The Water Cycle

This lesson complements the Biodiversity Word Walk and Lifecycle of a Plant.

Teacher: **Grade Level(s):** 3rd-6th

Time: 1 hour **Author**: Michelle Coe

Next Generation Science Standards:	**4-PS3-4**. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. **5-ESS2-1**. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. **MS-ESS2-4**. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
Enduring Understandings:	**ESS2.C** Water cycles among land, ocean, and atmosphere, and is propelled by sunlight and gravity. Density variations of sea water drive interconnected ocean currents. Water movement causes weathering and erosion, changing landscape features.
Content Objective:	Students will identify different parts of the water cycle, engage in collaborative discussions with other students and the instructor about the importance of water for biodiversity on Earth, and create models of the water cycle.

Vocabulary	**Materials**
Water Cycle Evaporation Condensation Precipitation Transpiration Groundwater	Science Journals Sandwich-size Ziploc bags Sharpies Blue food dye Duct tape or sticky-tac

Seasonality: This lesson plan will work well throughout the year.				
Monsoon July-Sept.	Autumn Oct.-Nov.	Winter Dec.-Feb.	Spring Mar.-Apr.	Dry Summer May-June

Engage: Guiding Question: What do you need in order to grow and learn here at school? As a class, create a storyboard detailing what students feel they need to grow, learn, and thrive at school. Ask everyone to close their eyes and now imagine they are a plant in the garden at school. Again, what do they need to grow and thrive? As a class create a new storyboard detailing what students list as needing to survive as a plant. Guiding Question: Do you see any themes across the two storyboards?

Explore: Take the classroom outside to observe. Ask each student to find a garden plant, sit down, and observe it for 2 minutes. What do they notice about the plant and what it needs to survive? What is below, above, and around the plant that may help it survive? Have students record responses in their journals. Bring the class back together and have students share their findings with their table group. Revisit and revise the classroom storyboard detailing what plants need to survive.

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Explain: Every plant has its ***WANTS***: water, air, nutrients, temperature, and space. Guiding Question: Think about the plant you observed in the garden. Where does it get its water from? Where does it get its nutrients from, it's perfect growth temperature, and how can we ensure it has enough space? Now, think about a desert plant that is *not* in our school garden. Does it receive its ***WANTS*** from the same sources? Discuss. What parts of a plant's ***WANTS*** do we *control* here at school? (water, soil, space, and sometimes temperature depending on if the plant is placed in a greenhouse, classroom, shade, etc.)

Today we will be focusing on one of the most important ***WANTS*** that should have come up in *both* humans and plants—water! Guiding Questions: Does water always look the same? Does it come in different forms? Think-pair-share and record answers on the board.

Guiding Questions: Where does our water come from? (Think: groundwater, rivers, streams, snowpack melt, lakes, and more!) Does the water in Arizona always stay in Arizona? Not always. Water moves in a cycle, just like our plant and animal life cycles. Water's life cycle moves from stage to stage and can change form (liquid, solids, and vapors such as water, ice cubes, and steam from a boiling pot). As water moves through these life cycle stages, it can also move to different places across the globe.

Elaborate: Guiding Question: What makes water change from a liquid, solid, or vapor? Just like our plant life cycles, the water cycle can get much of its energy from the sun. What happens when the sun's energy heats up a mound of snow? Ask prompting questions to get students thinking about liquid water, water vapor, clouds, and precipitation *before* introducing the scientific terms for these phases. Guiding Question: At each phase of the water cycle, have students think of one example they have experienced that relates to that cycle (a monsoon downpour, visiting a lake or body of water, a cloudy day, etc.).

Evaluate: Use a projector screen to display an image of the water cycle with each of the components labeled. Go through each scientific term with the students, referencing back to their own descriptive language and experiences. Pass out materials to each student to create a water cycle model (see below).

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Encourage students to think about how they could make the example on the board into their own unique creation. Remember, precipitation can also mean snow, hail, and rain. Water bodies can include rivers, lakes, and even plants (transpiration!). Remind students to label the parts of their model and puts their name on the bag.

Have students fill their bag with 1 inch of water, place 1 drop of food coloring into the bag, and seal the bag tightly. Hang students water cycle models in a sunny spot using duct tape or sticky-tac. Guiding Question: What do you predict will happen in the bag? What will the water cycle be able to do in this confined space? After a few days, evaporation, condensation, and precipitation (in the form of converging water droplets running down the bag) can be seen.

Discussion Extensions: How can the water cycle influence biodiversity across the world? (fluctuations across climate zones and environments impacts the species and the amount of flora and fauna present; this is often reflected in flora and fauna *adaptations* to particular climate zones such as desert climates and rainforest climates).