SANDOWAY
DISCOVERY CENTER

OUR CHANGING EARTH

GRADES 4-6

N.G.S.S.S Benchmarks

SC.4.E.6.3
Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.4
Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.4.L.17.1
Compare the seasonal changes in Florida plants and animals to those in other regions of the country.
SC.4.L.17.4
Recognize ways plants and animals, including humans, can impact the environment.
SC.4.N.1.1
Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.2
Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
SC.4.N.1.5
Compare the methods and results of investigations done by other classmates.
SC.4.N.1.7
Recognize and explain that scientists base their explanations on evidence.
SC.4.P.11.1
Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.
SC.4.P.11.2
Identify common materials that conduct heat well or poorly.
SC.5.L.15.1
Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.
SC.35.CS-CS.1.1
Identify the concepts illustrated by a simulation (e.g., ecosystem, predator/prey, and invasive species).
SC.35.CS-CS.1.2
Describe how models and simulations can be used to solve real-world issues in science and engineering.
SC.35.CS-CS.1.3
Answer a question, individually and collaboratively, using data from a simulation.
SC.35.CS-CS.1.4
Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.
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.
SC.6.E.6.2
Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
SC.6.E.7.5
Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
SC.6.E.7.6
Differentiate between weather and climate.
SC.6.E.7.7
Investigate how natural disasters have affected human life in Florida.
SC.6.E.7.8
Describe ways human beings protect themselves from hazardous weather and sun exposure.
SC.6.E.7.9
Describe how the composition and structure of the atmosphere protects life and insulates the planet.

Vocabulary

Habitat - The place or environment where an organism naturally or normally lives and grows.

Ecosystem - The complex of a community of organisms and its environment functioning as a unit.

Biome - A complex biotic community characterized by distinctive plant and animal species and maintained under the climatic conditions of the region.

Weather – The current state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

Climate – The typical atmospheric conditions of a region throughout the year.

Greenhouse Effect - The process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without its atmosphere.

Carbon Dioxide – A colorless, odorless gas found in our atmosphere, our bodies, and many other places.

Deforestation - is the removal of a forest or area of trees where the land is thereafter converted to a non-forest use.

Sea Level – The average level of the earths ocean in a region.

Erosion - The action of surface processes (such as water flow or wind) that removes material from one location to another.

Weathering – The breaking down of earth material due to water, wind, ice or other processes.

Acid/Base – Classification of chemicals that share common properties based on levels of particular ions.

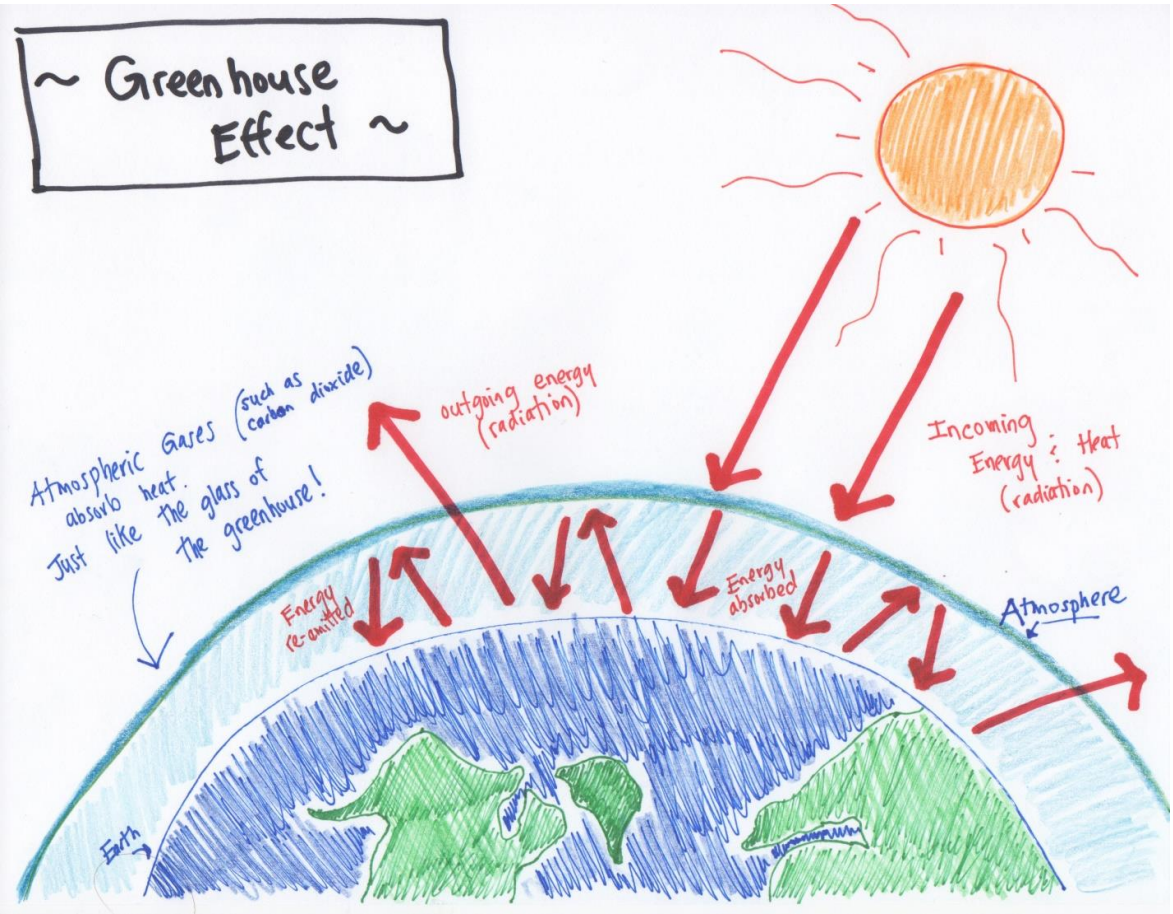
Scientific Model - A physical, conceptual, or mathematical representation of a real phenomenon that is difficult to observe directly.

Pre-Lesson

Tell your students that soon they will be visiting Sandoway Discovery Center to talk about the Earth's climate and how pollution is affecting our climate and thus our environment.

1) THE GREENHOUSE EFFECT

Using the diagram provided, explain to students how the greenhouse effect works.
Heavy gases, either natural or man-made, form a layer in our atmosphere like a blanket that keeps this planet warm for life to grow. However humans have added more gases like Carbon Dioxide (CO_2) from pollution that makes this blanket layer too thick.



If the Greenhouse layer is too thick, what will happen to the temperature of the earth inside?
The temperature will increase.

Scientist worry that if this layer continues to fill up with CO_2 pollution the earth will slowly get too hot for many plants and animals… Especially those that live in the ocean or on the shore!

Pre-Lesson

2) THE OCEAN AND HEAT

We mentioned that to much heat is bad for the ocean, this is because warming temperatures can melt land (glaciers) and sea ice (icebergs) leading to sea level rise and greater erosion.

These processes are harmful to animals that live, nest or hunt on the coastline.

Can you name any animals that live/depend on the coast?

Sea turtles *nest on beaches around the world. Their eggs are very delicate and depend on the sand to develop.*

Shorebirds *lay their eggs directly on the beach sand. Because of camouflage, these eggs are almost invisible to the eye.*

Polar Bears *hunt for food on sea ice. If the ice melts than they will no longer have hunting grounds to find food.*

3) THE OCEAN AND CARBON DIOXIDE

We know that extra Carbon Dioxide from pollution increases the greenhouse effect, but it also damages animals in the ocean.

CO_2 changes the oceans pH chemistry. pH is scale that tells whether a chemical is an acid/neutral/base. The ocean water is normally a pH of 8, but adding more CO_2 changes it more towards an acid and can damage animals with limestone (a sedimentary rock) skeletons.

Pass out both pH and Limestone animal coloring sheets. Have student use the guide on the pH sheet to color the scale correctly.

At the Sandoway, we will learn about the effects of too much heat and Carbon Dioxide on the ocean and its animals in more detail.

TEACHER RESOURCES

MAIN IDEA

- The Greenhouse effect happens naturally and helps keeps the planet warm to sustain life.
- The Earth has gone through slow cycles of natural warming and cooling, many times in the past.
- Mankind is changing the Earth with industry, cities and development, deforestation and pollution; Leading to a historic increase of carbon dioxide.
- Carbon Dioxide (CO_2) is one of the greenhouse gases causing Man-Made Greenhouse Warming. Methane however is the worst.
- The ocean absorbs extra heat and CO_2 from the atmosphere, causing damage to its ecosystems and ocean life.

DID YOU KNOW

Based on data collected and scientific models, researchers are worried that Man Made Warming will happen too fast for nature to adapt and not have a cooling down period.

We focus on reducing CO_2 levels because, out of all the greenhouse gases, it is the easiest to control and reduce. To control methane, the average person must avoid beef and dairy products and research ways to eliminate food waste at home.

Warming water can lead to larger cold winter storms. Warm water in winter months has more evaporation and can cause greater snowfall when air temps get cold enough.

The effects of the changing climate may not be felt by everyone in the same way, but it is better to act for the possible future of the planet rather than do nothing.

ONLINE RESOURCES

EDUCATORS

- climate.nasa.gov/
- www.epa.gov/climate-research
- 19january2017snapshot.epa.gov/climatechange_.html

STUDENTS

- climatekids.nasa.gov/

POST LESSON ACTIVITIES

- www.nps.gov/teachers/classrooms/sealev.htm
- www.exploratorium.edu/snacks/ocean-acidification-in-cup
- www.education.com/activity/article/Observe_Greenhouse_Effect/

TEACHER RESOURCES

CONCEPT FLOW CHART