Chapter 1
Studying the State of Our Earth

Environmental science

_____

_____.

Environment

- ***Environment:***_____
  _____.
- ***Environmental science:***
  _____
  _____.

Living *versus* Non-Living

- The environment may also be divided in another way, into two parts:
  - The ***Biotic:***
  - The ***Abiotic:***

Ecosystem

- ***System:*** _____
- ***Eco:***_____
  - ***Ecosystem:*** _____

- Environmental studies includes _____, the study of interactions among human systems and those found in nature, along with other subjects such as _____, _____, _____, _____, _____, _____, and _____.

Figure 1.1
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Figure 1.2
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Humans Alter Natural Systems

- Humans_____
  _____
  _____
  _____

Environmental Scientists Monitor Natural Systems for Signs of Stress

- ***Ecosystem services:***

- ***Environmental indicators:***.

TABLE 1.2 Five key global environmental indicators

Indicator	Recent trend	Outlook for future	Overall impact on environmental quality
Biological diversity	Large number of extinctions, extinction rate increasing	Extinctions will continue	Negative
Food production	Per capita production possibly	Unclear leveling off	May affect the number of people Earth can support
Average global surface temperature and CO_2 concentrations	CO_2 concentrations and temperatures increasing	Probably will continue to increase, at least in the short term	Effects are uncertain and varied, but probably detrimental
Human population	Still increasing, but growth rate slowing	Population leveling off Resource consumption rates are also a factor	Negative
Resource depletion	Many resources are being depleted at rapid rates. But human ingenuity frequently develops "new" resources, and efficiency of resource use is increasing in many cases	Unknown	Increased use of most resources has negative effects

Table 1.2
Environmental Science

- *Environmental indicators* _____.
- The five global environmental indicators are:

1.
2.
3.
4.
5.

Environmental Indicator: Biological Diversity

- ***Biological Diversity or Biodiversity:***

Biological Diversity

- Biological diversity includes:

1.

2.

3.

Genetic Diversity

- A measure of the _____a population.
- Populations with _____ _____ than populations with lower genetic diversity.

Species Diversity

- The number of species in a region or in a particular type of habitat.
- ***Species:***

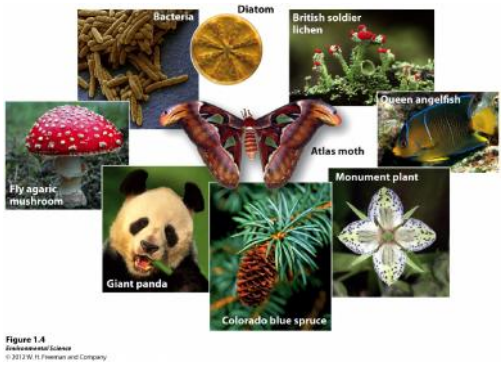


Figure 1.4

Ecosystem Diversity

•

Environmental Indicator: Food Production

- Our ability to grow food _____ _____.
- We use science and agricultural technology ___ _____ _____ _____

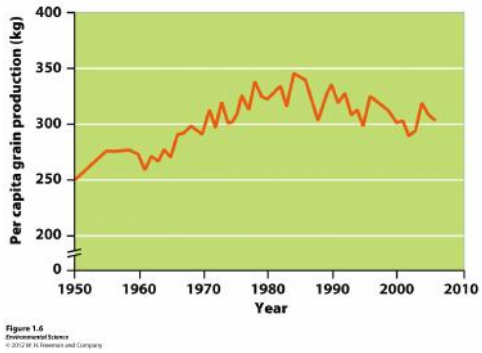


Figure 1.6
Environmental Science

Environmental Indicator: Average Global Surface Temperatures and Carbon Dioxide Concentrations

- ***Greenhouse gases:*** _____

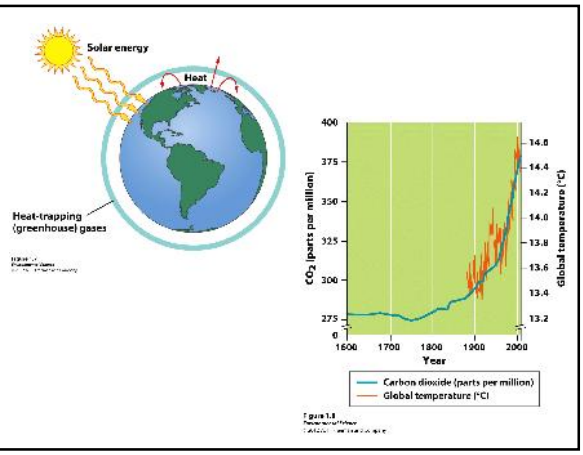
  _____

  _____

The most important greenhouse gas is _____.

- ***Anthropogenic:*** _____

  _____



Environmental Indicator: Human Population

- The current human population is _____.
- Over one million additional people are added to the Earth every five days.

Figure 1.9
Environmental Science

Environmental Indicator: Resource Depletion

- As the human population grows, _____ _____ _____
- Some natural resources such as _____ _____and cannot be renewed or reused.
- Other natural resources like _____ _____ finite amounts but can be recycled.

Resource Depletion

- ***Development:*** _____ _____ _____ _____

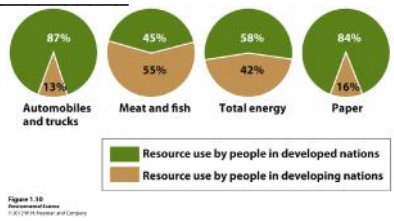


Figure 1.11
Environmental Science

Sustainability

- ***Sustainability:***

  _____
  _____
  _____
  _____
  _____.

Continued Human Well-Being Depends on Sustainable Practices

- ***Sustainable Development:***

  _____
  _____
  _____
  _____
  _____

Figure 1.12
Environmental Science

Human Well-Being Depends on Sustainable Practices

- In order to live sustainably:
  - Environmental systems _____ _____.
  - Renewable resources must _____ _____.
  - Nonrenewable resources must _____

Defining Human Needs

- People in developed nations _____ _____.
- Many people _____ _____ _____.
- Basic human needs are _____ _____

The Ecological Footprint

- A measure _____
  _____
  _____
  _____.

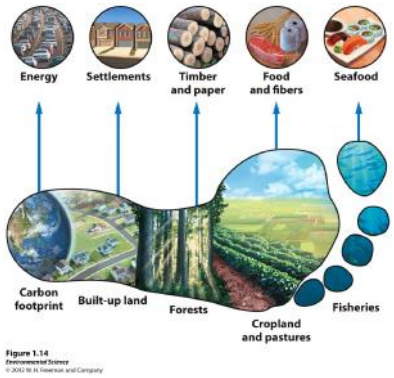


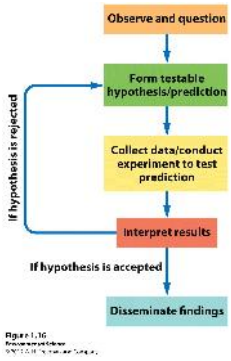
Figure 1.14

Figure 1.15

Science is a process.

The Scientific Method

1. Observations and_____
2. _____
3. _____
4. _____
5. _____



Observations and Questions

- Observing and questioning _____ _____.

Hypothesis

- An educated guess, _____ "_____." (P. B. Medawar)
- A null hypothesis is _____ _____.

Collecting Data

- ***Replication:*** _____ _____.
- ***Sample size:*** _____ _____.
- Scientists try to make sure the sample size is large enough to minimize the opportunity for chance to affect the results.

Collecting Data

- **Three aspects of taking a measurement:**
  - ***Accuracy:*** _____ _____ _____
  - ***Precision:*** _____ _____
  - ***Uncertainty:*** _____ _____

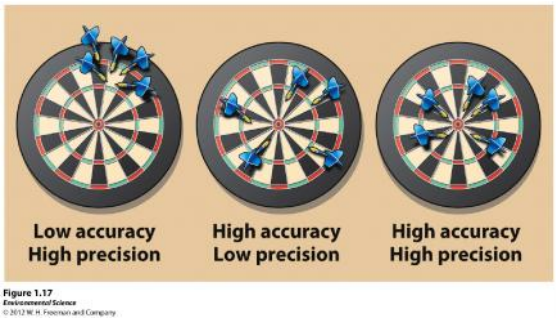


Figure 1.17
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Interpreting Results

- Once results have been obtained, analysis of the data begins. This process involves two types of reasoning, _____ and _____.

Interpreting Results

- ***Inductive reasoning:*** _____ _____ _____.
- ***Deductive reasoning:*** _____ _____ _____.

Disseminating Findings

- Scientists _____
  _____
  _____
  _____.
- This allows other scientists_____
  _____
  _____
  _____.

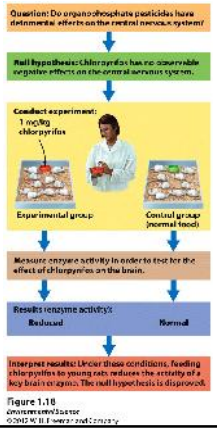
- ***Theory:*** _____
  _____
  _____
  _____
  _____.
- ***Natural law:*** _____
  _____
  _____
  _____
  _____.

Controlled Experiments and Natural Experiments

Controlled Experiments and Natural Experiments

- ***Controlled experiment:***

_____
_____
_____
_____.



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Controlled Experiments and Natural Experiments

- ***Natural experiments:***

_____
_____
_____
_____.



Environmental Science Presents Unique Challenges

- There is no "_____" planet with which to compare the Earth. This means there is a lack of "_____" data.
- It is often difficult to decide _____ _____ _____.

Environmental Science Presents Unique Challenges

- Environmental science has so many interacting parts; _____ _____.
- Human well-being is a concern for moral reasons, and because people that are _____ _____ _____.

Environmental Science Presents Unique Challenges

- Environmental issues are very _____, and therefore are poorly understood.
- Many environmental choices are exactly that_____ _____ _____ ___.

Figure 1.21
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