

Title: Desertification

Overview: This lesson will introduce the concept of desertification and the factors that contribute to desertification. Students will re-create the desertification process, utilize several reading strategies to read and learn about desertification and its effects on human-environment interaction and write a letter proposing a solution for lands threatened by desertification.

Objectives and Standards:

1. Students will be able to understand the concept of desertification.
2. Students will be able to identify and analyze factors that contribute to desertification and understand where desertification is a threat in other parts of the world.
3. Students will evaluate a position on desertification and write a persuasive letter supporting their opinion with facts from the lesson.

Benchmark: Students will describe how physical processes affect different regions of the world.

Grade Level: 7th -9th grade

Subject: World Geography

Time: 2-3 55 minute days

Prerequisites: Students will have already learned about different types of climates and factors that effect climates. This lesson is during the Africa unit, so students will also have background knowledge on the physical and political geography of Africa. Students will also have already worked with climographs and are able to create their own.

Required Materials:

3-sided box graphic organizer
blow-dryer station readings/information
piece of sod blank climograph worksheet
sand desertification worksheet
climograph handout

Suggested Procedure:

Day1: Students will be given a list of vocabulary they will encounter in the readings on desertification. With these terms, they will complete a keyword classification strategy. Students will generate 3-5 categories for the list of vocabulary words. They will do this silently, by themselves, then, when each student is finished we will discuss their classifications. Ask students these questions; Why did they pick the categories they did? Why did they put the specific words in the categories? What do they think the reading is

about? Are there any words they don't know? As a class we will read aloud from *World Regions: Africa*, a National Geographic Reading Expedition book by Sherilin Chanek.

Have pre-assigned groups of 5-6 meet at a work station. Each station will contain a piece of sod in a box, a pile of sand and a blow-dryer. Students will have a worksheet to complete as a group while performing the experiment. Students will simulate desertification. First, create a windstorm, by blowing the dryer over the pile of sand for a few minutes. Next, students will remove some of grass, to simulate overgrazing. Students will repeat the process several times. Make sure students complete their worksheets and bring for class the next day (or collect them) and clean up.

Day 2: Experiment stations have been put away and now reading stations are set up around the room. Each station has information on desertification and the contributing factors. Students will visit each station, read the information and fill in their graphic organizer (three facts for each category, plus the climate map-the key for the map is at the National Geographic website listed below). After students have visited each station and collected the information we will reconvene and de-brief the information they have collected.

Next, we will examine a few cities around the world threatened by desertification. Ask students to predict climate trends in these cities. What is the weather like? What is the temperature like? How do they think the land is used? Students will complete climographs for each of the four cities and compare and contrast these places. Finally, as a class we will evaluate all the information we have looked at and discuss, as a class, the problem of desertification. Why is it a threat? Should we be concerned? Why?

Day 3: Using the information in their graphic organizers, students will brainstorm on the back of the worksheet some possible solutions for the desertification issue. They will then write a formal letter to a fictional government agency proposing their solution for this issue.

Differentiation: Readings can be modified according to reader's needs. More scaffolding can be provided for the written assessment, students may work together, or alone in a quiet resource room if needed.

Assessment: Students' learning will be assessed by the completion of the experiment worksheet and the letter.

Credits: Sara Sommers

Websites:

International Year of Freshwater 2003

<http://www.wateryear2003.org>

Climographs

<http://www.worldclimate.com/climate/index.htm>

Maps

<http://plasma.nationalgeographic.com/mapmachine/>

Desertification Experiment

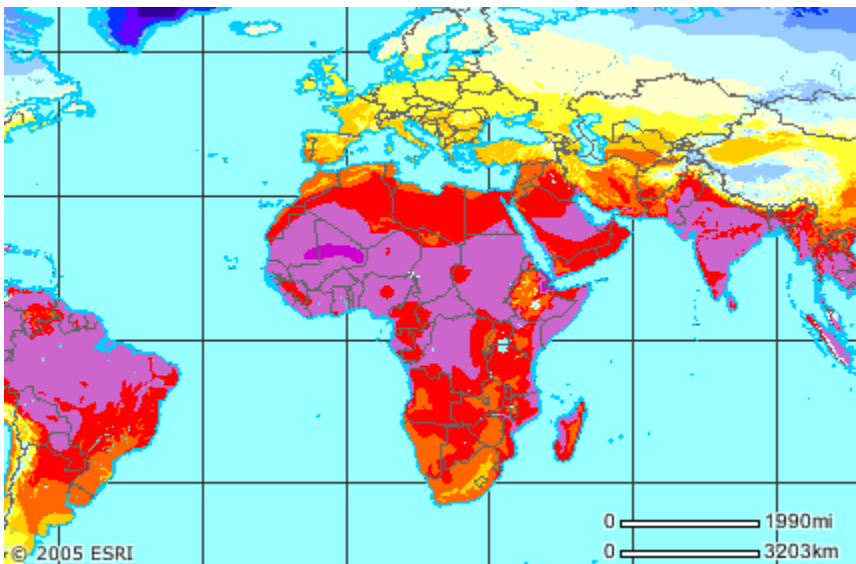
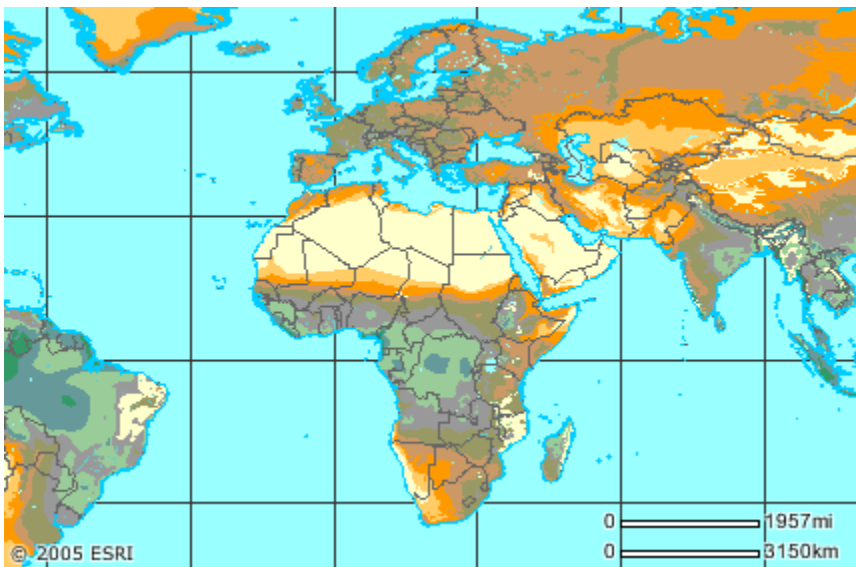
1. Describe what happened during the experiment. What did the sand do as it blew across the grass? What happened to the remaining grass and topsoil after the “overgrazing”?
2. What environmental factors contribute to desertification? What human activities contribute to desertification?
3. Why would it be important for the people living in the Sahel to slow desertification? What about conservation of the environment, how does it factor in?
4. Based on the experiment, where else in the world do you think desertification occurs?

CLIMATE

Climatic variations

High temperatures lasting for months create droughts that prevent the vegetation from growing.

Using these maps, determine the average temperature and precipitation as well as the type of climate in the Sahel region. Record in your graphic organizer.



HUMAN ACTIVITIES

Human activities leading to desertification are mainly related to agriculture.

Overgrazing removes the grass and other vegetation that protects the soil from erosion. Over cultivation exhausts the soil's nutrients and minerals needed to sustain plant life.

Deforestation destroys the trees that bind the land to the soil. Wood is the principal source for lighting and cooking in many arid areas.

The increase of human activities brings an increased greenhouse effect, causing global warming. Dry lands are likely to be especially vulnerable to rises of temperature during the 21st Century.

Economic pressures can lead to the over-exploitation of land, and usually hit the poor the hardest. Forced to extract as much as they can from the land for food, energy, housing and source of income, they are both the causes and the victims of the desertification.



IMPACTS

Environmental impacts

Because of the plant loss, desertification makes areas more flood-prone. It also causes the salt level in soil to rise, results in deteriorating quality of water, and silting of rivers, streams and reservoirs.

Economic impacts

Desertification has huge economic consequences – the World Bank estimates that at the global level, the annual income lost in the areas affected by desertification amounts to US\$ 42 billion each year, while the annual cost of fighting desertification would cost only US\$ 2.4 billion a year.

Poverty and mass migration

Desertification brings hunger and poverty. People living in areas threatened by desertification are forced to move elsewhere to find other means of livelihood. Usually they migrate towards urban areas or go abroad. Mass migration is a major consequence of desertification.

From 1997 to 2020, some 60 million people are expected to move from the desertified areas in Sub-Saharan Africa towards Northern Africa and Europe.



Dead vegetation in drought-stricken area, Sol-Dior area, Senegal.



The result of overgrazing on the outskirts of Amman city, Jordan.

REGIONS

What are the regions most threatened?

In all, more than 110 countries have dry lands that are potentially threatened by desertification. Africa, Asia and Latin America are the most threatened by desertification.

Africa

2/3 of the continent is desert or dry lands in Africa. The region is afflicted by frequent and severe droughts. Many African people depend heavily on natural resources to survive.

Asia

Asia contains stretches and stretches of arid, semi-arid, and dry sub-humid land reaching from the Mediterranean coast to the shores of the Pacific.

Degraded areas include expanding deserts in China, India, Iran, Mongolia and Pakistan, the sand dunes of Syria, the steeply eroded mountain slopes of Nepal, and the deforested and overgrazed highlands of the Lao People's Democratic Republic. In terms of the number of people affected by desertification and drought, is the most severely affected continent.

Latin America and the Caribbean

Although better known for their rain forests, Latin America and the Caribbean are actually about one-quarter desert and dry lands. Poverty and pressure on land resources are causing land degradation in many of these dry areas.

CONSERVATION

How can we act against desertification?

1. Restore and fertilize the land

A simple and cheap way to fertilize the land is to prepare compost that will regenerate the soil with organic matter.

2. Combat the effects of the wind

By constructing barriers and stabilizing sand dunes with local plants.

3. Reforestation

Trees play several roles: they help fix the soil, act as wind breakers, make soil richer with nutrients, and help absorb water during heavy rainfall.

Because the burning of land and forests increases dangerous greenhouse gases, afforestation – planting new trees - can help reduce the greenhouse gases since plants absorb carbon dioxide, a greenhouse gas, and give off oxygen.

4. Develop sustainable agricultural practices

Dry lands are home to a large variety of species that can also become important commercial products, products sold for a profit. For example, these plant species provide 1/3 of the plant-derived drugs in the United States. Agriculture diversity must be preserved. Over-use of land can be stopped by letting the soil 'breathe' during a certain-time period, with no cultivation, nor livestock grazing.

5. Traditional lifestyles

Traditional lifestyles as practiced in many arid zones offer examples of living in harmony with the environment. In the past, nomadism was particularly adapted to dry lands conditions; moving from one waterhole to another, never staying on the same land; pastoral peoples didn't exert much pressure on the environment. However, changing lifestyles and population growth are putting increasing pressure on scarce resources and vulnerable environments.

http://www.wateryear2003.org/en/ev.php-URL_ID=5137&URL_DO=DO_TOPIC&URL_SECTION=201.html

International Year of Freshwater 2003

CLIMOGRAPH INFORMATION

Average temperature is in Celsius and average rainfall is in inches.

Zinder, Nigeria

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temp.	72.0	76.8	84.7	90.7	91.8	88.7	83.5	80.4	83.7	85.8	80.4	73.9
Rain	0	0	0	0	.7	1.7	5.5	7.8	2.5	.2	0	0

Farmington, New Mexico

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temp.	28.5	35.1	41.9	50.6	60.9	70.7	76.7	74.0	66.3	54.3	40.6	29.7
Rain	.6	.6	.8	.5	.7	.2	1.0	1.2	1.0	.7	.8	.5

Halls Creek, Australia

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temp.	86.4	85.3	84.2	80.4	73.6	68.7	67.3	71.8	79.0	84.9	87.8	88.5
Rain	5.7	4.8	2.9	.8	.5	.2	.3	.1	.2	.6	1.3	2.9

Yinchuan, China

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temp.	16.5	23.7	37.0	51.1	62.6	70.3	74.1	70.9	61.0	48.4	33.4	20.3
Rain	0	.1	.2	.5	.7	.8	1.6	2.1	1.0	.5	.2	0

CLIMATE

HUMAN ACTIVITY

DESERTIFICATION

IMPACT

REGIONS

CONSERVATION