Earth Science: Grade 2, Semester 1

Change, Equilibrium and Cycles

Big Idea: Earth's surface features, weather and climate are constantly changing, sometimes gradually and sometimes catastrophically. Several factors control these changes. Weather and climate have a significant role controlling ecosystems throughout time and different geographical zones.

CH.2.01 - Students will analyze how the unusual properties of water contribute to its pathways through earth's systems.

Week 01 - Week 02

Essential Questions: How does water determine the nature of Earth?

Skills:

- A. Measure and calculate different physical properties of water
- B. Use models to understand how water is distributed in various reservoirs on Earth.
- C. Set up a simple experiment to model the flow of surface and underground water between reservoirs.
- D. Measure, calculate and manage the water supply in an area and represent the data using tables, graphs and 3D diagrams
- E. Students will analyze how different environmental changes would impact the water cycle and availability of water in Egypt.

Concepts:

- A. The abundance of liquid water on Earth's surface and its unique combination of physical and chemical properties are central to the planet's dynamics.
- B. These properties include water's exceptional capacity to absorb, store, and release large amounts of energy, transmit sunlight, expand upon freezing, dissolve and transport materials, and lower the viscosities and melting points of rocks.
- C. The oceans contain 97 percent of Earth's water. This means that only three percent of Earth's water is fresh water. Fresh water is an important resource for many purposes. Most fresh water is locked up and frozen in ice caps and glaciers at high latitudes and altitudes.

Evidence:
-Students will be able to diagram the water cycle, explain the different parts of it and factors that affect it.
Student will conduct and interpret experiments modelling water flow
Student will create a water supply management plan (simplified) that demonstrated their understanding of sources and sinks for fresh water
Texts & References: Earth COMM Ch. 4 Sec. 1
Capstone Connection: This directly informs and connects the Capstone which is about water, its chemical and physical properties, and the challenge of how to supply clean water to communities. Apply knowledge and information to the Capstone Challenge of making potable water
Grand Challenge Connections: Improve Sources of Clean Water

Topic: water, water cycle, reservoirs,

CH.2.02 - Students will model factors which affect water reservoirs and associated costs.

<u>Week 03 - Week 04</u>
Essential Questions: How does water determine the nature of communities?

Skills:

- A. Model factors which affect water stored in surface and in groundwater reservoirs.
- B. Collect data about the water use different areas, compare them and measure domestic water use.
- C. Determine the amount of water used for different purposes (industry, irrigation, drinking…).
- D. Collect and interpret water analysis data for different surface and subsurface samples

Concepts:
A. Water is a vital earth resource that flows through the Earth system and can be stored in natural or human constructed reservoirs, either on the surface, or as groundwater.

Evidence:
Students will prepare a PowerPoint Presentation with an analysis of fresh water resources in Egypt and their uses.
Texts & References: Earth COMM Ch. 7 Sec 8
Capstone Connection: Apply knowledge and information to the Capstone Challenge of making potable water
Grand Challenge Connections: Address the exponential population growth and prepare for the impact, Improve Sources of Clean Water, Increase industrial base for Egypt

Topic: fresh water reservoirs, water consumption

CH.2.03 - Students will investigate human and natural factors that control water resources and options for water conservation.

Week 05 - Week 05
Essential Questions: How does availability of fresh water impact local areas?
Skills:
A. Use the collected and available data sets to explore different methods to conserve water.
Concepts:
- A. Many processes transfer water between stores.
- B. Most water supplies are withdrawn from either surface water or groundwater.
- C. Water management methods attempt to distribute freshwater resources more evenly through the use of dams, aqueducts, and wells.

Evidence:
Students will describe a way to conserve water and will explain what factors need to be put into place in order for this method to work
Texts & References: Earth COMM Ch. 7 Sec. 9
Capstone Connection: Apply knowledge and information to the Capstone Challenge of making potable water
Grand Challenge Connections: Improve Sources of Clean Water

Topic: groundwater, water management.

CH.2.04 - Students will apply their knowledge of the movement of pollutants into water reservoirs and existing water treatment methods to create innovative methods to supply fresh water to areas of Egypt.

<u>Week 06 - Week 07</u>

Essential Questions: How can water pollution problems be solved in Egypt?

Skills:

- A. Investigate the vulnerability of water resources to pollution by both human use and natural cycles or processes.
- B. Construct models of water-treatment processes.
- C. Construct a groundwater model to infer how pollutants reach the groundwater table and move with groundwater flow.
- D. Investigate how extracting water from a groundwater well influences the movement of pollution in groundwater.

Concepts:

- A. Pollutants released into the environment can contaminate both surface water and groundwater supplies.
- B. Surface water generally has more varied pollutants.
- C. Many kinds of substances can pollute water. Most of these fall into one of two categories: organic or inorganic.
- D. Evaporation, condensation and bacterial activities are naturally occurring processes of water purification.
- E. Waste water treatment involves a series of steps which can vary by locality.

Evidence:

Students will describe a variety of ways of controlling water pollutants.

Texts & References: EarthComm Ch. 7 Sec. 10

Capstone Connection: Apply knowledge and information to the Capstone Challenge of making potable water

Grand Challenge Connections: Improve Sources of Clean Water,Reduce pollution fouling our air water and grounds

Topic: pollution, groundwater, water purification.

CH.2.05 - Students interpret topographic maps of river systems to create a definition of a drainage basin.

<u>Week 08 - Week 09</u>

Essential Questions: How does water interact with landforms?

Skills:

- Identify factors affecting stream drainage which lead to landforms
- Make inferences using topographic maps and satellite images
- Identify how the form of a part of the river system aligns with its function (structure and function within systems)

Concepts:

- A. A river system is a network of streams. River systems are important in the hydrologic cycle.
- B. River systems are made up of different parts with differing forms and functions.
- C. Regionally these local stream networks create a drainage basin.

Evidence:

Students will create their own definition of a drainage basin
Students will identify a drainage basin and drainage divides on a topographic map
Students will predict the effect of slope of rivers on river velocity and on landforms and explain their reasoning.

Texts & References: Sec.2, and 3 (Ch 4 Earth COMM)

Capstone Connection: Apply knowledge and information to the Capstone Challenge of making potable water

Grand Challenge Connections: Improve Sources of Clean Water

Topic: rivers, topographic maps, drainage, hydrologic cycle.

CH.2.06 - Students can infer how the features of a river system in Egypt has affected the lives of local residents.

Week 11 - Week 12

Essential Questions: What affects river flow change and how does that affect communities?

Skills:

- A. Calculate and measure the slope of a river and its effect on water velocity.
- B. Interpret the effect of river velocity on the shape and size of sediments.
- C. Construct a model of a high gradient stream.
- D. Identify and interpret stream channel forms and features on a topographic map, aerial photograph, or satellite image.

Concepts:

- Rivers are most effective in causing erosion and deposition of land.
- High and Low gradient streams have very different features.

Evidence:

Students will identify and explain the difference between sediments according to their sizes.

Quality of stream model that was created.

Texts & References: Sec. 4, and 5 Ch 4 Earth COMM

Capstone Connection: Apply knowledge and information to the Capstone Challenge of making potable water

Grand Challenge Connections: Improve Sources of Clean Water

Topic: rivers, sediment, water flow, erosion.

CH.2.07 - Using elements of experimental design, students will create their own experiments to explore factors which affect the movement and deposition of loose sediments by wind.

Week 11 - Week 12

Essential Questions: What is the role of wind-blown materials in the geology and environment of Egypt?

Skills:

- A. Interpret the effect of wind on rocks and loose sediments.
- B. Recognize the deposition effect of wind.
- C. Create an experiment using good experimental design techniques.

Concepts:

- Wind is one of the major factors that creates the physical properties of land forms and human-made features.
- Particle size and wind speed are related.
- Several factors affect wind erosion and sediment deposition.

Evidence:

Describe the role of wind in erosion and deposition and relate to development in arid areas.

Texts & References: Sec. 9 Ch 4 Earth COMM

Grand Challenge Connections: Increase efficient use of our land through improved use of arid areas

Topic: wind, sediment, erosion.

CH.2.08 - Students will be able to recognize the major components of soil and identify and explain the basic physical properties of soils.

<u>Week 13 - Week 14</u>

Essential Questions: Where does soil come from and what is the importance of soil in our lives?

Skills:

- Identify different components of soil
- Identify basic properties of soil and the relationship of those properties to the proportion of soil components.

Concepts:

- A. Soils are the last products of different erosional and depositional factors
- B. Soils generally contain rock and mineral fragments, clays, and organic matter in varying proportions
- C. The proportions of these components determine many of the physical properties of soils

‣D. In arid regions, the interplay of precipitation and evaporation can create special soil conditions (i.e. caliche, salinized soil).

Evidence:

In groups students will prepare an information brochure explaining the value of soil and the need to protect soil in Egypt.

Texts & References: Earth COMM Ch. 4 Sec. 7

Capstone Connection: Apply knowledge and information to the Capstone Challenge of making potable water

Grand Challenge Connections: Increase efficient use of our land through improved use of arid areas, Recycle and retain garbage for recycling

Topic: soil properties, erosion.