4.9 IMPACTS OF CLIMATE CHANGE

OBJECTIVES

The students

- Identify how climate change may impact their local environment.
- Identify how human activities such as agriculture and transportation can affect the land, vegetation, animals, water, ocean, and air.
- Identify ways people can help protect the local environments and resources.

CLIMATE EDUCATION FRAMEWORK

- 3-5Impacts.A.1 Erosion is the movement of Earth materials (such as coastal land) by forces such as moving water (waves, currents, floods) and wind. Erosion and floods threaten homes, roads, and other coastal development.
- 3-5Impacts.A.2 Global climate change is causing sea levels to rise. Higher sea levels cause more erosion of coastal areas such as beaches. Higher sea levels also cause more damage from flooding events such as very high tides, storm surges, and very heavy rainfall.
- 3-5Impacts.A.3 Changes in temperature and rainfall affect land and ocean organisms and ecosystems. Changes in climate can cause big changes to island ecosystems that can then have significant impacts on island communities.
- 3-5Impacts.A.4 People who live on small islands depend on **freshwater sources** that can be affected by changes in climate that include higher temperatures, changing rainfall patterns, and erosion/flooding by ocean water.
- 3-5Impacts.A.5 People who live on small islands depend on **local food resources** that can be affected by changes in climate that include higher temperatures, changing rainfall patterns, and erosion/flooding by ocean water.
- 3-5Adapt.A.1 Human activities such as agriculture, fishing and transportation can have major effects on the land, vegetation, animals, water, ocean, and air.
- 3-5Adapt.A.2 Individuals and communities can do things to help protect Earth's resources and environments. Examples include treating sewage, recycling waste materials, reducing runoff from agricultural activities, and using good fishing practices.

BACKGROUND

This activity begins with a discussion of some of the impacts of climate change introduced in activity 4.7 INTRODUCTION TO CLIMATE CHANGE. They identify the rise in air and ocean temperatures as well as the resulting rise in sea level and changes in rainfall patterns as changes that may impact their local island environment directly. They are asked to specifically focus on local fresh water sources, local food sources, and the local environment. Then they investigate local human activities that may contribute to these changes and discuss the question, “What can we do?” A final activity challenges the students to go one step further by having them consider ways to prevent or limit erosion using their models from the previous activity 4.8 EROSION.

MATERIALS

Erosion models from Activity 4.8 EROSION.
Birdseed, grass seed, or other fast growing seeds
Soil
Sand
Electric fan and extension cord
Water
Containers for rain-makers
Other supplies as requested by groups
Working Dictionary

STUDENT ROLES

Meteorologist
Geologist

PRODUCTS

Models of methods to prevent erosion
Class list of Possible Local Climate Change Impacts

PROCEDURES

1. **Help the students review some of the impacts of global warming introduced in Activity 4.7 INTRODUCTION TO CLIMATE CHANGE.**
   Ask such questions as
   - What is meant by global warming?
     ✔The Earth is getting warmer.
   - What on Earth is getting warmer?
     ✔The air, oceans and the land.
   - What is happening to the sea level as the temperature gets warmer. Why?
     ✔It gets higher because ice from the poles and glaciers is melting.
   - What can happen as the sea level rises?
     ✔Work for such ideas as beach erosion and flooding from higher tides, bigger storm surges.
   - What effects do temperature changes have on the water cycle and rainfall?
     ✔Rainfall patterns change.
   - Which of these could affect our island environment?
     ✔Work to include erosion, flooding, more or less rainfall, etc.

2. **Have the class make a list of *Possible Local Climate Change Impacts*. Make at least five subcategories, one per group—(local) fresh water sources, (local) food sources, (local) ocean plants and animals, (local) land plants and animals, and the island or land itself.**
   Have them
   - Use the ideas from the previous discussion to identify possible impacts on their particular subcategory.
   - Use specific local examples.
   - Add other ideas as applicable.
   - Share and discuss their lists.
   - Make additions and revisions as desired.
   - Assemble them into a class list of Possible Local Climate Change Impacts.

3. **Have the students make concept maps about the impacts human activities can have on the local environment including the land, air, plants, animals, water, and ocean.**
   Have them
   - Work in six groups, one for each of the categories above.
   - Discuss what and how human activities can impact their part of the local environment. Identify specific examples.
     ✔Help them to include agriculture, fishing, transportation, building construction and other locally applicable activities.
   - Make their group map including information and examples from their discussion.
   - Share and display their concept maps.

4. **Pose the question, *What can our community do to help protect our local resources and environment?***
   Have the students
   - Identify things that can be done to accomplish this.
     ✔Help them to include such things as treating sewage, not littering, recycling waste materials, using good fishing practices, reducing run-off from farms and other sites, composting, not wasting water, and so forth.
   - Make posters about their ideas.

5. **Help the students review the natural causes of erosion investigated in the previous activity, 4.8 EROSION.**
   Ask such questions as
   - What is your working definition of erosion?.
   - What are some causes of erosion?
   - Are these natural effects of nature? Why do you think so?
   - Can humans cause erosion or make it worse? How?
   - What human activities could cause erosion?
   - Can you describe any local examples where human activities have produced erosion? (Or increased the effects of erosion?)
     ✔Try to include such local activities as agriculture, building construction, and transportation.
   - Can you think of any ways erosion could be prevented?

6. **Challenge the students to design ways to slow the erosion process in their models from the previous activity. Encourage them to use methods that have real world potential.**

7. **Have each group try their prevention idea using their models. Have them describe what they did and relate it to a real world solution if possible.**

8. **Help the students discuss the degree of success of their erosion prevention simulations. Have them suggest and explore ideas to prevent or further reduce the effects of erosion both natural and man-made. Have them identify and describe any local examples of soil or sand erosion prevention techniques.**

9. **Have the students revise their working definition of erosion to include their new understandings.**

10. **(Optional.) Pose the question, *What can our class do to help protect our local resources and environment?***
    - Have the students suggest ideas.
      ✔It may help to have them focus only on the school environment or classroom resources.
    - Discuss the ideas and help them identify those ideas that the students could actually accomplish.
    - Have the students select one idea, discuss how it could be accomplished, and design an implementation plan.
    - Have them carry out their plan.
    - Discuss the results focusing on the fact that everyone can help protect local resources and their environment.

EXTENSIONS

- Have the students make concept maps about the impacts human activities can have on the Earth's environment including the land, air, plants, animals, water, and ocean. Some additional research will likely be necessary.
- Have them research efforts being made in other places to protect Earth's resources and environments.
- Have the class organize a campus clean-up day.
- Discuss and implement ways to conserve classroom resources.