LESSON FOURTEEN

Core Learning Goal: 3

The student will demonstrate an understanding of geographic concepts and processes to examine the role of culture, technology, and the environment in the location and distribution of human activities throughout history.

Expectation: 1

The student will demonstrate an understanding of the relationship of cultural and physical geographic features in the development of government policy.

Indicator 3.1.2

The student will evaluate the role of government in addressing land use and other environmental issues.

Assessment Limits:

- *International, **national, state**, and/or regional **issues.***
- *Regional means both different areas within Maryland and the United States and different areas of the world.*

Overview:

In this lesson students will examine Maryland's air pollution problem. They will identify federal and state actions to improve air quality and propose further actions needed.

Lesson Objectives:

Students will analyze data on air pollution in Maryland.

Students will evaluate the effectiveness of government actions to improve air quality.

Materials:

Overhead transparency: ***Maryland Air Pollution Fact Sheet***

Student Handout: ***Pollution Data*** (3 pages)

Recommended teacher resource:

Maryland Department of the Environment

Useful websites:

www.cleanair.net
www.epa.gov
www.nsc.org/ehc/mobile/mse_fs.htm
www.ccap.org

Procedures:

1. Ask students "What state regulations must you follow if you own an automobile? Direct their responses toward the auto emissions testing requirement in some Maryland counties. Point out that not all states require emissions testing.

2. Show students a transparency of the ***Maryland Air Pollution Fact Sheet.*** Discuss the information, and ask students to suggest some possible causes of air pollution in Maryland.

3. Divide students into small groups. Distribute the ***Pollution Data*** handouts and have each group:
   Write a summary on the extent of air pollution in Maryland.
   Identify actions taken by the federal and state governments.
   Examples of actions may include:
   Federal: Requiring catalytic converters, suing Midwest utilities
   State: Issuing permits to pollution sources, auto emissions testing

4. Ask each group to recommend actions that would improve air quality. Record their recommendations on the chalkboard in these categories:

Federal Actions	**State Actions**	**Individual Actions**

Summarize by asking: "Which level of action – federal, state, or individual – would most likely be successful in reducing air pollution?"

Assessment of Indicator:

Have students answer this Brief Constructed Response item:

- How is the government involved in protecting air quality?
- What is the most effective action the government can take to reduce air pollution? Justify your choice.
- Include examples and details to support your answer.

Use the Social Studies Rubric to score student responses.

Information from the Maryland Department of the Environment and the Environmental Protection Agency were used to create this lesson.

Maryland Air Pollution Fact Sheet

- **Baltimore was one of only nine cities in the United States required to improve emissions standards by the 1990 Clean Air Act.**

- **One-fourth of Marylanders live in areas where the air quality is designated unhealthy.**

- **Over 50,000 children in Maryland suffer from asthma.**

- **The Baltimore/Washington metropolitan area is ranked the 7th worst in air quality in the United States.**

- **Anne Arundel County is ranked the 10th worst county in air quality in the United States.**

- **The Baltimore area exceeded ground-level ozone safety standards every summer between 1980-2000.**

Pollution Data

Data 1a

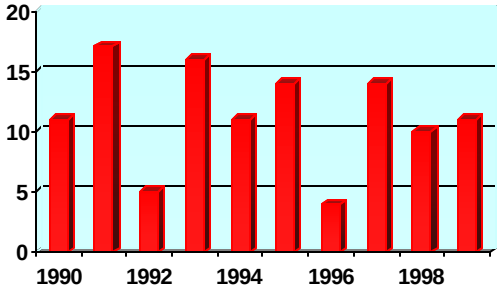
Air Pollution – Cause/Effect

Many factors contribute to air pollution: vehicle emissions, electric power plants, coal-burning industries, chemical plants, and consumer products like aerosal sprays and refrigerants. Negative effects of pollution include the depletion of the earth's ozone layer, acid rain that harms agricultural crops, and health problems such as asthma and eye/throat irritation. The diagram below shows the formation of ground-level ozone, also called smog. In the summer months, temperature inversions (warm air trapped near the surface) keep smog in the same place near Maryland's metropolitan areas for days.

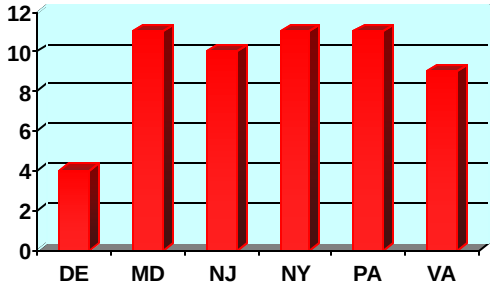
Pollution Alerts

The Maryland Department of the Environment reports on air pollution levels as **Code Red** (dangerous) and **Code Orange** (unhealthy). In 1999, for example, there were 11 Code Red alerts and 24 Code Orange alerts issued for the Baltimore area. The entire mid-Atlantic region also experienced significant pollution alerts in 1999.

Maryland Code Red Days



Mid-Atlantic Code Red Days 1999



Data 1b

The Clean Air Act

In 1970 Congress passed the Clean Air Act to fight air pollution in the United States. This act was re-authorized by Congress again in 1990. Some provisions of the law included:

- Setting emissions performance requirements for nine United States cities, including Baltimore
- Directing the Environmental Protection Agency (EPA) to work with states and monitor progress
- Requiring catalytic converters to be installed in all vehicles sold in the United States
- Discontinuing the use of leaded gasoline, and promoting the use of reformulated (less polluting) gasoline
- Monitoring state-to-state pollution, such as when emissions from electric power utilities in the Midwest drift into east coast states
- Requiring states to inspect and issue permits to pollution sources
- Identifing "non-attainment areas" throughout the United States

Maryland Ozone Classifications

The Clean Air Act of 1990 directed the Environmental Protection Agency to study and classify air quality in various parts of the United States. Levels of "attainment" indicate whether an area meets federal clean air health standards. The chart below shows Maryland's ratings as of December 1997:

Anne Arundel County, Baltimore City, Baltimore County, Carroll County, Cecil County, Harford County, Howard County	Severe Nonattainment
Calvert County, Charles County, Frederick County, Montgomery County, Prince George's County	Serious Nonattainment
Kent County, Queen Anne's County	Marginal Nonattainment
Allegheny County, Caroline County, Dorchester County, Garrett County, Somerset County, St. Mary's County, Talbot County, Washington County, Wicomico County, Worcester County	Insufficient data to classify

Data 1c

Government Actions/Results

Below are examples of three actions that were taken by state or federal governments in 1999 to enforce the Clean Air Act:

The federal government filed suit against seven utility companies in the Midwest, charging that 17 power plants had illegally released massive amounts of air pollution for years.
New York State sued 17 coal-burning industries seeking significant Civil penalties. Under the Clean Air Act, monetary awards of up to $25,000 per day are allowed. New Hampshire and Ontario, Canada joined in the lawsuit.
The Environmental Protection Agency (EPA) issued an administrative order against the TVA, a federal utility agency that runs 24 power plants in Illinois, Indiana, Kentucky, Ohio, Tennessee, and West Virginia. It charged that required air pollution controls were not installed in the plants.

Between 1970 and 1995, the United States saw a 34% reduction in emissions. During the same period, Maryland saw a 28% reduction in emissions.

In the years between 1990-2000, the number of Code Red and Orange days in major U.S. metropolitan areas was cut in half.

In 1984, Baltimore exceeded federal carbon monoxide limits 17 times, but in 1995 it was re-classified as meeting the federal limits.