



Erosion Exploration

Summary:

Students will investigate factors that increase erosion and learn how the environment is affected. By the end of the lesson, students will be able to present solutions to erosion problems and also compare and contrast Puerto Rico issues to the continental United States.

Background Information:

Erosion by wind and water occurs naturally but can be accelerated by human activity. In many regions, farming, construction, mining, and other activities have left soil relatively unprotected from erosion. Because of this, topsoil is being removed more quickly than natural processes can restore it. As of 2001, one estimate indicated that soil in the United States was being eroded at a rate 17 times higher than the rate at which it was formed. About 90% of available cropland was losing soil faster than it could be replaced. Some soil conservation methods include planting windbreaks, constructing terraces, and implementing erosion-reducing farming practices. Some of these practices include contour farming, strip-cropping, and no-till farming. Windbreaks, or shelterbelts, are belts of trees that are planted along the edges of fields to reduce wind erosion. When slopes are flattened to reduce run-off, this is known as terrace farming. This is used in the cultivation of rice and other crops from China to the Andes.

The no-till method of soil conservation means that plowing, planting, fertilizing and weed control are all done at the same time. In other words, once the ground is planted it is not disturbed again until harvest. There is less chance of erosion because the soil is left alone. This method is used in the Southern and Midwestern states. Strip cropping is when farmers alternate a crop that leaves bare ground between rows with a crop that completely covers the ground. Eastern and Central United States are areas that use this method of soil conservation. (Namowitz)

A method of specific crop planting is similarly used in Puerto Rico for farms growing shade grown coffee. Where shade coffee is growing, we also find other plants such as bananas, plantains, and a diverse species of trees. This method of farming is more expensive and time consuming since the crop has to be hand-picked. But it is much better for the environment than regular

Grade Level: 9th

Goal:

Our influence on Earth has a global impact on the environment.

Key Concepts:

Erosion, geography, plantings strategies, soil conservation, diversity

Objectives:

- 1.) Students will identify reasons for erosion
- 2.) Students will discuss solutions to erosion problems
- 3.) Students will relate Wisconsin geography to Puerto Rico

Teaching Location:

In the classroom and research in library

Lesson Time: Two 50 minute class.

One for research and one for presentations

Subject Areas for Infusion:

Science, Earth Science, Environmental Science

Standards:

Environmental Education:
A.8.1

Science:

A.12.1

A.12.5

C.12.6

coffee. Shade coffee plantations consist of many types of plants that are rooted into the soil. This does not eliminate the problem of erosion, especially in mountainous areas, but these roots do play a role in conservation. Shade coffee is currently being produced at Hacienda Verde in Puerto Rico. This is an excellent resource for teachers and students: www.haciendaverde.org

Another good website for information on shade coffee from Grounds For Change: Socially Responsible Coffee at: <http://www.groundsforchange.com/learn/shadegrown.php?PHPSESSID=78710faac3474b16c7b0067a02e8a762>. Here is a paragraph taken from that site:

“Clear-cutting the forest for full-sun plantations increases soil erosion and deadly mudslides and the chemicals used to support the growth of full-sun hybrids produce toxic run-off and acidify the soil. Needless to say, biodiversity on these plantations is negligible. Shade grown coffee shrubs live twice as long and the shade trees generate natural mulch, which means less replanting and less need for chemical fertilizers” (Grounds for Change).

Materials:

- Newspapers
- Internet access
- Reference books/magazines

Set-Up:

Read background information. Gather various newspapers.

Procedure:

Introduction.

Give background information on soil erosion in general, in Puerto Rico and the effects it has on the environment. Explain lesson plan to students.

Vocabulary

erosion: the removal and transport of materials by natural agents such as wind and running water

topsoil: the portion of soil containing organic material, or humus, that forms from decayed plant and animal material

conservation: the protection, restoration and management of natural resources

shade coffee: a type of crop that can be planted in conjunction with other, larger plants

Activity 1.

The class is divided into groups of 3. Each group member will have a specific role for the research assignment. Since there are 3 members to the group, one will research soil erosion and conservation efforts in Wisconsin, one will research soil and conservation efforts in Puerto Rico and the third will specifically research of shade coffee (what is it, where is it planted, why is it good for the environment, list some examples of a crop in the states that can be similarly used).

This is not a formal report. It will be used as a discussion piece in class.

Assignment requirements:

1. Legible notes/paragraphs reporting information
2. Sited references

3. Personal opinion on the subject; this should include which conservation effort the student thinks is most beneficial and why

A class period at the library or with designated research material is given. Additional time outside of class may be necessary.

Activity 2.

- 1.) Presentation/Discussions will be led by the students and facilitated by the teacher.
- 2.) This is done by having all students who researched Wisconsin go to the front of the class of the class to explain their findings and discuss. Each student should present one fact or opinion at a minimum.
- 3.) Repeat step two with the Puerto Rico group and shade coffee group.
- 4.) A journal entry may be done in class if there is time, otherwise given as a homework assignment. This journal entry should include a chart showing similarities and differences in terms of erosion and environmental problems that the United States has with the Commonwealth of Puerto Rico. Lastly, the student should write a short paragraph explaining what role they can play in soil conservation.

Conclusion.

The way we treat the environment at home affects the entire world. We as members of a global world and ecosystem must be aware of what consequences stem from our actions. Students should understand this concept through the research of Wisconsin and Puerto Rican soil erosion issues. Although Wisconsin and Puerto Rico are miles away from each other, they still both experience problems with soil erosion.

Assessment.

Each member of the group will be responsible for their assigned portion. They will turn in their write-up and bibliography for a homework letter grade. A passing grade will not be possible without references.

References:

Used for this activity:

1. Identifying Erosion at <http://atozteacherstuff.com/pages/298.shtml>
2. Namowitz, Spalding. McDougal Littell Earth Science, McDougal Littell Inc., Evanston IL 2003. pgs 272-273.

For resources:

1. Grounds For Change: Socially Responsible Coffee
<http://www.groundsforchange.com/learn/shadegrown.php?PHPSESSID=78710faac3474b16c7b0067a02e8a762>
2. Hacienda Verde www.haciendaverde.org
3. Conservation Program in the Caribbean
U.S. Fish & Wildlife Service
Boqueron Field Office
P.O.Box 491
Boqueron, P.R. 00622-0491