## **Chapter 1 NoteGuide**

## **1.1 Objectives**

Define environmental science and compare environmental science with ecology.
List the five major fields of study that contribute to environmental science.
Describe the major environmental effects of hunter-gatherers, the agricultural revolution, and the Industrial Revolution.
Distinguish between renewable and nonrenewable resources.
Classify environmental problems into three major categories.

### What Is Environmental Science?

- Environmental Science -
- It includes the study of the \_\_\_\_\_\_ on the environment.

#### The Goals of Environmental Science

- A major goal of environmental science is to \_\_\_\_\_\_ and \_\_\_\_\_ environmental problems.
- To accomplish this goal, environmental scientists study two main types of interactions between humans and their environment:
  - 1.
  - 2.

### **Many Fields of Study**

- Environmental science is an \_\_\_\_\_\_ science, which means that is involves \_\_\_\_\_\_ fields of study.
- Important to the \_\_\_\_\_\_ of environmental science is \_\_\_\_\_\_.
- Ecology –

Major Fields of Study That Contribute to Environmental Science		
<b>Biology</b> is the study of living organisms.	Zoology is the study of animals. Botany is the study of plants. Microbiology is the study of microorganisms. Ecology is the study of how organisms interact with their environment and each other.	
<b>Earth science</b> is the study of the Earth's nonliving systems and the planet as a whole.	Geology is the study of the Earth's surface, interior processes, and history. Paleontology is the study of fossils and ancient life. Climatology is the study of the Earth's atmosphere and climate. Hydrology is the study of Earth's water resources.	
<b>Physics</b> is the study of matter and energy.	<b>Engineering</b> is the science by which matter and energy are made useful to humans in structures, machines, and products.	
<b>Chemistry</b> is the study of chemicals and their interactions.	<b>Biochemistry</b> is the study of the chemistry of living things. <b>Geochemistry</b> , a branch of geology, is the study of the chemistry of materials such as rocks, soil, and water.	
Social sciences are the study of human populations.	Geography is the study of the relationship between human populations and Earth's features. Anthropology is the study of the interactions of the biological, cultural, geographical, and historical aspects of humankind. Sociology is the study of human population dynamics and statistics.	

## What are our Main Environmental Problems?

- Environmental problems can generally be grouped into three categories:
  - 1.
  - 2.
  - 3.

# **Resource Depletion**

• Natural Resources are any \_\_\_\_\_ materials that are used by humans, such as, \_\_\_\_\_, \_\_\_\_, and

Renewable and Nonrenewable Resources			
Renewable	Nonrenewable		
energy from the sun water wood soil	metals such as iron, aluminum, and copper nonmetallic ma- terials such as salt, sand, and clay		
air	fossil fuels		

- Natural resources are classified as either a \_\_\_\_\_ resources or a \_\_\_\_\_ resource.
- Renewable resources can be \_\_\_\_\_\_ relatively quickly by \_\_\_\_\_\_ process.
- \_\_\_\_\_ resources form at a much slower than they are consumed.
- Resources are said to be \_\_\_\_\_\_ when a large fraction of the \_\_\_\_\_\_ has been \_\_\_\_\_\_ up.
- Once the supply of a \_\_\_\_\_\_ resource has been used up, it may take millions of years to replenish it.
- \_\_\_\_\_ resources, such as \_\_\_\_\_, may also be depleted causing deforestation in some areas.

## **Pollution**

- Pollution is an \_\_\_\_\_ change in the natural environment that is caused by the \_\_\_\_\_ of substances that are \_\_\_\_\_ to living organisms or by \_\_\_\_\_, \_\_\_, \_\_\_, \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_,
- Much of the pollution that troubles us today is produced by \_\_\_\_\_\_ and the accumulation of \_\_\_\_\_\_.

There are two main types of pollutants:

- Biodegradable pollutants, which can be \_\_\_\_\_\_ by \_\_\_\_\_ processes and include materials such as \_\_\_\_\_\_.
- Nondegradable pollutants, which \_\_\_\_\_\_ be broken down by natural processes and include materials such as \_\_\_\_\_\_.
- Degradable pollutants are a problem only when they accumulate \_\_\_\_\_\_ than they can be
- However, because nondegradable pollutants do not break down easily, they can build up to dangerous levels in the environment.

## Loss of Biodiversity

- **Biodiversity** is the \_\_\_\_\_\_ of organisms in a given \_\_\_\_\_, the genetic variation within a population, the variety of species in a \_\_\_\_\_\_, or the variety of \_\_\_\_\_\_ in an \_\_\_\_\_.
- The organisms that share the world with us can be considered natural resources.
- We depend on them for food, the oxygen we breathe, and for many other things.
- Yet, only a fraction of all the species that once roamed the Earth are alive today, and many are extinct.
- Scientists think that if the current extinction rates continue, it may cause problems for the human population.
- Many people also argue that all species have potential economic, scientific, aesthetics, and recreational value, so it is important to preserve them.

#### Classify the following: Resource Depletion, Pollution, Loss of Biodiversity

Smog	Strip mining
Pesticides in the water	Top Soil running out
Soil produces low crop yields	High gas prices
Rain Forest Destruction	More animals being raised in captivity
Ozone Depletion	Massive fish kills
Acid Rain	

#### **1.2 Objectives**

- **1.** List three differences between developed and developing countries.
- 2. Explain what sustainability is, and describe why it is a goal of environmental science.

#### **Developed and Developing Countries**

- The \_\_\_\_\_\_ distribution of wealth and resources around the world influence the environmental problems and solutions a society can make.
- \_\_\_\_\_ countries have \_\_\_\_\_\_ incomes, \_\_\_\_\_\_ population growth, diverse
  - \_\_\_\_\_ economies, and stronger social support.
- \_\_\_\_\_ countries have \_\_\_\_\_\_ average incomes, simple \_\_\_\_\_-based communities, and \_\_\_\_\_\_ population growth.

### **Population and Consumption**

- Almost all environmental problems can be traced back to two root causes:
  - 1. The human population in some areas is \_\_\_\_\_\_ too \_\_\_\_\_ for the local environment to support.
  - 2. People are \_\_\_\_\_, \_\_\_\_, or \_\_\_\_\_ many natural resources faster than they can be \_\_\_\_\_, or \_\_\_\_\_ up.

### Local Population Pressures (Population Crisis)

- When the population in an area grows rapidly, there may not be enough natural resources for everyone to live a healthy, productive life.
- In severely overpopulated regions, forests are stripped bare, topsoil is exhausted, and animals are driven to extinction.
- In these areas, malnutrition, starvation, and disease can be constant threats.
- In developing countries, millions of people are starving.
- Yet these human populations tend to grow the fastest.
- Food production, education, and job creation cannot keep pace with the population growth, so each person gets fewer resources as time goes by.
- Population crisis is most severe in \_\_\_\_\_ countries

### **Consumption Trends (Consumption Crisis)**

- To support the higher quality of life, \_\_\_\_\_\_\_ countries are using much more of Earth's resources.
- Developed nations use about 75 percent of the world's resources, although they make up only 20 percent of the world's population.
- This rate of consumption creates more waste and pollution per person then in developing countries.

## **Ecological Footprints**

- Ecological footprints are calculations that show the \_\_\_\_\_\_ area of Earth needed to \_\_\_\_\_\_ one person in a particular country.
- An ecological footprint estimates the land used for crops, grazing, forests products, and housing. It also includes the ocean area used to harvest seafood and the forest area needed to absorb the air pollution caused by fossil fuels.
- An ecological footprint is one way to express the differences in consumption between nations.

#### A Sustainable World

- **Sustainability** is the condition in which human needs are met in such a way that a human population can survive indefinitely.
- Sustainability is a key goal of environmental science.
- A sustainable world is not unchanging as technological advances and human civilizations continue to be productive.
- However, our current world is not sustainable as the developed countries are using resources faster than they can be replaced.
- Achieving a sustainable world requires everyone's participation including individual citizens, industry, and the government.

#### Multiple Choice

- 1. How do scientists characterize a nonrenewable resource?
  - A. a resource that is used by humans
  - B. a resource that can not be replaced
  - C. a resource that can be replaced relatively quickly
  - D. A resource that takes more time to replace than to deplete

- Which of the following is an important foundation of environmental science?
   F. ecology
   G. economics
  - H. meteorology
  - I. political science
- 3. Which of the following phrases describes the term biodiversity?
  - A. species that have become extinct
  - B. the animals that live in an area
  - C. species that look different from one another
  - D. the number and variety of species that live in an area
- 4. Energy from the sun, water, air, wood, and soil are all examples of what kind of energy?
  - F. ecological energy
  - G. organic energy
  - H. renewable energy
  - I. solar energy

Use this graph to answer questions 6 and 7



# World Population (1600–2000)

- 6. What was the total population increase between the years 1600 and 1900?
  - F. 0.6 billion
  - G. 0.9 billion
  - H. 1.0 billion
  - I. 1.5 billion

7. If the rate of growth from 1900-1950 had been the same as the rate of growth from 1950-2000, what would the world population have been at the end of the century?

- A. more than 7 billion
- B. more than 10 billion
- C. more than 15 billion
- D. more than 20 billion
- 8. Which of the following characterizes the environmental consequences of the current population trend? F. More people mean more housing construction.
  - G. The need for food and resources is growing rapidly.
  - H. The standard of living has risen around the world.
  - I. There is no connection between population growth and environment.