

MARIE SELBY
BOTANICAL
GARDENS

Selby Gardens Rainforest Field Studies

Grades 6-8



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Curricular units designed & prepared by Rita Zywica



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Resources:

- “Deforestation”. *National Geographic*
<https://www.nationalgeographic.com/environment/global-warming/deforestation/>
- “GCSE Bitesize Tropical Rainforests: Characteristics and Climate.” *BBC*.
<https://www.bbc.co.uk/bitesize/guides/zscsmnb/revision/1>
- “The Amazon Rainforest – a cloud factory.” Dr. Wolfgang Huisl. Max Planck Institute for Chemistry. <http://www.mpg.de/622290/pressRelease20100920>
- “Charcoal: Out of the Grill and Into the Ground.” Willyard, Cassandra. *GeoTimes*. July 2008.
<http://www.geotimes.org/july08/article.html?id=trends.html>
- “Earth Observatory.” NASA. <http://earthobservatory.nasa.gov/GlobalMaps/>
- Learning Science <http://new.learningscience.org/wp/>
- Blue Planet Biomes <https://www.blueplanetbiomes.org/>
- *Other sources cited in body of units are hyperlinked*



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6th Grade Climate Unit	
<p>Unit Overview and Key Concepts</p> <p>Focus on how climate is defined and the trademarks of tropical rainforests. The CRG is designed to mimic the Neo-tropical rainforest found in Central and South America. Students will become familiar with how scientists measure and analyze atmospheric data over time to discover changes that occur both regionally and globally. Due to human activity, the rainforests are being depleted. This activity has been cited as a contributor to climate change since plants are responsible for removing and sequestering carbon dioxide, the most abundant greenhouse gas. Deforestation also exposes the soil causing it to lose moisture and heat up. When these forests are destroyed it heats the atmosphere because these plants are no longer removing greenhouse gases from the air or protecting the soil. The plowing and burning of the forests releases the stored gases in plants thus adding more harmful greenhouse gases to the atmosphere. Deforestation is the process of changing the physical characteristics of the rainforest and has an impact on regional and global climates.</p>	<p>Pre-Activities and Resources</p> <ul style="list-style-type: none"> ● Lesson to Identify and recognize the climate and biology of the tropical rainforests ● Deforestation reading (textbook) and flipchart ● Analyze a tropical rainforest climate timeline <p>Field Activities during Visit to Selby Gardens</p> <ul style="list-style-type: none"> ● Observational journal or scavenger hunt of plants that make up the Rainforest ● Gather temperature and rainfall data from Forest Pool Lookout and visit the Treetop Research Station to learn like a botanist.
<p>NGSSS</p> <p>SC.6.E.7.4 Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.</p> <p>SC.6.E.7.6 Differentiate between weather and climate</p> <p>SC.6.E.7.9 Describe how the composition and structure of the atmosphere protects life and insulates the planet.</p> <p>IFC Big Idea and Dates</p> <p>Big Idea #7: Earth Systems and Patterns September 18 – October 8</p>	<p>Post-Activities and Resources</p> <ul style="list-style-type: none"> ● Closed container Greenhouse Lab or this Virtual Lab ● Temperature and rainfall measurement analysis (using TI Calculators and software if applicable to classroom) ● Use observations to identify that the CRG model has aspects of various tropical rainforests



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6th Grade Water Cycle and Weather Patterns Unit

<p>Unit Overview and Key Concepts</p> <p>The water cycle is the driving force behind the weather of the tropical rainforests. Students will begin by understanding the changes a water molecule undergoes as it travels through the water cycle. Due to the lushness of the rainforest students should become familiar with transpiration, the process through which plants expel water. The physical characteristics of the CRG should be explored so that students may recognize that depending on the layer they are in (floor, understory and canopy) plants have adapted to collect adequate water and sunlight for survival.</p> <p>Again, deforestation by humans can impact the natural cycles that occur in the rainforest. Removal of the forests has caused acid rain, erosion and run-off of the soil, which has been proven to be nutrient poor and only useful for a couple of seasons of farming crops. Students should learn about the many uses of rainforest plants to justify conserving this valuable resource.</p>	<p>Pre-Activities and Resources</p> <ul style="list-style-type: none"> • Changes in phases of matter in water Lab • Interactive flipchart and/or website to model the water cycle in the tropical rainforest. • Transpiration of water in plants Lab
<p>NGSSS</p> <p>SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.</p> <p>SC.6.E.7.3 Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.</p> <p>SC.6.E.6.1 Describe and give examples of ways in which Earth’s surface is built up and torn down by physical and chemical weathering, erosion, and deposition.</p> <p>Big Ideas and IFC Dates</p> <p>Big Idea #7: Earth Systems and Patterns, October 9-15</p> <p>Big Idea #6: Earth Structures October 31- November 15</p>	<p>Field Activities during Visit to Selby Gardens</p> <ul style="list-style-type: none"> • Observe and explore the Banyan Tree Plaza, Rainforest Falls and Forest Pools to discuss the cycling of water. • Inspect plants for hidden water and adaptations of plants that make them more accessible to a water source. • Explore the “economic botany” of the Rainforest <p>Post-Activities and Resources</p> <ul style="list-style-type: none"> • Create a cloud hands-on activity • Discuss and predict the implications of deforestation on the water cycle of the rainforest. • Acid rain, run-off and erosion of soil occur when humans impact the land of the rainforests



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7th Grade Cells Unit

<p>Unit Overview and Key Concepts</p> <p>The 7th grade science curriculum is centered on life science, starting with understanding of what life is and that organisms are made of one or more cells. Rainforests are hotspots for biodiversity because of the millions of species that make up this ecosystem. Students compare and contrast plant and animal cells and the processes that occur in these cells. Photosynthesis is a vital plant process and the foundation for the physical characteristics of the rainforests. At Selby Gardens students can observe the layers of the rainforest and different plant life in each layer. Students can draw conclusions about the plant life based on the intensity of sunlight each layer receives to drive photosynthesis.</p> <p>Another cellular process that justifies a visit to Selby Gardens is reproduction. Focusing on plants is a great way to teach about sexual and asexual reproductive processes since plants utilize both, and the stages of each process can easily be modeled.</p>	<p>Pre-Activities and Resources</p> <ul style="list-style-type: none"> ● Microscope viewings of plant and animal cells Phytochemicals Gallery ● Cellular processes activity/flipchart focused on photosynthesis and cellular respiration. ● Reproduction in plants (sexual and asexual) flipchart
<p>NGSSS</p> <p><u>SC.6.L.14.2</u> Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multicellular), all cells come from pre-existing cells, cells are the basic unit of life.</p> <p><u>SC.6.L.14.4</u> Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.</p> <p><u>SC.8.L.18.1</u> Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.</p> <p><u>SC.7.L.16.3</u> Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.</p> <p>Big Ideas and IFC Dates</p> <p>Big Idea #14: Organization and Development of Living Organisms</p> <p>Big Idea #18: Matter and Energy Transformations</p> <p>Big Idea #16: Heredity and Reproduction</p> <p>September 3- October 11</p>	<p>Field Activities during Visit to Selby Gardens</p> <ul style="list-style-type: none"> ● Observation of plant life that composes each of the layers of the rainforest (physical characteristics) ● Look for evidence of asexual reproduction ● Classification: Dichotomous Key <p>Post-Activities and Resources</p> <ul style="list-style-type: none"> ● Sunlight intensity and photosynthesis lab ● Compare and contrast sexual and asexual reproduction observations ● PBS Pick the Pollinator Interactive



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7th Grade Relationships in Ecosystems Unit	
<p>Unit Overview and Key Concepts</p> <p>The final quarter of the 7th grade Life Science curriculum focuses on the interdependence of living and nonliving factors in an ecosystem. Both our local Florida ecosystem and the rainforest are teeming with life and interactions that can be studied to understand roles and relationships in an ecosystem. Teachers can focus their visit on the symbiotic relationship of epiphytes and trees or explore the ecosystem by observing all aspects of the Gardens and interpreting how plants, animals and humans are all connected.</p> <p>The NGSSS requires students to be familiar with our local Florida ecology and though rainforests are not found here, there are many similarities. Mangroves and epiphytes are examples of plants that are present in both ecosystems and are great to teach about the interdependence of living things in an ecosystem. By comparing our local ecosystem to that of the rainforest students will be able to draw conclusions about how abiotic factors influence what organisms will make up an ecosystem.</p>	<p>Pre-Activities and Resources</p> <ul style="list-style-type: none"> • Roles in a food web (producers, consumers, decomposers) Earth Odyssey video • Relationships in communities National Geographic video (predator-prey, competition and symbiotic)
<p>NGSSS</p> <p><u>SC.7.L.17.1</u> Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.</p> <p><u>SC.7.L.17.2</u> Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.</p> <p><u>SC.7.L.17.3</u> Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.</p> <p>Big Idea and IFC Dates</p> <p>Big Idea #17: Interdependence March 31 – June 2</p>	<p>Field Activities during Visit to Selby Gardens</p> <ul style="list-style-type: none"> • Observe epiphytes and mangroves for evidence of the interdependence between organisms in an ecosystem • Bromeliad tank inspection to view microscopic life • Interpretive tools: figurines of animals and puzzles of plant/animal interactions
<p>NGSSS</p> <p><u>SC.7.L.17.1</u> Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.</p> <p><u>SC.7.L.17.2</u> Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.</p> <p><u>SC.7.L.17.3</u> Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.</p> <p>Big Idea and IFC Dates</p> <p>Big Idea #17: Interdependence March 31 – June 2</p>	<p>Post-Activities and Resources</p> <ul style="list-style-type: none"> • Florida Ecosystems partner presentations (attachment) • Diagram/design a Rainforest ecosystem that represents the observations recorded during visit



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8th Grade Chemical and Physical Changes to Matter Unit	
<p>Unit Overview and Key Concepts</p> <p>Chemistry In middle school is often taught by demonstrating inorganic chemical reactions. It is more meaningful to learn about the chemistry that occurs in regards to living organisms. The rainforest is an intricate web of life fueled by a variety of chemical processes. The carbon and nitrogen cycles are both great teaching tools to understand how matter can change both physically and chemically in nature. Manipulating chemicals can influence these processes and thus the overall health of an ecosystem.</p> <p>Observations of chemical and physical changes of the rainforest may include: separation of salt and water by mangroves, phase changes of water as it cycles, soil inspections for evidence of carbon cycle, and examples of human use of rainforest plants for practical use.</p>	<p>Pre-Activities and Resources</p> <ul style="list-style-type: none"> ● Marvelous Water Molecule and pH Lab or Virtual Lab ● Identify changes to matter as chemical or physical that occur in plants (photosynthesis and separation of mixture: salt and water) ● Interactive: Changes in our World: Chemical and Physical
<p>NGSSS</p> <p>SC.8.P.9.2 Differentiate between physical and chemical changes.</p> <p>S.C. 8.P.8.4 Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured (i.e. density, thermal or electrical conductivity, solubility, magnetic properties, melting & boiling points, and know that these properties are independent of the amount of the sample.</p> <p>SC.8.P.8.9 Distinguish among mixtures (including solutions) and pure substances.</p> <p>SC.8.P.8.8 Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.</p> <p>SC.8.P.8.5 Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.</p> <p>Big Idea and IFC Dates</p> <p>Big Idea #8: Properties of Matter, 9/23- 10/15 & November 5 - 11</p>	<p>Field Activities during Visit to Selby Gardens</p> <ul style="list-style-type: none"> ● Collect measurements of the pH and temperature of water and soil. STEM Classroom of Tomorrow (CoT) probe ware collection of data. ● Mangrove inspection of salt extractions (separation of mixture) <p>Post-Activities and Resources</p> <ul style="list-style-type: none"> ● Analysis of data collected at Selby Gardens and compared to actual rainforest data. Project Amazonia ● Diagram a Natural Cycle (carbon, nitrogen, water, etc) and/or Carbon Cycle Role Play



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Middle Grades Conserving Biodiversity Unit

Unit Overview and Key Concepts

Rainforests are known for their wide array of life and by the middle grades most students have learned that the rainforests are being depleted by human activity. During the middle grades students should learn about the endless resources the rainforest has to offer and why preserving them is vital to the health of the earth. Connections to the rainforests can be drawn to all the major middle grade content area curriculums and works very well as the theme for an interdisciplinary unit. In classrooms teachers may focus lessons on the geography, civilizations, arts or natural processes of the rainforest. A visit to the CRG will be a hands-on experience to enhance the classroom lessons and to teach students to appreciate the bounties the rainforest has to offer.

This unit's resources and lesson plans can be used throughout the middle grades content areas. **Standards are included with individual lessons.**

Lesson Plans and Resources

- http://kids.mongabay.com/lesson_plans/
- <http://www.pbs.org/journeyintoamazonia/teacher.html>
- <http://rainforestheroes.com/teachers-and-families/rainforest-lesson-plan-ideas/>
- <https://www.rainforest-alliance.org/curricula?page=1>
- <https://www.nationalgeographic.org/activity/protecting-biodiversity-amazon-rain-forest/>



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