

Chapter One

**ENVIRONMENTAL  
PROBLEMS, THEIR  
CAUSES, AND  
SUSTAINABILITY**

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What keeps us alive?

- Food
- Water
- Oxygen
- Shelter
- ????

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What is Environmental Science?

Environmental science is the study of how the earth works, how we interact with the earth and how to deal with environmental problems.

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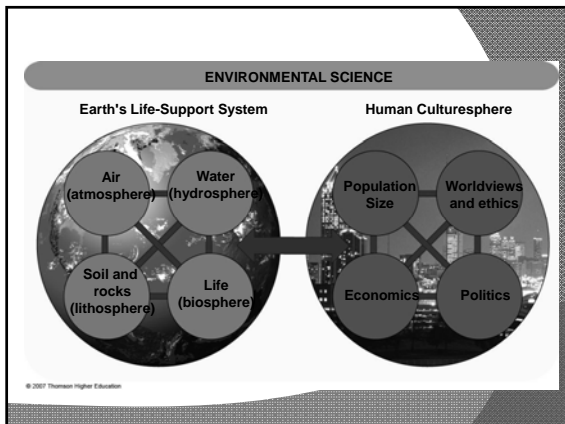
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## What is APES?

- ◎ The goals of APES is to learn:
  - how nature works.
  - how the environment effects us.
  - how we affect the environment.
  - how we can live more sustainably without degrading our life-support system.

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## Sustainability

- ◎ Sustainability, is the ability of earth's various systems to survive and adapt to environmental conditions indefinitely.
- ◎ The steps to sustainability must be supported by sound science.

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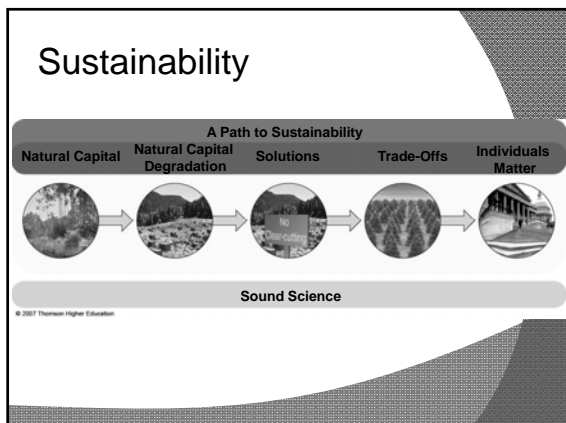
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### What is an environmentally sustainable society?

- An environmentally sustainable society meets basic needs of its people in a just and equitable manner without degrading the *natural capital* that supplies these resources.

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### What is *Natural Capital*?

- Natural resources  
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- Natural services

- What are examples of natural resources and natural services?

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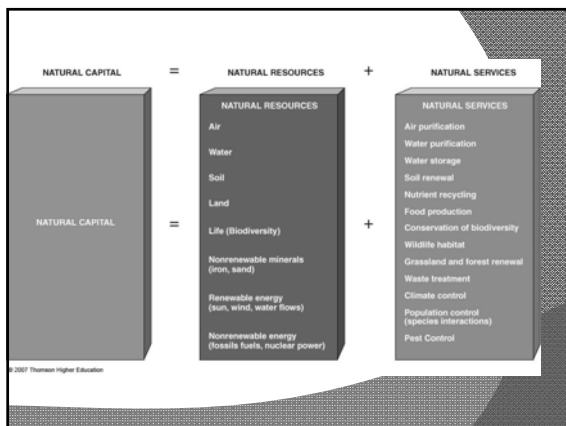
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**How fast is the human population growing?**

- ⊙ Slowing, but still rapid
- ⊙ J-Curve

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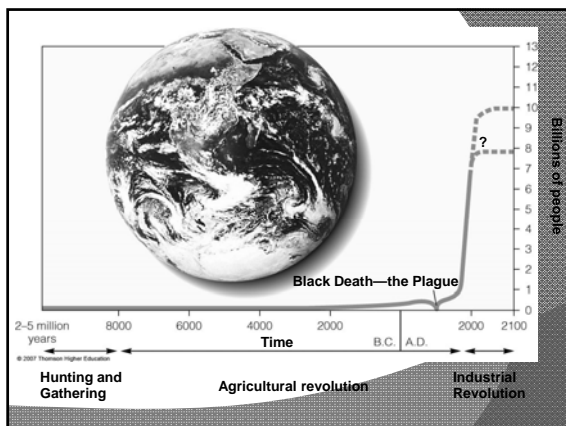
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What is the difference between economic growth, economic development, and environmentally sustainable economic development?

- ⊙ Economic growth provides people with more goods and services.
  - Measured in gross domestic product (GDP) and purchasing power parity (PPP).
- ⊙ Economic development uses economic growth to improve living standards.
  - The world's countries economic status (developed vs. developing) are based on their degree of industrialization and GDP-PPP.

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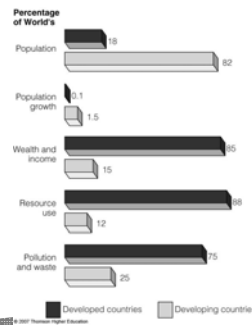
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### Developed vs. Developing Countries



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### Developed vs. Developing Countries



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## What are Resources?

- ⊙ Anything obtained from the environment to meet our needs and wants.

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## Types of Resources

- ⊙ **Perpetual:** On a human time scale are continuous.
- ⊙ **Renewable:** On a human time scale can be replenished rapidly by natural processes (e.g. hours to several decades).
- ⊙ **Nonrenewable:** On a human time scale are in fixed supply

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## Perpetual Resources

- ⊙ Always there
- ⊙ Never goes away
- ⊙ Unlimited supply
- ⊙ Examples:
  - Sun
  - Wind

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## Renewable Resources

- ⊙ Depletion
  - Loss of resource
- ⊙ Degradation
  - Loss of quality of resource
- ⊙ Sustainable yield
  - Using a resource at a rate at or below the rate that the resource is renewed
- ⊙ Examples:
  - ?

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## Nonrenewable Resources



- Exist as fixed quantity
  - Becomes economically depleted.
- Recycling and reusing extends supply
  - Recycling processes waste material into new material.
  - Reuse is using a resource over again in the same form.

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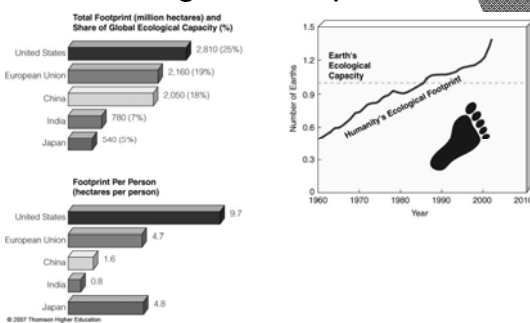
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## Our Ecological Footprint




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### Pollution



- Anything found at high enough levels in the environment to cause harm to organisms.
- Two types:
  - Point source
  - Nonpoint source

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### Pollution

- Pollutants can have three types of unwanted effects:
  - Can disrupt/degrade life-support systems.
  - Can damage health and property.
  - Can create nuisances such as noise and unpleasant smells, tastes, and sights

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### What are the major causes of environmental problems?

**Causes of Environmental Problems**

 Population growth	 Unsustainable resource use	 Poverty	 Not including the environmental costs of economic goods and services in their market prices	 Trying to manage and simplify nature with too little knowledge about how it works
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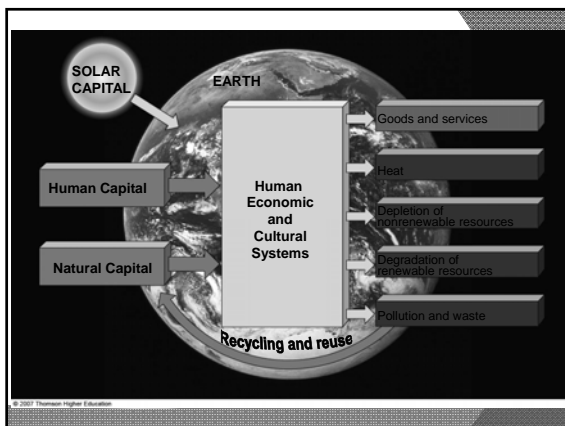
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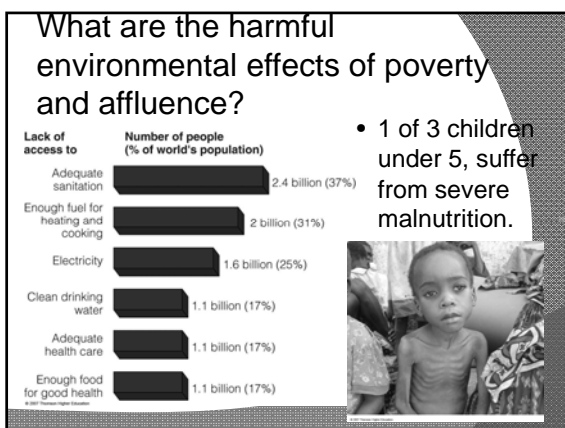
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### Resource Consumption and Environmental Problems

- ⊙ Underconsumption
- ⊙ Overconsumption
  - Affluenza: unsustainable addiction to overconsumption and materialism.

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**Connections between Environmental Problems and Their Causes**

**Developing Countries**

**Developed Countries**

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**What three major human cultural changes have taken place since humans arrived?**

- ⊙ Agricultural revolution
  - Allowed people to stay in one place.
- ⊙ Industrial-medical revolution
  - Led shift from rural villages to urban society.
  - Science improved sanitation and disease control.
- ⊙ Information-globalization revolution
  - Rapid access to information.

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**Trade-Offs**

Industrial-Medical Revolution	
Advantages	Disadvantages
Mass production of useful and Aproducts	Increased air pollution
Higher standard of living for many	Increased water pollution
Greatly increased agricultural production	Increased waste pollution
Lower infant mortality	Soil depletion and degradation
Longer life expectancy	Groundwater depletion
Increased urbanization	Habitat destruction and degradation
Lower rate of population growth	Biodiversity depletion

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**SUSTAINABILITY AND ENVIRONMENTAL WORLDVIEWS**

- Technological optimists:
  - suggest that human ingenuity will keep the environment sustainable.
- Environmental pessimists:
  - overstate the problems where our environmental situation seems hopeless

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**How Would You Vote?**

- Is the society you live in on an unsustainable path?
  - Yes: Without readily available green products and services, converting to a sustainable society is unrealistic.
  - Not entirely: I'm doing what I can to improve sustainability, including recycling and using less energy.
  - No: We do not use resources in an unsustainable manner.

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What are the four scientific principles of sustainability and how can we use them and shared visions to build more environmentally sustainable and just societies during this century?

- Reliance on Solar Energy
- Biodiversity
- Population Control
- Nutrient Recycling

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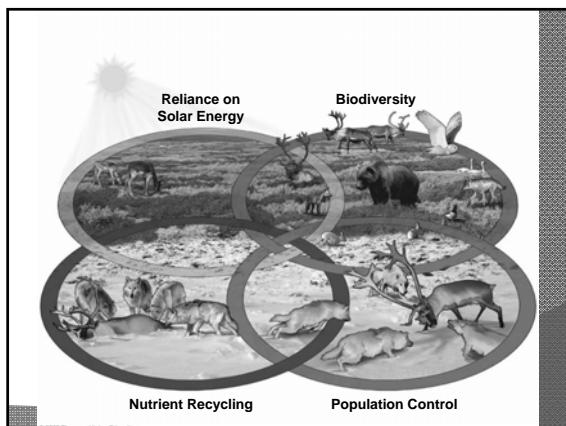
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Solutions	
Principles of Sustainability	
How Nature Works	Lessons for Us
Runs on renewable solar energy.	Rely mostly on renewable solar energy.
Recycles nutrients and wastes. There is little waste in nature.	Prevent and reduce pollution and recycle and reuse resources.
Uses biodiversity to maintain itself and adapt to new environmental conditions.	Preserve biodiversity by protecting ecosystem services and habitats and preventing premature extinction of species.
Controls a species' population size and resource use by interactions with its environment and other species.	Reduce human births and wasteful resource use to prevent environmental overload and depletion and degradation of resources.

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Current Emphasis	Sustainability Emphasis
Pollution cleanup	Pollution prevention (cleaner production)
Waste disposal (bury or burn)	Waste prevention and reduction
Protecting species	Protecting where species live (habitat protection)
Environmental degradation	Environmental restoration
Increased resource use	Less wasteful (more efficient) resource use
Population growth	Population stabilization by decreasing birth rates
Depleting and degrading natural capital	Protecting natural capital and living off the biological interest it provides

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## Aldo Leopold's Environmental Ethics



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- Individuals matter.
- ... land is to be loved and respected is an extension of ethics.
- We abuse land because we regard it as a commodity...

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