



## **Module 3, Investigation 4: Briefing**

### **Where in the world are major environmental changes?**

#### **Background**

Many environmental changes are interconnected on a global scale. For example diseases that originate in one place may threaten populations in other places as people migrate from region to region. Also, unusual climate and weather conditions may destroy crops in one country and create bumper crops in another country. Serious food shortages may occur in one place and surpluses in another. Moving food over long distances may be required to avoid starvation and malnutrition. NASA scientists are interested in monitoring environmental changes on Earth's surface so that their consequences can be understood and predicted. Environmental changes often affect human well-being.

Human activities on Earth's surface have intended and unintended consequences. For example, cutting portions of tropical rainforests to obtain valuable wood for export to other countries, clearing land for cattle grazing, and settlements may result in creating wealth for lumber companies and livestock owners and in providing places to live for migrating people. Unintended consequences may include destroying species of wildlife dependent on the rainforest and altering Earth's climate. Unintended consequences may not be understood in time to repair the negative environmental changes.

In this investigation, you consider what makes up a major environmental change and then look at deforestation as an example. Deforestation is a major research topic for NASA scientists.

#### **Objectives**

In this investigation you will

- describe several major environmental changes,
- locate places in the world where major environmental changes are occurring,
- give reasons why an environmental change may be classified major,
- describe issues related to deforestation in a tropical region,
- offer ways to remedy some of the negative consequences of deforestation,
- describe features on thermal images, and
- explain why NASA scientists study environmental changes.

#### **Procedures for the Investigation**

You identify and classify examples of major environmental changes on Earth's surface. You use atlases to locate places where the environmental changes are occurring and describe the features of those places. You examine remotely sensed images of Brazil's forests to identify patterns of deforestation and speculate about what caused the patterns and how they might be changed.



# Module 3, Investigation 4: Log 1

## Where in the world are major environmental changes?

For this investigation, your class will be divided into groups to consider different types of environmental changes and issues. Each group should have a recorder/reporter who will share group findings with the entire class.

Many environmental changes negatively affect a large proportion of Earth’s human population, influence large areas of Earth’s surface, endure for a long time, and require the cooperation of many societies to solve or improve. Working in your groups, identify and list issues that you believe are major environmental changes. Once you have identified your list, enter them below and compare each environmental change on the list against the following traits. Does each environmental change have the four traits? Air pollution from burning fuels is given as an example below.

### Traits

- A significant portion of the world’s population is involved in the change.
- Large areas of Earth are influenced by the change.
- The problem has effects that endure a long time.
- The cooperation of several countries may be required to solve or improve the conditions related to change.

Group recorders report to the class, and differences and similarities are discussed.

**Environmental Changes Checklist**

Changes	Trait a		Trait b		Trait c		Trait d	
	Yes	No	Yes	No	Yes	No	Yes	No
Air pollution	●		●		●		●	



## **Module 3, Investigation 4: Log 2**

### **Where in the world are major environmental changes?**

Think about and answer these general questions.

1. What are the basic material needs that all people have?

---

---

---

2. What are the resources that people use to fulfill basic needs?

---

---

---

3. How do people get these resources?

---

---

---

4. How does getting needed resources affect the natural environment? Provide examples.

---

---

---

---

---

5. How do the resource choices of one group affect other people? Provide examples.

---

---

---

---

---

---

---

---



## Module 3, Investigation 4: Log 3

### Where in the world are major environmental changes?

1. Describe two differences that are observed between the 1975 and 1992 images.

1)

---

---

2)

---

---

2. Describe the pattern of deforestation that you see on the 1992 image.

---

---

---

3. What human activities created the pattern?

---

---

4. If animal populations need large expanses of natural forest to live and reproduce, what would be the effects of the change in land use patterns on animal populations?

---

---

---

---

5. Using the image as a model, on a separate sheet of paper, do a sketch map of a pattern that you think would be better to preserve wildlife habitat and still allow some settlement activity in the region. Is there a better way to develop the forest and still provide for the needs of animals?

---

---

---

---



## Module 3, Investigation 4: Log 3

### Where in the world are major environmental changes?

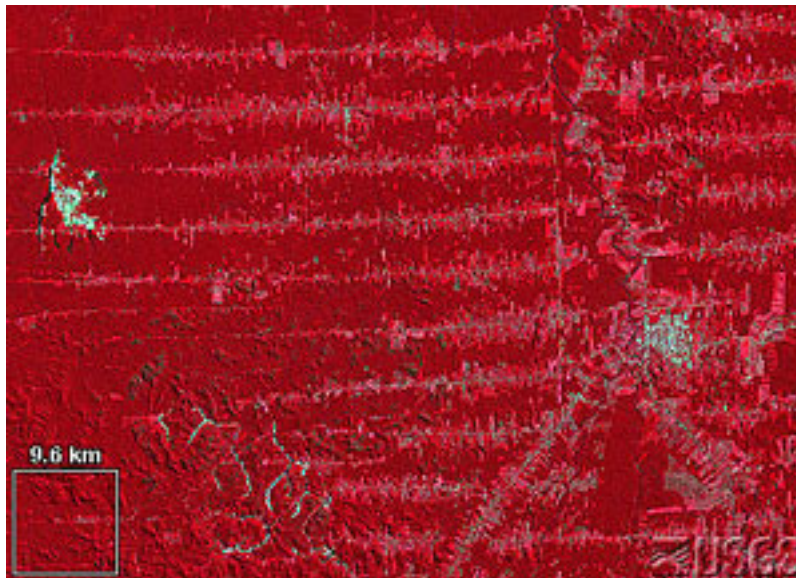
Dark red indicates forested areas. Light red indicates deforested areas. Light blue shows settlements.

Notice that in the 1975 image there is a line of light red and some small blue dots. These represent a road through the forest and some small settlements. Little deforestation had taken place in this area of Rondonia. Now examine the 1975 and 1992 satellite images of Rondonia, Brazil. Both images are from Landsat.

1975



1992



Source: <http://edcwww.cr.usgs.gov/earthshots/slow/Rondonia/Rondonia>



## Module 3, Investigation 4: Log 3

### Where in the world are major environmental changes?

6. Why do you think your proposed pattern would be better than the current pattern on the 1992 image?

---

---

---

---

---

7. Does deforestation in Rondonia affect other places? How?

---

---

---

8. Are there some other ways that basic needs might be met that would have less impact on the environment?

---

---

---

---

---

---

---

#### Concluding the Activity

Using what you have learned in this investigation, develop a short essay on the following question:  
*What are the advantages and disadvantages for people when forests are cut down?*