

## UNIT V - NATURAL RESOURCES AND CONSERVATION

### Lesson 4: Air Quality

**Competency/Objective:** Describe the importance of air quality.

#### **Study Questions**

1. **What is air quality?**
2. **What types of pollution affect air quality?**
3. **What are the sources of air pollution?**
4. **Why is it important to maintain air quality?**
5. **What is being done to ensure air quality?**

#### **References**

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit V.
2. Transparency Master  
TM 4.1 Air Pollution in the Past
3. Activity Sheets  
AS 4.1 Factors Affecting Air Quality  
AS 4.2 Pollutants in the Home

## UNIT V - NATURAL RESOURCES AND CONSERVATION

### Lesson 4: Air Quality

#### TEACHING PROCEDURES

##### A. **Review**

Previous lessons discussed water quality and conservation. This lesson will discuss air quality. Fresh, clean air is necessary for life but frequently is taken for granted. Citizens should strive to keep air clean by recognizing and reducing causes of air pollution.

##### B. **Motivation**

1. Using an oxyacetylene torch, light the torch with only acetylene to show the soot that is formed. Ask students what happens to the soot in the air.
2. Using a white paper towel, hold it over the exhaust pipe of a car that is running. Repeat the experiment on a diesel car or truck. Were there any differences in the color of the exhaust emissions?
3. Show students an air filter from a furnace to show them how much dust and other matter is captured from the air people breathe.

##### C. **Assignment**

##### D. **Supervised Study**

##### E. **Discussion**

###### **Q1. What is air quality?**

###### **A1. Air quality is the purity of the air that is used by living organisms.**

High-quality air is free of pollution. Air with low quality contains materials that are toxic for living organisms to breathe. Have students brainstorm a list of possible ways that humans and other living things are affected by the quality of the air.

###### **Q2. What types of pollution affect air quality?**

###### **A2.**

- a) **Gaseous pollutants**
  - 1) **Carbon monoxide**
  - 2) **Nitrogen dioxide**
  - 3) **Sulfur dioxide**
  - 4) **Hydrocarbons**
- b) **Odor**
  - 1) **Factory odors**
  - 2) **Animal odors**
  - 3) **Waste treatment facilities**
- c) **Particulate matter**
  - 1) **Natural particles**
  - 2) **Human-generated particles**

Many factors contribute to the reduced quality of air in the environment. It is important to take steps to improve the quality of air in the environment. Complete AS 4.1 as a group and discuss possible ways humans contribute to the reduction of the quality of their air. Complete AS 4.2 and identify sources of air pollution in the home.

**Q3. What are the sources of air pollution?**

**A3.**

- a) **Human activities - burning, factories, automobiles, etc.**
- b) **Natural processes - fires, volcanic eruptions, decay, etc.**

Have students relate the types of pollution identified in study question 2 to their sources in this study question.

**Q4. Why is it important to maintain air quality?**

**A4.**

- a) **Human health**
- b) **Plant health**
- c) **Climate**
- d) **Maintain beauty of surroundings**
- e) **Reduce damage to property**

Air rich in chemicals, hazardous gases, and other pollutants affects the health of animals and plants. It damages property and causes a dingy, dirtier looking world in which to live. Discuss important reasons to maintain air quality.

**Q5. What is being done to maintain air quality?**

**A5.**

- a) **Motor vehicle emission controls on new cars**
- b) **Motor vehicle exhaust inspection**
- c) **Increased public transportation**
- d) **Use of ethanol and electric cars**
- e) **Use of alternate energy such as solar power, water power, and windmills**

Although progress has been made in controlling air pollution, more needs to be done. The public has become more conscious of the environment and is taking steps to maintain air quality. Each person should do his or her part to reduce air pollution and to maintain a healthy environment in which to live. Display TM 4.1 to demonstrate how pollution standards have developed and changed over history.

**F. *Other Activities***

1. Have students clip out newspaper articles on air pollution and write short critiques or summaries of these articles or have students to make a collage of magazine and newspaper pictures of air pollution sources.
2. Ask students to identify one source of air pollution and present to the class a way the source can be prevented or reduced.
3. Have students debate whether the air is cleaner now than it was 20 years ago. Encourage them to consider the current population and amount of industries in operation. What safeguards do we now have that were not enforced 20 years ago?

G. **Conclusion**

H. **Answers to Activity Sheets**

AS 4.1 Factors Affecting Air Quality

Answers will vary.

AS 4.2 Pollutants in the Home

Answers will vary.

I. **Evaluation**

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

## Air Pollution in the Past

- 1960** Studies are conducted on how carbon dioxide creates the greenhouse effect.
- 1963** About 300 people were killed and thousands of others were injured in New York City because of high concentrations of air pollutants that accumulated in air over the city. Other episodes in major cities led to much stronger air pollution control programs in the 1970s.
- 1963** Clean Air Act of 1963 authorized the U.S. Public Health Service to study air pollution and provided grants and training for states to control it.
- 1970** With the passage of the Clean Air Act Amendments of 1970, responsibility for controlling air pollution was assigned to the Environmental Protection Agency. Ambient air quality standards and performance standards for coal-fired power plants were established. These standards became known as the New Source Performance Standards.



## Air Pollution in the Past

**1987** CFC production is banned through a multinational treaty called Montreal Protocol.

**1990** Clean Air Act Amendments of 1990 targeted several specific areas:

Acid Rain: Reduce by half sulfur dioxides and nitrogen oxides.

Urban Smog: Establish targets for cities that do not meet limits on ozone (a key ingredient in smog.) These cities (non-attainment areas) have specific phased-in targets to be met.

Automobile Emissions: Set specific targets for reduction of tailpipe emissions of hydrocarbons. Require longer-lasting pollution control equipment on cars and cleaner kinds of gasoline (such as gasohol) in cities with the worst carbon monoxide problems. Mandate development of automobiles meeting even stricter standards in extremely pollution-prone cities like Los Angeles.





## Air Pollution in the Past

**1990** Toxic Air Pollutants: Expand the number of regulated toxic air pollutants from 7 to 189, set new safety standards for residents living near polluters, require polluters to install the best available pollution control equipment to reduce toxic emissions by 90% by the year 2003.

Depletion of the Ozone Layer: Phase out destruction of ozone-destroying chemicals throughout the 1990s, including CFCs, methyl chloroform, and carbon tetrachloride and establish rules for recycling and disposal of such chemicals.



Lesson 4: Air Quality

Name \_\_\_\_\_

**Factors Affecting Air Quality**

**Objective:** Students will identify sources affecting air quality.

**Directions:** Generate a list of sources contributing to reduced quality of air and list them to the right of each category.

Gaseous Pollutants

Odor

Particulate Matter



Lesson 4: Air Quality

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**Pollutants in the Home**

**Objective:** Students will identify sources of pollution in the home.

**Directions:** Identify possible sources of pollution in your home, ways in which the pollutant could have harmful effects on people in the home, and possible ways in which the pollution could be reduced.

Sources of Pollution

Effects

Solutions

