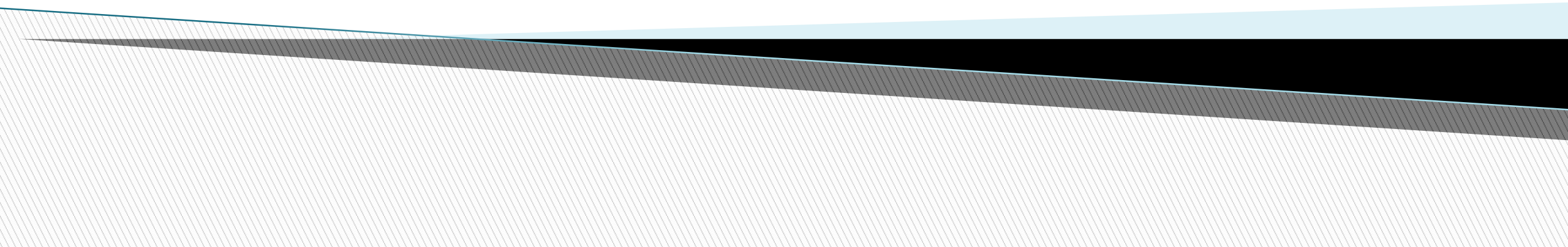


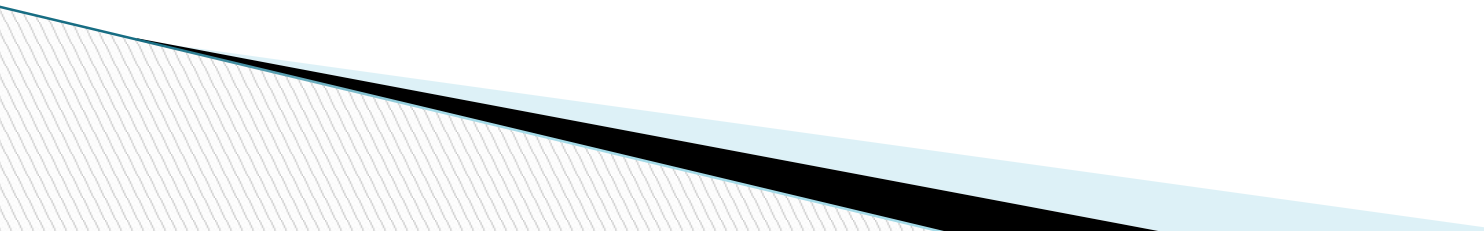
# Chapter 1 – Science and the Environment

Section 1 – Understanding Our Environment

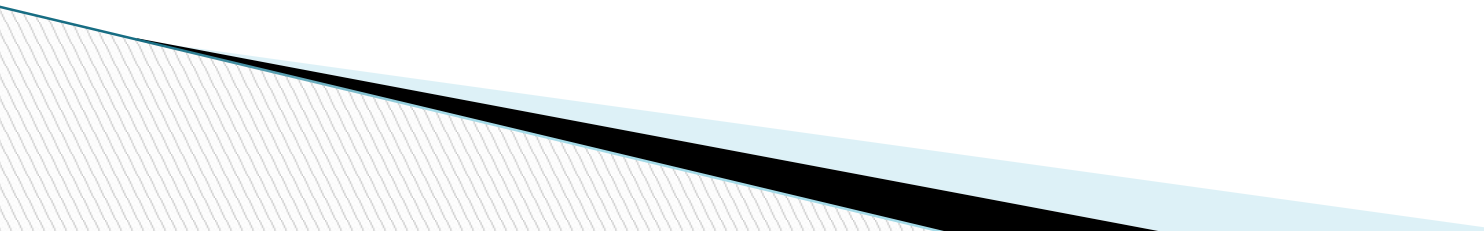
Section 2 – The Environment and Society



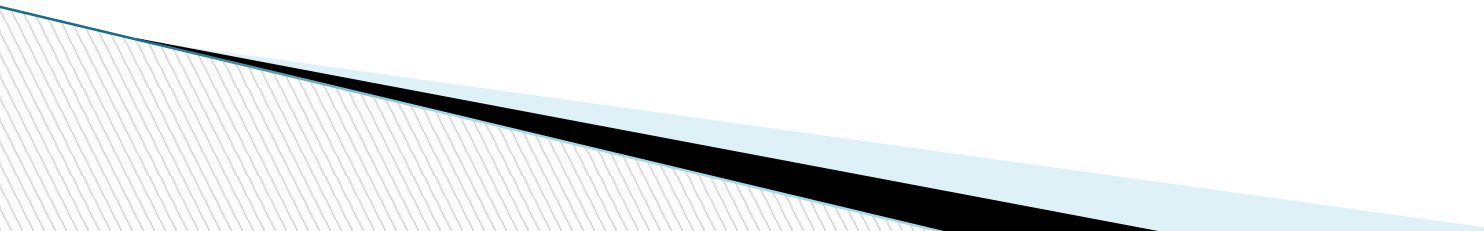
# Section 1 – Understanding Our Environment – Objectives

- ▶ 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–gathers, the agricultural revolution, and the industrial revolution.
  - ▶ Distinguish between renewable and nonrenewable resources.
  - ▶ Classify environmental problems into three major categories.
- 

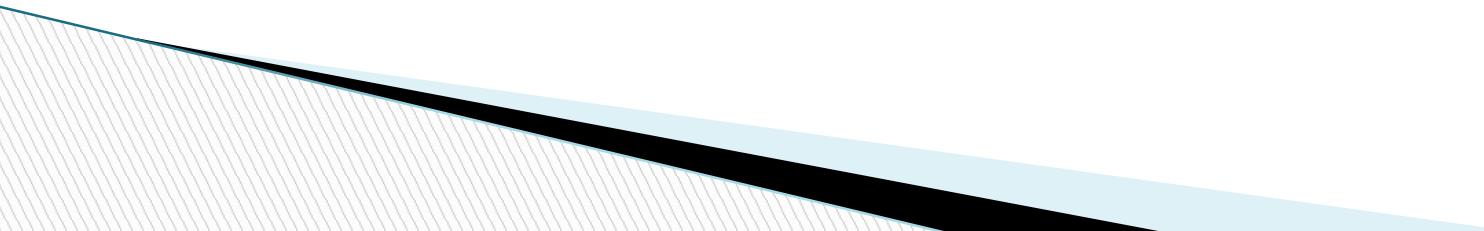
# What is Environmental Science?

- ▶ It is important to understand the environment as a whole, including both its biological and physical features.
  - ▶ Environmental science is the study of the environment that includes the physical, biological, and social sciences.
- 

# The Goals of Environmental Science

- ▶ People influence the environment and the environment influences people.
    - It's important to understand how our actions effect the environment
    - With a better understanding of how the environment works we can make better decisions.
- 

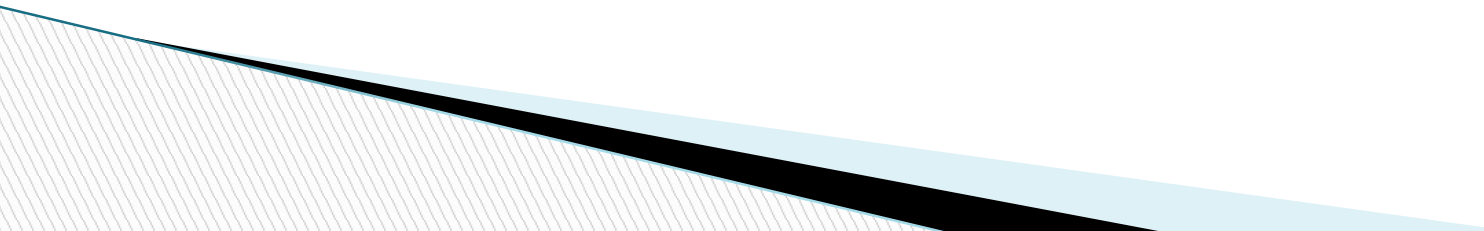
# Many Fields of Study

- ▶ Environmental science is an interdisciplinary science, which means it involves many fields of study.
  - ▶ Ecology is the study of how living things interact with each other and with their nonliving environment.
- 

# Major Fields of Study That Contribute to Environmental Science

- ▶ Biology 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 how organisms interact with their environment and each other.
- ▶ Earth Science is the study of Earth's nonliving systems and the planet as a whole.
  - Geology is the study of Earth's surface, interior processes, and history.
  - Paleontology is the study of fossils and ancient life.
  - Climatology is the study of Earth's atmosphere and climate
  - Hydrology is the study of Earth's water resources
- ▶ Physics is the study of matter and energy
  - Engineering is the science by which matter and energy are made useful to humans in structures, machines, and products

# Major Fields of Study That Contribute to Environmental Science

- ▶ Chemistry is the study of chemicals and their interactions
    - Biochemistry is the study of the chemistry of living things.
    - Geochemistry, 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.
- 

# Environmental Science

- ▶ The study of environmental science requires the use of these five areas of science. This interdisciplinary look gives a deeper understanding.



# Scientists as Citizens, Citizens as Scientists

- ▶ Governments, businesses, and communities recognize that studying our environment is vital to maintaining a healthy and productive society.
- ▶ It is important that environmental scientists share their findings with each other.
  - United Nations conferences
    - Global Warming
- ▶ Citizens also play an important role in environmental scientists
  - It is often the observations of nonscientists that lead to addressing environmental issues`

# Our Environment Through Time

- ▶ The environment has gone through many changes as we have changed our influence.
  - Hunter–Gather’s – moved around following herds and searching for food
    - Over hunting was an issue
  - Agricultural Revolution – settling down and domesticating plants and animals
    - Large impact
    - Advanced allowed for larger yields and less people needing to farm
  - Industrial Revolution – advances in technology
    - Large manufacturers
    - Air and water pollution

# Improving Quality of Life

- ▶ Human society has always strived to improve the quality of life. Many advances have led to major improvements.
  - Antibiotics and advances in medicine
  - Better nutrition
  - Sanitation
  - Electricity
  - New energy sources

# Spaceship Earth

- ▶ Earth is essentially a *closed system* – the only thing that enters Earth's atmosphere is large amounts of energy from the sun, and the only thing that leaves is large amounts of heat.
  - Closed systems can have potential problems
    - Limited resources
    - Produce more waste than can be disposed of
- ▶ Earth can be thought of as a complete system, environmental problems can occur on different scales: local, regional, or global.
  - Local – new landfill in your community
  - Regional – polluted rivers
  - Global – climate change

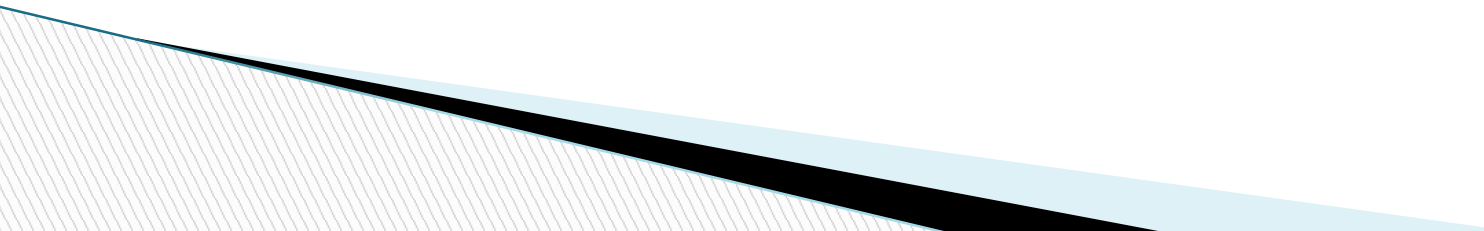
# Population growth: A Local Pressure

- ▶ The agricultural and industrial revolution allowed for the human population to grow larger and faster than ever before.
  - This is one reason for many environmental issues we see today.
- ▶ The larger the population the larger the demand for resources...the larger the ecological footprint

# What Are Our Main Environmental Problems?

- ▶ Resource Depletion
  - ▶ Pollution
  - ▶ Loss of Biodiversity
- 

# Section 2 – The Environmental and Society Objectives

- ▶ Describe the “The Tragedy of the Commons.”
  - ▶ Explain the law of supply and demand.
  - ▶ List three differences between developed and developing countries.
  - ▶ Explain what sustainability is, and describe why it is a goal of environmental science.
- 

# The Tragedy of the Commons

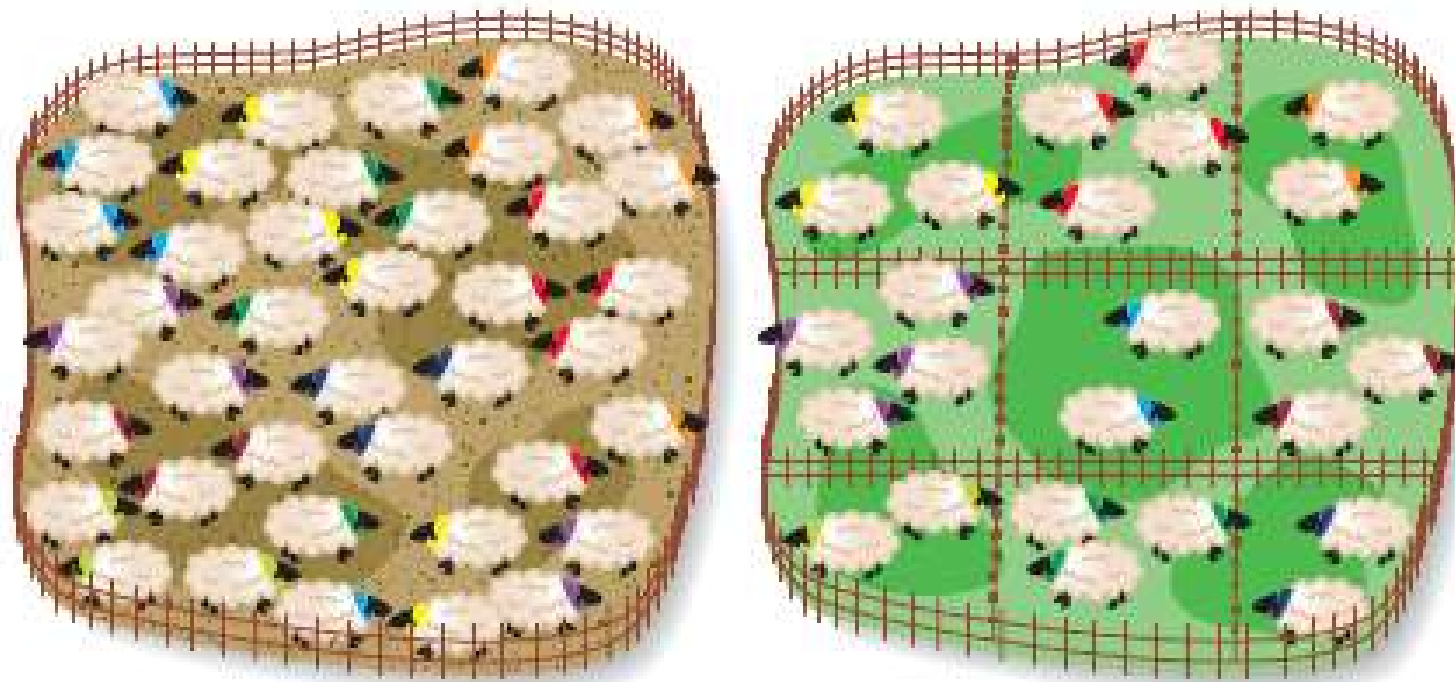
- ▶ In 1968, ecologist Garrett Hardin published his essay, “The Tragedy of the Commons.”
- ▶ He argued in this essay that the main difficulty in solving environmental problems is the conflict between short-term interests of individual and the long-term welfare of society.
  - Commons are areas of land that belong to a whole village. Anyone can use this land to graze their animals.
    - If I don’t use the resource, someone else will.
    - The land gets over grazed and damaged by this mindset.
      - Everyone suffers when this happens.



# The Tragedy of the Commons

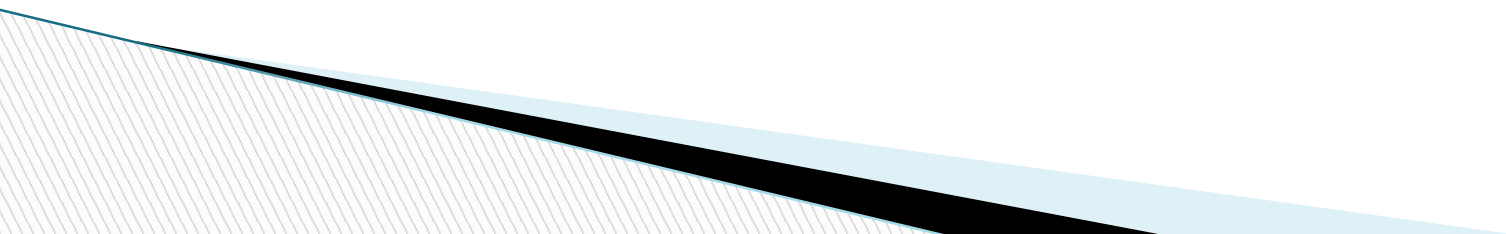
- ▶ Commons were eventually replaced by enclosed fields owned by one individual.
- ▶ They were more likely to watch how they used the land.
  - If they overgrazed their plot, they would suffer.

## “The Tragedy of the Commons”



# Economics and the Environment

- ▶ Economic forces influence how we use our resources.



# Supply and Demand

- ▶ The law of supply and demand states that the greater demand for a limited supply of something, the more that product is worth.
  - Copper
  - Gold

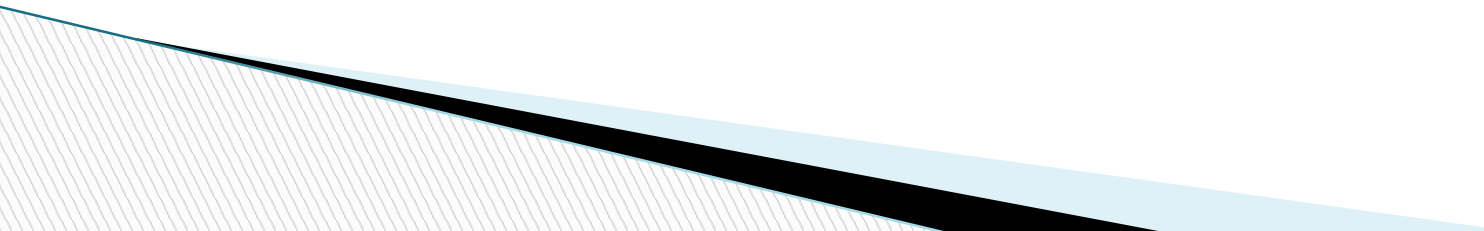
# Cost and Benefits

- ▶ The cost of environmental solutions can be high.
- ▶ A cost–benefit analysis balances the cost of the action against the benefit expected from it.

# Risk Assessment

- ▶ Any action has a risk of an undesirable outcome.
- ▶ Risk assessment is a tool that helps us create cost-effective ways to protect our health and environment.

# Developed and Developing Countries

- ▶ Developed countries have higher average incomes, slower population growth, diverse industrial economies, and stronger social support systems.
  - ▶ Developing countries have lower average incomes, simple and agriculture-based economies, and rapid population growth.
  - ▶ Developed and developing countries have different consumption patterns that affect the environment in different ways.
- 

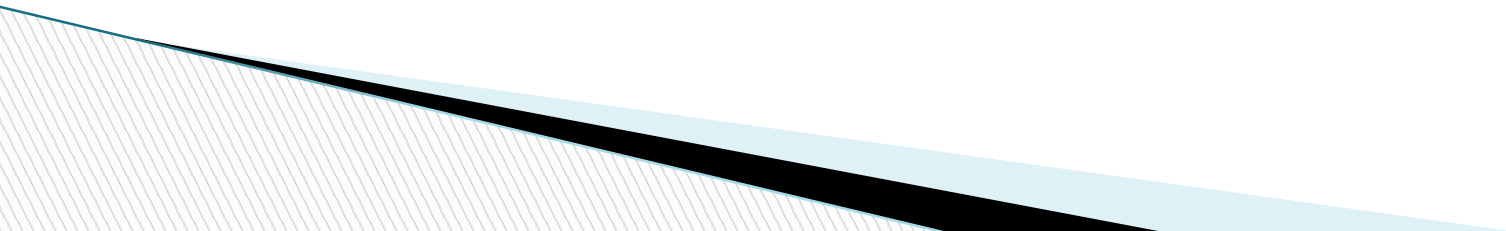
# Local Population Pressures

- ▶ In a population in an area grows rapidly, there may not be enough natural resources for everyone in the area to live a healthy, productive life.
  - Infrastructure, health care, food, space

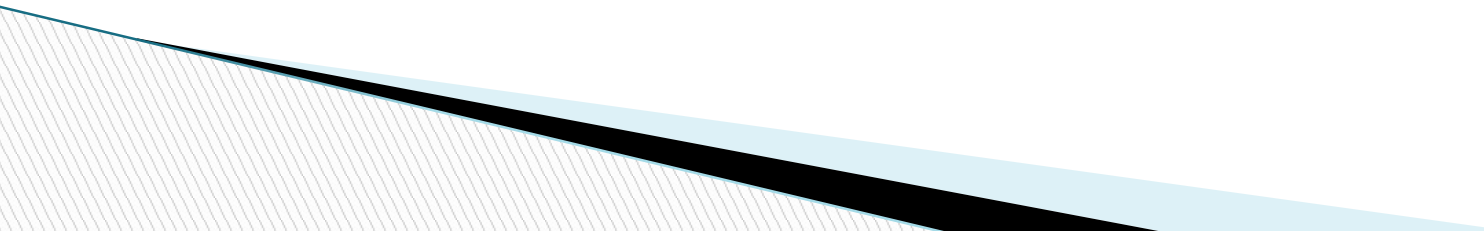


# Consumption Trends

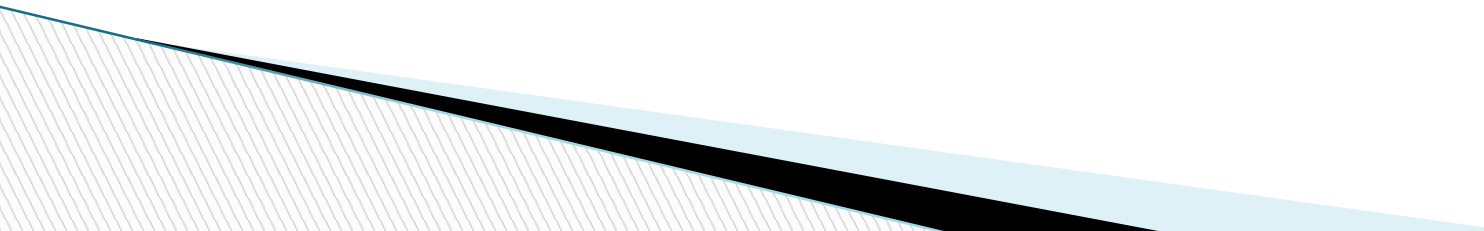
- ▶ Developed nations use about 75% of the world's resources, even though they make up only about 20% of the world's population.



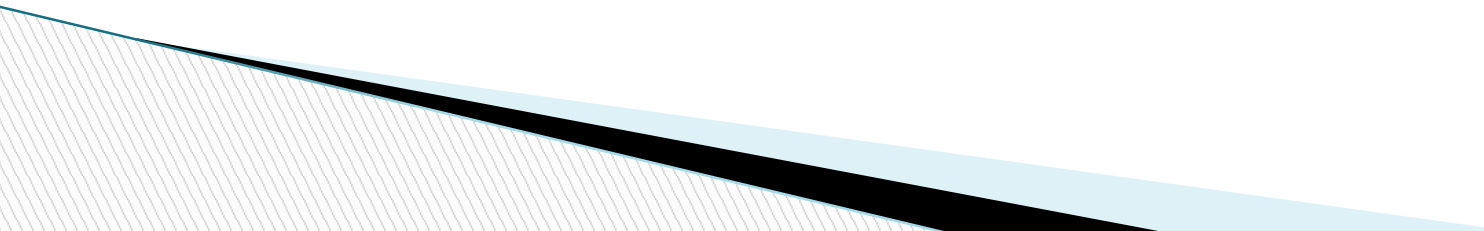
# Ecological Footprint

- ▶ The ecological footprint shows the productive area of Earth needed to support one person in a particular country.
  - ▶ People living in developed nations have a larger ecological footprint, than people living in developing nations.
- 

# Critical Thinking and the Environment

- ▶ It will be important for you to take what you learn in this class and others to make good decisions.
  - ▶ Decisions that are beneficial for the environment, while still allowing us to live productive lives.
  - ▶ You will use your knowledge to think and reason, what is best for me and the environment.
- 

# Sustainable World

- ▶ A sustainable world is the goal of scientists.
  - ▶ Finding a way to live our lives while limiting our ecological footprint.
  - ▶ Sustainability is the condition in which human needs are met in such a way that a human population can survive indefinitely at a standard of living similar to the current one.
- 

# Questions

1. Describe the two main types of interactions that environmental scientists study. Give an example of each.
  2. Explain how environmental problems can be local, regional, or global. Give one example of each.
  3. Explain why environmental science is an interdisciplinary science.
  4. Describe three differences between developing and developed nations. Would you classify Mexico as a developing nation? Explain your answer.
- 