ask local farmer to share how wind and weather patterns influence their operation.
- Learn about the importance of air in the soil for plant health and organisms that live in soil; plant nitrogen-fixing legumes (peas, beans, vetch, clover) in a pot indoors and study the symbiotic relationship between legumes and bacteria in the soil.
- Explore what happens when air is heated and chemical reactions occur by baking a delicious treat and eating it together.

Forest Days/Outdoor Learning

- Sit quietly in sit spots, place hands on abdomen or chest, and focus on breath, feeling how our lungs expand and contract as we take in air and let it out.
- Look for evidence of air in motion- in tree branches, through a bird's wings in flight, or any other examples; record observations and draw a picture of air in motion.
- Experience the pressure of air on our bodies- lie down on backs with arms extended straight up and hands together; very slowly let arms fall away from each other toward the ground so you end up in a "T" shape. Share what this felt like.

The Nature of Sound
Students will: model how different animals hear and make sounds, and learn how these sounds are important in their lives; compare how sound waves travel in different mediums; explore how sound waves make ear drums vibrate and are interpreted by our brains; investigate connection between size and pitch, and how sound bounces off large surfaces; and map sounds heard inside and outside the school.

Farm to School

- Map sounds heard around the school garden; consider how different species make and hear sounds and why.
- Model how sound travels through soil and consider the impact of factors such as soil compaction and saturation, as well as interesting anomalies like insect resonating chambers built underground.
- Ask a local farmer to compile and share a list of sounds heard on their farm.

Forest Days/Outdoor Learning

- Feel how we make verbal sounds by placing hand over throat while speaking, singing, or humming. What other ways do we make sound?

- Play aural hide and seek, locating each other over varying distances through sense of hearing; have the hiders experiment with making verbal sounds of different pitch or volume, and using other methods to make sound.
- Experiment with how sound travels through drifts of fallen snow.
- Make a list of sounds heard outdoors and explore how each sound is made.
- Create an audio recording while listening outdoors and then play it back once inside- did you originally hear all the sounds captured by the recording device? Consider how we all hear and interpret sounds differently.

Water

Students will: follow a water drop's journey through the water cycle; use a model to observe evaporation, condensation, and precipitation in the atmosphere; observe examples of cohesion, adhesion, and surface tension; use a model to understand how water travels through plants by capillary action; learn how much of the Earth's water is fresh and available to living beings; and compare the density of water at different temperatures.

Farm to School

- Conduct an experiment to illustrate the importance of water to plant health using the same species of plant under three different watering conditions. Record observations of plant health over a period of days or weeks.
- Investigate how capillary action helps plant roots take up water from the soil and study the adaptations of plants for periods of flood and drought.
- Study plants and transpiration- cover half of a potted plant’s leaves with a clear plastic bag after watering; place in sunlight and observe what happens.
- Visit several local farms and learn about their different water systems.
- Sample and compare vegetables with different water content such as tomatoes, carrots, and peas.

Forest Days/Outdoor Learning

- Observe surface tension of water by placing light objects (leaves, lint, a strand of hair, etc.) in a bowl of water; experiment with how heavy an object can be before it breaks surface tension and sinks.
- Model cohesion and adhesion of water by acting out skits as water molecules.
- Explore the density of liquid and frozen water using cups of water and ice; set up cups of water at varying temperatures (hot, warm, cool, cold) and record observations.

Wind and Clouds Aloft

Students will: use a graphical display to understand the naming system for ten main cloud types; view examples of cloud types, learn how they form, and their connection to weather patterns; use a model to investigate weather vanes and wind direction; model how a simple turbine can harness wind energy to lift a weight; and make observations outside about wind speed, wind direction, and cloud type, looking for patterns and writing a weather report.

Farm to School

- Consider the impacts of wind and clouds on growing food.
- Make observations and create a weather report for the school garden- how would you plan your garden activities for the day or next few days based on your report?
- Visit a farm that uses wind turbines as one source of energy.

Forest Days/Outdoor Learning

- Model how different cloud types form and what weather patterns they produce by acting out skits.
- Create a simple weather vane and investigate wind direction around the school, exploring how buildings and other large masses provide a protective lee.
- Construct a small (toy-sized) sailboat and visit a nearby pond to see if you can sail it on a windy day.

Get Your Bearings

Students will: learn how animals use sun position, landscape features, and Earth's magnetic field for orientation and navigation; investigate our ability to form a mental map; learn the cardinal directions and understand how standard units are helpful for creating and using maps; use an orienteering compass to locate the cardinal directions, landscape features, and a hidden treasure; and use landmarks and observations to create a map.

Farm to School

- Create a scavenger hunt and find buried treasure in the school garden using a map and compass.
- Consider the importance of orientation for greenhouse placement as well as planting gardens and orchards.
- Investigate how animals such as honeybees, birds, and various mammals navigate daily and during migration.

Forest Days/Outdoor Learning

- Use memory and landscape features to navigate to sit spots and create a map of where each sit spot is located.
- Use a map and compass to find various treasures hidden around the school grounds.