Lesson II

Prototype Lesson Plan

World Regional Studies

A series of activities for middle school students on the topic of remote sensing and using the technology to examine the theme of Human-Environment Interaction.





About These Lessons

Educational Objectives

Content

Presentation of Lessons to the Students

Level of Difficulty

Format

Considerations Regarding Printing

Prerequisite Knowledge

Acknowledgements



Lesson II Exploring the Human-Environment Interaction









Let's think about our world, and the impact that we, as humans, may have on it.











QUESTION: What is the surface area of the earth in square miles?

- A. 8,945 sq mi
- B. 506,432 sq mi
- C. 1,487,839 sq mi
- D. 196,936,994 sq mi <u>CLICK for ANSWER</u>





The earth's land surface area is **57,308,738 sq mi**.

Let's put that in perspective. Connecticut is 5,543 sq mi. It would take 10,339 Connecticuts to cover just the worlds land area.





The world seems to be a big place. But now, let's think about the human side of it.





The areas shown in shades of brown represent deserts and other arid regions of the world, areas that are not very hospitable for humans to live. Mountainous and ice covered areas are also not suitable for humans to live.



Of the total land area of **57,308,738 sq mi.,** only about **32,665,981 sq mi** or roughly **57%** is suitable for humans to live on.

CONTINUE





Distribution of World Population by Country



Distribution of World Population by Country



This graph shows the growth of world population over the past 1,000 years.

Notice how quickly it has risen in the last 150 years.

Click to go to

Population Counter



CONTINU

http://www.worldometers.info/world-population/





Population Density:

Global Population: 7,600,000,000 people Hospitable Land Area: 32,665,981 sq mi

7,600,000,000 people **32,665,981** sq mi

mile

233 people per square mile

1 mile



Population Density:

Global Population: 7,600,000,000 people Hospitable Land Area: 32,665,981 sq mi



Let's Look at Some Examples of Human/Environment Interactions Click on a Continent to Explore it More



Africa



Click on a star to examine a case study of the human/environment interaction in that area.

GO BACK

Asia

Click on a star to examine a case study of the human/environment interaction in that area.

GO BACK

Australia



Click on a star to examine a case study of the human/environment interaction in that area.



Europe



Click on a star to examine a case study of the human/environment interaction in that area.



North America





South America



Click on a star to examine a case study of the human/environment interaction in that area.



Bolivia



Landsat 5, Sept. 30, 1984



Landsat 8, Aug. 24, 2017



QUESTION: What is the primary event/activity that has taken place between these two dates of imagery?

Bolivia



Landsat 5, Sept. 30, 1984



Landsat 8, Aug. 24, 2017



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<image>

DEFORESTATION is the process by which forests are converted to nonforested land. Although deforestation can occur as a result of natural causes such as forest fires, it is also an example of one of the many ways in which human change to natural resources impacts our planet.





Bolivia - Deforestation







DEFORESTATION is the process by which forests are converted to nonforested land. Although deforestation can occur as a result of natural causes such as forest fires, it is also an example of one of the many ways in which human change to natural resources impacts our planet.





QUESTION: Why is deforestation occurring?

CLICK for ANSWER



Bolivia - Deforestation

Why is **deforestation** occurring?

The causes of deforestation are complex, but the primary reason for deforestation in tropical regions is the need for agricultural land. In countries with poor economies, people turn to agriculture to meet everyday needs of living and survivng. Poor farmers migrate to agriculture settlement areas, and cut and burn several acres of forest to use for farming. The unfortunate thing is that the soil quickly losses nutrients needed for growing crops so the farmers are forced to move to new areas and repeat the process. Large companies are also involved in deforestation where large areas of forest are cut for cattle pastures to support the beef industry. In addition, timber companies cut large areas of forest for timber and pulp.



Bolivia - Deforestation



QUESTION: Why the star shape patterns in this image?

CLICK for ANSWER

Bolivia - Deforestation



Why the star shape patterns?

The star-shaped patterns are radial soybean fields that are part of a **planned settlement** east of Santa Cruz de la Sierra in Bolivia. The stars radiate from small towns three miles apart and are separated from neighboring stars by a small stretch of the dry tropical forest that used to cover the area.

The area has been rapidly deforested to accommodate people that have been resettled from the Altiplano, the high planes of the Andes. Each small community has a school, a church, a cafe and a soccer field.

Argentina

<u>QUESTION</u>: Can you identify what has happened between these two dates of imagery? HINT: Look at the light blue areas. **CLICK for ANSWER**

Band **False Color**

Landsat 5, Mar. 17, 1989

Landsat 8, Feb. 24, 2016

Click to

TOGGLE

<u>images</u>

mbinati

Argentina

QUESTION: Can you identify what has happened between these two dates of imagery? HINT: Look at the light blue areas. <u>CLICK for ANSWER</u>





Click to

TOGGLE

<u>images</u>

Landsat 5, Mar. 17, 1989

Argentina

QUESTION: Can you identify what has happened between these two dates of imagery? HINT: Look at the light blue areas. <u>CLICK for ANSWER</u>





Click to

TOGGLE

<u>images</u>

Landsat 8, Feb. 24, 2016

Argentina – Urban Growth



CONTINU

Atlas of Urban Expansion: http://www.atlasofurbanexpansion.org/cities/view/Buenos_Aires

Argentina – Urban Growth



CONTINI

Atlas of Urban Expansion: http://www.atlasofurbanexpansion.org/cities/view/Buenos_Aires

Peru – Glacial Melt



Click to TOGGLE images

Coropuna Dormant volcano

Landsat 5, Aug 12, 1989



Peru – Glacial Melt



Click to TOGGLE images

Coropuna Dormant volcano

Landsat 8, Oct 28, 2017



Ecuador

<u>QUESTION</u>: Besides the clouds (white areas), what is different between these two images? What sort of activity is taking place?

CLICK for ANSWER

nbina Band



Landsat 5, Mar. 27, 1985

Landsat 8, Oct. 13, 2017

Ecuador – Shrimp Farms



mangrove

This is the conversion of mangrove swamps to shrimp farm aquaculture. This activity was initiated in Ecuador during 1968, when a group of local agricultural entrepreneurs conducted a trial after watching that shrimp grew in natural ponds neighboring the local mangrove swamps. By 1974, there were already some 600 hectares under cultivation.



Shrimp farms



Ecuador – Shrimp Farms

Almost all of the shrimp is exported.































Cana Brava Lake Dam



QUESTION:Why is there a need to constructdams in Brazil?CLICK for ANSWER

The construction of dams is driven mostly by the needs of Brazil's agricultural and heavy industry. Over the last several decades, Brazil has become the second largest exporter of agricultural products in the world, and along with the growth of industry requires additional water and energy production.







Chile



QUESTION: Why are power plants located near sources of water?

CLICK for ANSWER

The image to the left is an aerial view of the Ventanas power plant in the city of Quintero on the coast of Chile. The image below is a street level view looking towards the west (between the yellow lines to the left). This is a coal fired power plant, and the largest power plant in the country of Chile.



Street level view looking towards powerplant.

Chile

Power plants use water to generate steam to spin turbines to create electricity. Water is also used to condense the steam back to water. This process tends to heat up the water which is then released back into the environment. This image is a panchromatic (black & white) image of the area around Quintero, Chile. Viewing this image, everything appears to be fine, and no environmental impacts are readily apparent.

QUESTION: What do you think is an environmental impact of a power plant on the coast?



Chile – Thermal Plume

This is the same panchromatic image with a thermal image displayed on top. Thermal imagery measures emitted energy from the earth's surface in the form of heat. The thermal plume from the cooling water of the Ventanas power plant is evident in the harbor of Quintero, Chile. This "thermal pollution" is responsible for killing millions of fish a year around the world.



