Environmental Issues: Their Causes and Sustainability

Sustainability
Growth & Development
Resources & Pollution
Problems in the Environment
Chapter 1

Environmental Problems: An Introduction and Overview

- Living in an exponential age: reading p. 5
- Starts off slowly, then "takes off"
- See Fig 1-1, world population growth
- Almost one of every two people on Earth try to survive on less than $4 per day.
- Environmental effects of poverty: depletion/degradation of local forests, grasslands, soil and wildlife →premature extinctions, loss of biodiverstiy, climate change

Exponential growth

- Plays a key role in 5 important and interconnected environmental issues:
  - Population growth
  - Resource use and waste
  - poverty,
  - loss of biological diversity
  - Global climate change

Solutions to most problems are available….

Environmental Issues to contemplate p. 6 and 7

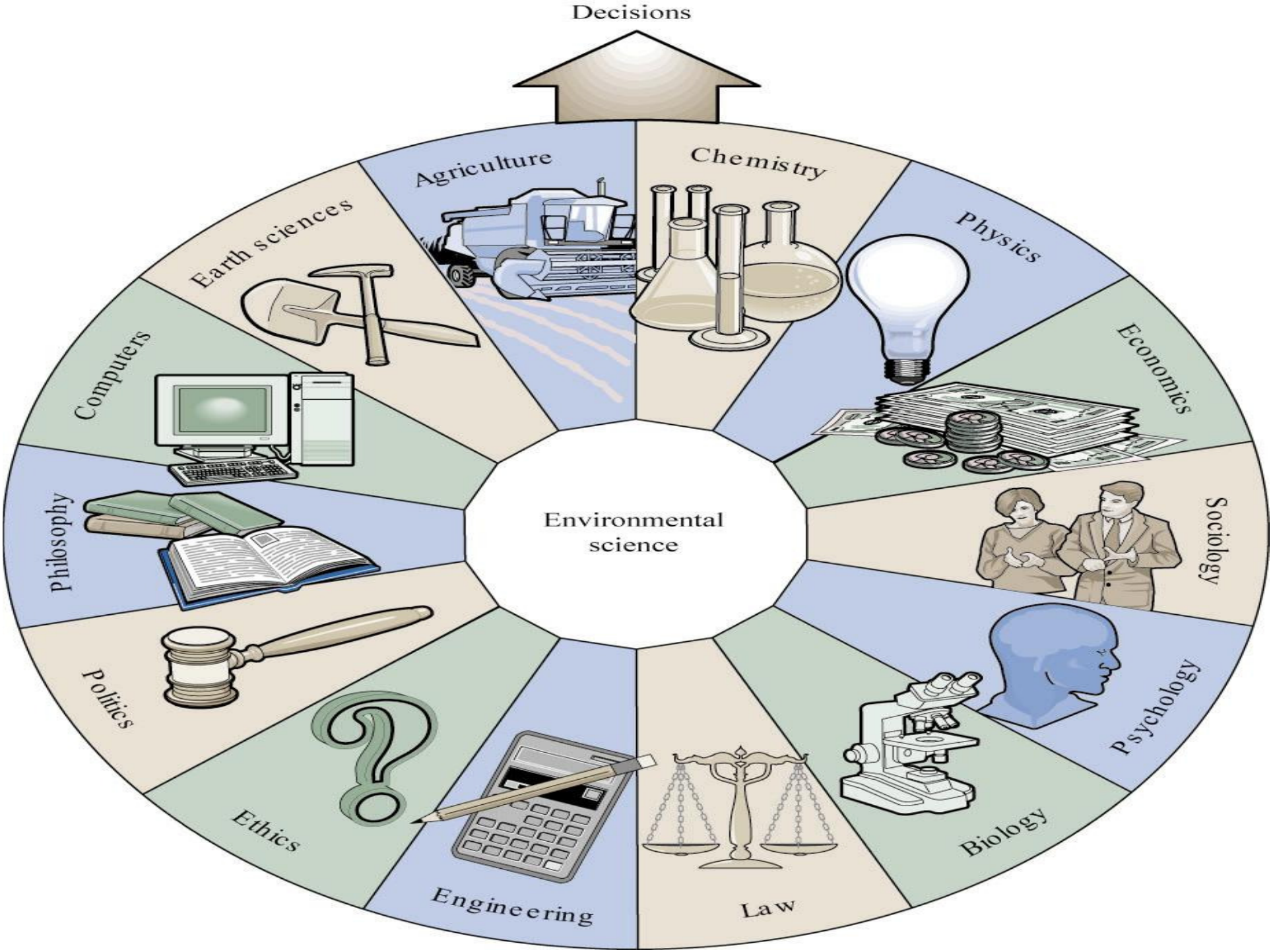
- What is sustainability?
- Discuss the correlation, if any, between human population and natural resource consumption.
- Do you believe that the current lifestyle of North America is sustainable? Analyze your lifestyle; how would resources be affected if everyone on Earth lived the way you do?

Key Concepts: See page 6 chapter Purpose and Questions

- **Growth and Sustainability**
- **Resources and Resource Use**
- **Pollution**
- **Causes of Environmental Problems**

The Field of Environmental Science

- Environmental Science is interdisciplinary, and includes applied and theoretical aspects of human impact.
  - Incorporates scientific aspects of ecology, conservation, geography, with inputs from social sciences such as economics, sociology and political science.


Decisions
Environmental science
Agriculture
Chemistry
Physics
Economics
Sociology
Psychology
Biology
Law
Engineering
Ethics
Politics
Philosophy
Computers
Earth sciences

Interrelated Nature Environmental Problems

- Environment is everything that affects an organism during its lifetime.

An Ecosystem Approach

- Ecology- the study of the relationships between living organisms and their environment.
- Ecosystem: Region in which the organisms and the physical environment form an interacting unit or system.
  - The task of an Environmental Scientist is to recognize and understand natural interactions and integrate these with human uses of the natural world.

Living More Sustainably

- Sustainability- (1) living off the natural income replenished by soils, plants, air and water & (2) not depleting earth's endowment of natural capital that supplies this income
- Sustainable Society-satisfying the basic needs of the people for food, clean air & water, and shelter indefinitely without (1) depleting or degrading natural resources & (2) preventing future generations from meeting their basic needs

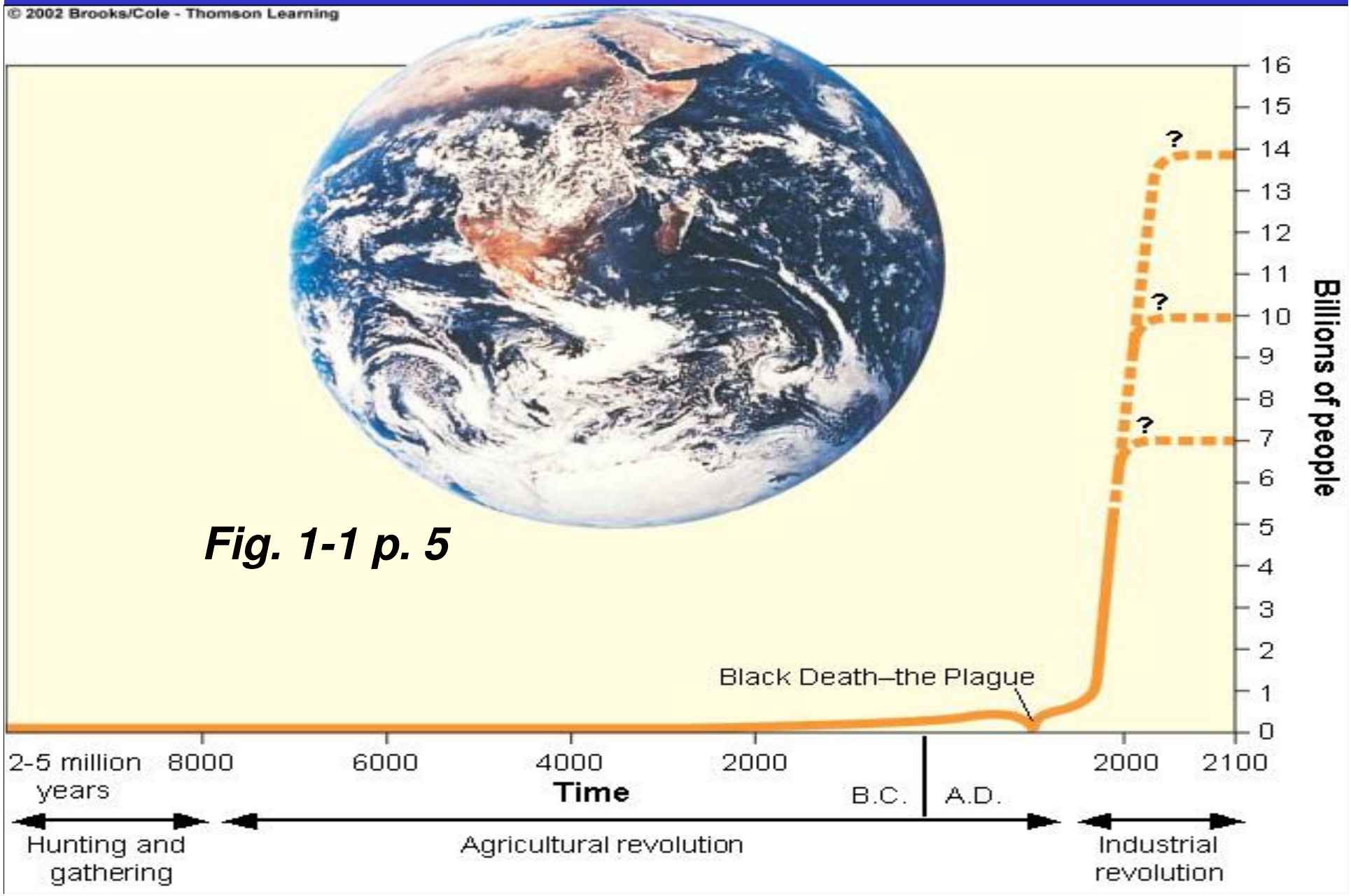
Refer to *Spotlight* on p. 5

Population Growth

- **Exponential Growth-** Growth in a species that takes place at a constant rate per time period.
- **Doubling Time/ Rule of 70-** 70 divided by percentage growth rate=doubling time

Fig. 1-1 p. 5, fig 1-4 p. 9

World Population



Economic Growth

- Gross National Product (GNP)- the value of all the goods and services produced within and outside of a country during a year plus the net income earned by its citizens
- Gross Domestic Product (GDP)-the value in dollars of all goods and services produced within a country
- Gross World Product (GWP)- the value of all the goods and services produce in the world during a year
- Per Capita GNP- GNP divided by the population at mid-year; each persons "slice of the pie"

Economic Development

- Developed countries (MDC)- (pop=1.2b) highly industrialized with high per capita GNP; represent 20% of the worlds pop that control 85% of wealth; 88% of resources and produce 75% of pollution and waste
- Developing countries (LDC)- (pop=5.1 bil) low per capita GNP; represent 95% of the projected increase in the worlds population

The Good of Economic Growth

- Positive
  - Increased Life Expectancy
  - Infant Mortality Drop
  - Increased Food Production
  - Safe Drinking Water in Rural Areas
  - Increased Production with fewer materials
  - Decrease in Major Air and Water Pollution (since 1970s) in MDC

The Bad of Economic Growth

- Negative-
  - Life Expectancy Lower in LDCs
  - Infant Mortality is 8 times Higher in LDCs
  - Less Sustainability in Agricultural Practices
  - Air and Water Pollution in LDCs is too High (WHO)
  - Increased Demand on Resources (pop)
  - Increased Disturbance of Habitable Surface (73% already)
  - Climate Change from Burning of Fossil Fuels
  - 1 in 4 people in the world make less than $370/year
  - Economic Gap Increase (Rich get richer, poor get poorer)

Globalization

- Globalization-the process of global, social environmental and political change that leads to an increased integrated world; Three major indicators:
  - Economic Effects
  - Information and Communication
  - Environmental Effects

Resources

- Perpetual
- Renewable
- Non-renewable

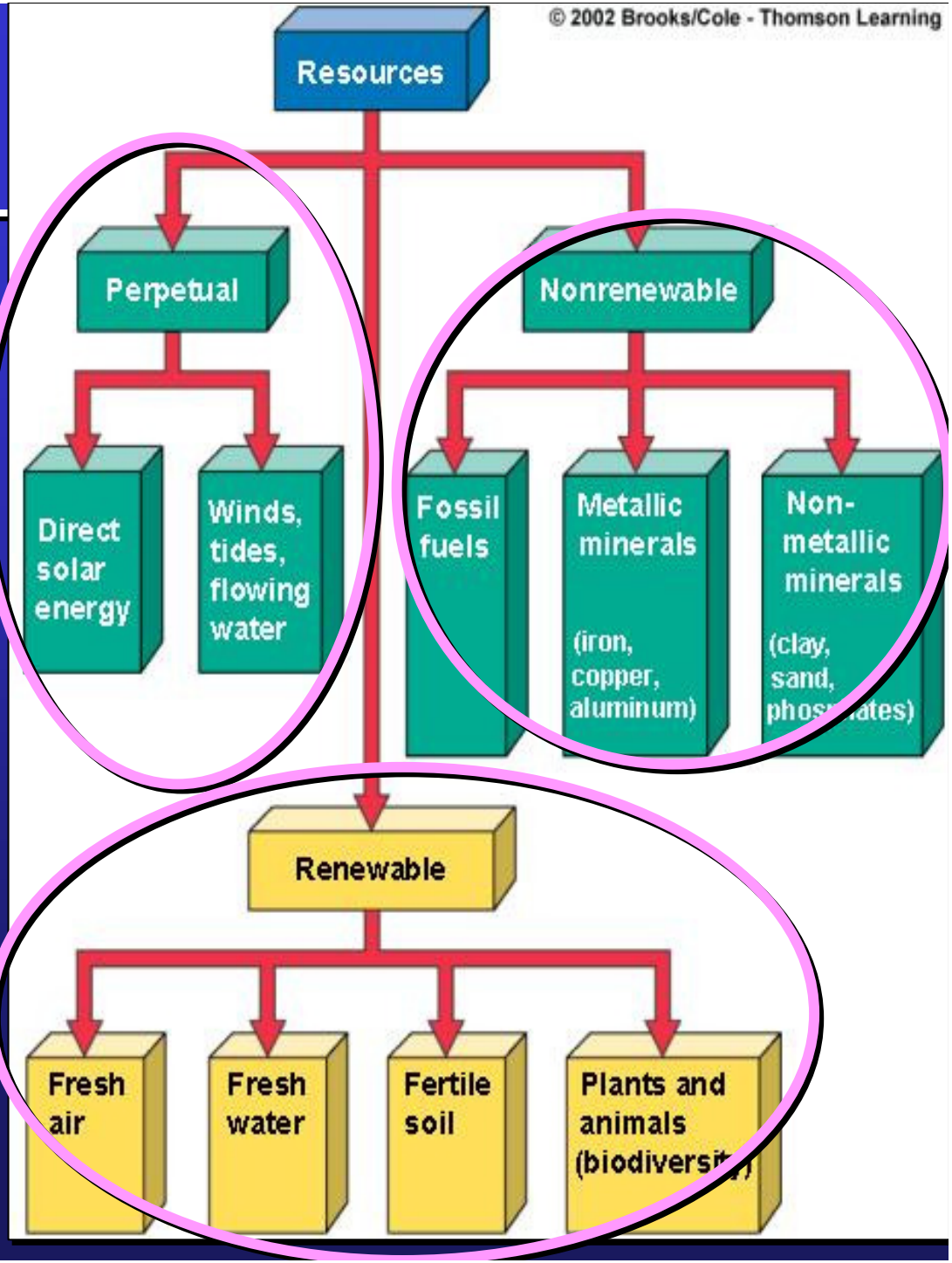


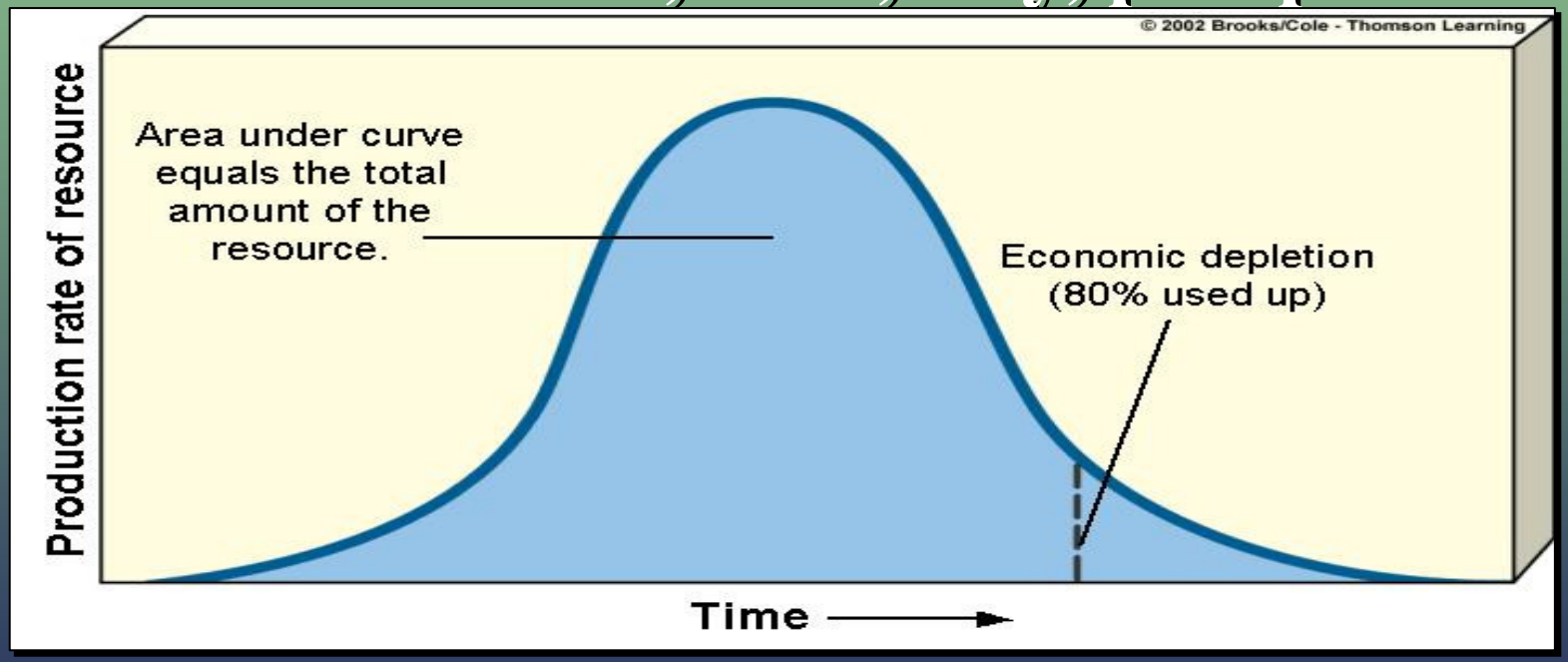
Fig. 1-6 p. 10

Renewable Resources

- **Sustainable Yield-** the highest rate of use of a resource in which it can be used indefinitely without reducing its available supply
- **Environmental Degradation-** exceeding a resource's natural replacement rate causing the resource to decrease
  - Urbanization of productive land
  - Excessive erosion/soil compaction
  - Deforestation/overgrazing
  - Decreased biodiversity

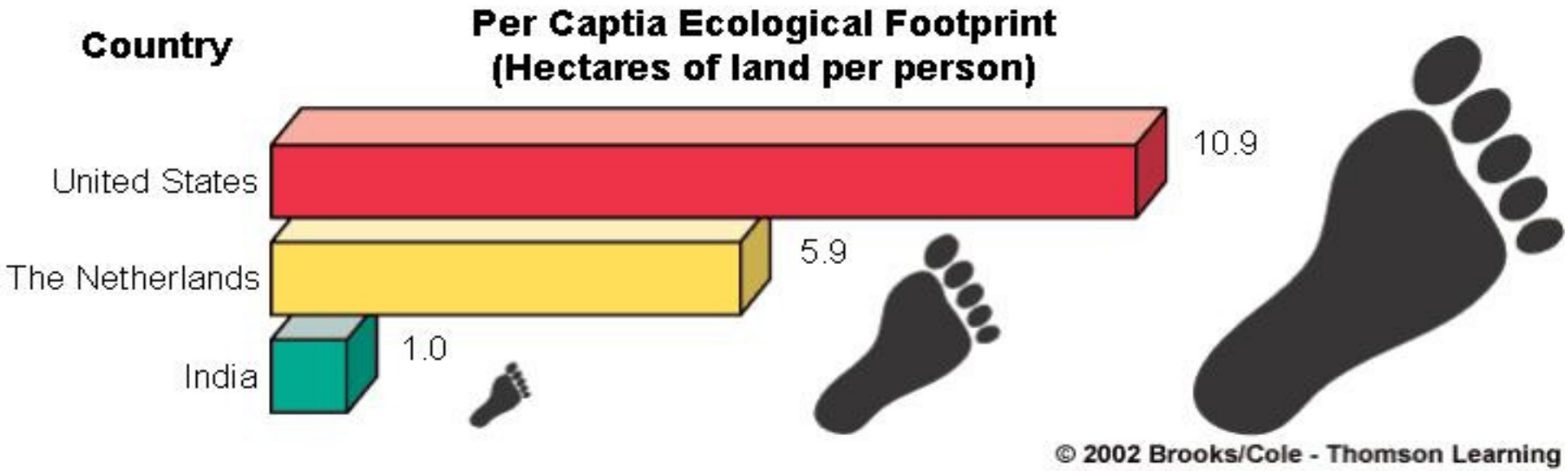
Non-Renewable Resources

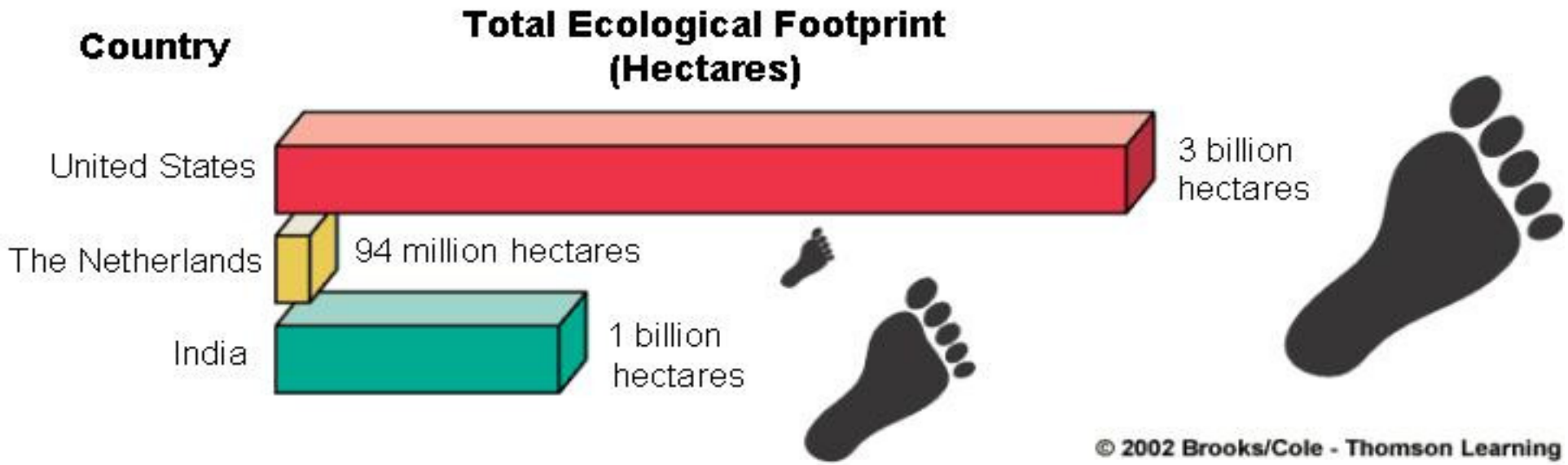
- Energy- coal, oil, natural gas
- Metallic- iron, copper, aluminum (recyclable)
- Non-Metallic- salt, sand, clay, phosphate



Economic Depletion

Ecological Footprint





Current Ecological Footprint:

- Today, humanity's ecological footprint is 15% higher than the Earth's biological capacity per person. (See fig 1.7, p. 11)

Pollution

- **Pollution-** any addition of a material into the environment that negatively affects organisms; can either be natural or man-made (anthropogenic)
  - Volcanic activity
  - Burning of fossil fuels
- **Effects of Pollution-**
  - Disrupt life-support systems for species
  - Damage to species and property
  - Unwanted noise, smells, tastes, and sights

Pollution Sources

- Point Source- pollution that comes from a readily identifiable source
  - Smokestack
  - Drainpipes
  - Exhaust pipes (cars)
- Nonpoint Source- pollution that comes into an area from another, difficult to locate, region
  - Farm runoff (pesticides)
  - Sprayed pesticides & materials carried by wind

Dealing With Pollution

- **Prevention (Input Control)**- the reduction or elimination of pollutants
  - Refuse, replace, reduce, reuse & recycle
- **Cleanup (Output Control)**- occurs after pollutants have been released; issues
  - Temporary as long as consumption of product continues
  - Transient-moves pollution from one area to another
  - Costly- generally passed to the consumer

Environmental Problems

Biodiversity Depletion
- Habitat destruction
- Habitat degradation
- Extinction

Air Pollution
- Global climate change
- Stratospheric ozone depletion
- Urban air pollution
- Acid deposition
- Outdoor pollutants
- Indoor pollutants
- Noise

Major Environmental Problems

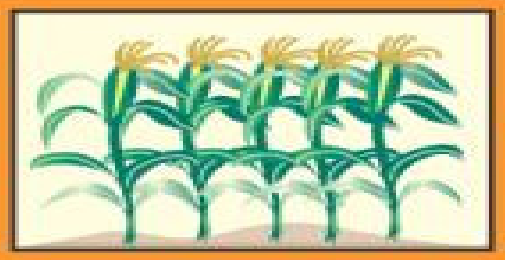
Food Supply Problems
- Overgrazing
- Farmland loss and degradation
- Wetlands loss and degradation
- Overfishing
- Coastal pollution
- Soil erosion
- Soil salinization
- Soil waterlogging
- Water shortages
- Groundwater depletion
- Loss of biodiversity
- Poor nutrition

Water Pollution
- Sediment
- Nutrient overload
- Toxic chemicals
- Infectious agents
- Oxygen depletion
- Pesticides
- Oil spills
- Excess heat

Waste Production
- Solid waste
- Hazardous waste

Environmental and Resource Problems

➢ Five Root Causes



- Rapid 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

Environmental Impact

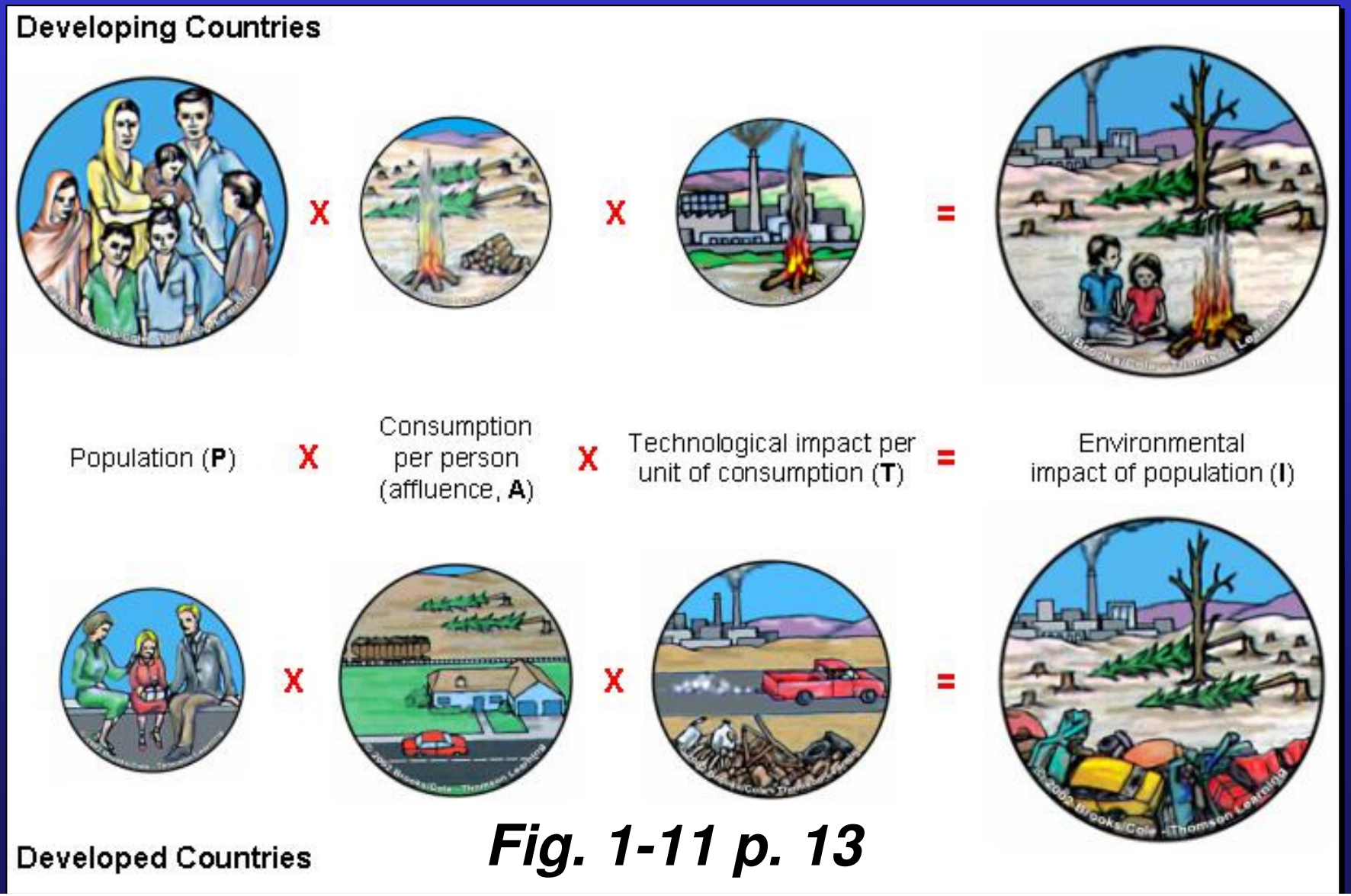


Fig. 1-11 p. 13

Environmental Interactions

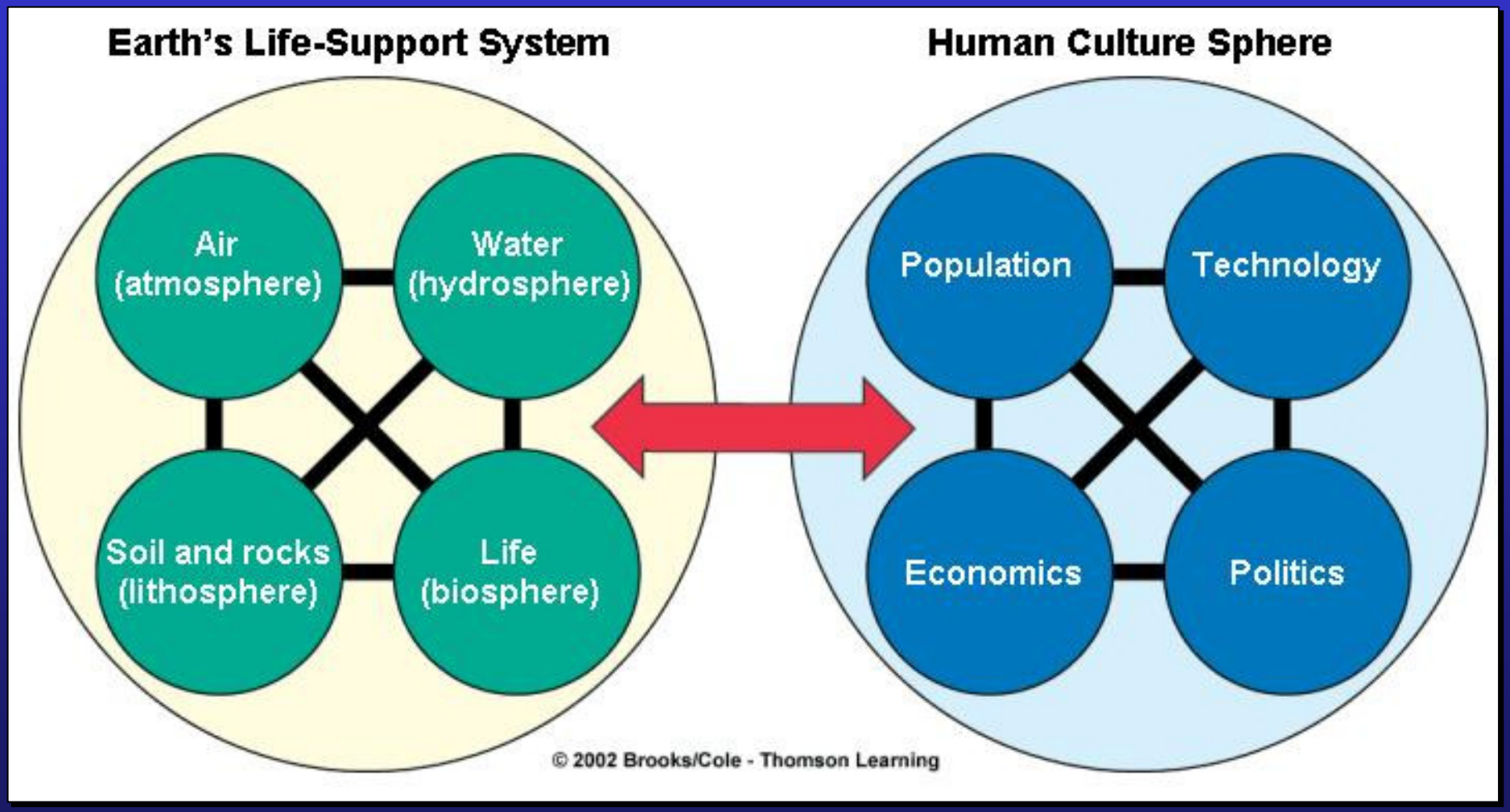


Fig. 1-13 p. 16

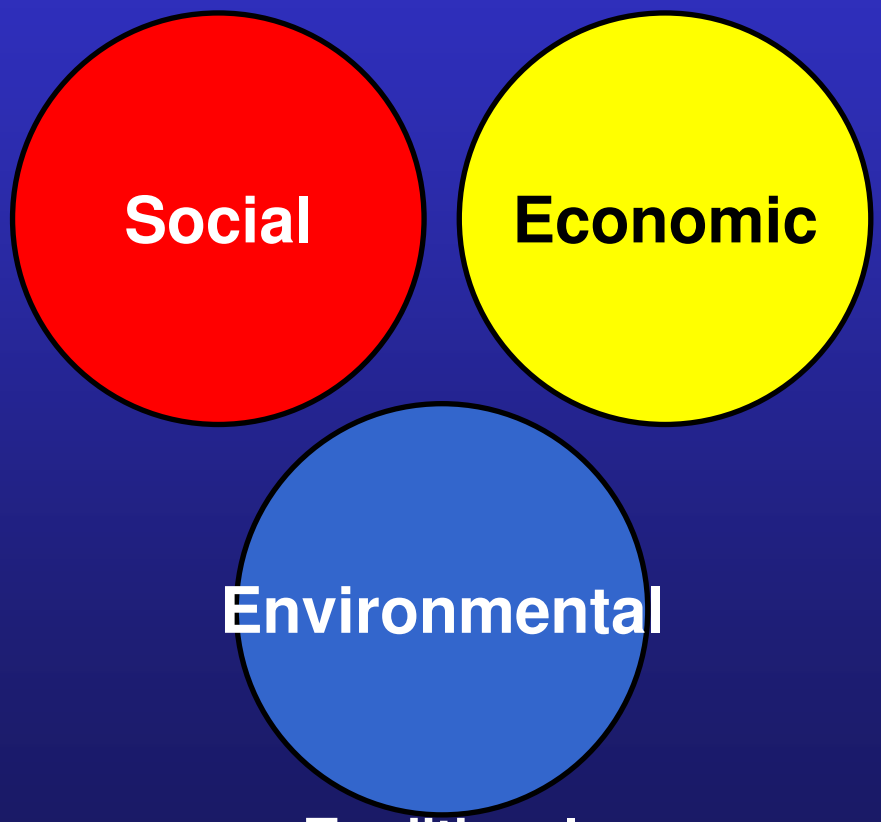
Environmental Worldviews

- **Planetary Management-**humans are dominate and decide how to best manage the planet
  - Humans are in charge
  - There will always be more (unlimited supply)
  - Economic growth is good…always
  - Success depends on our ability to dominate, understand and control nature
  - Technology will inevitably save mankind

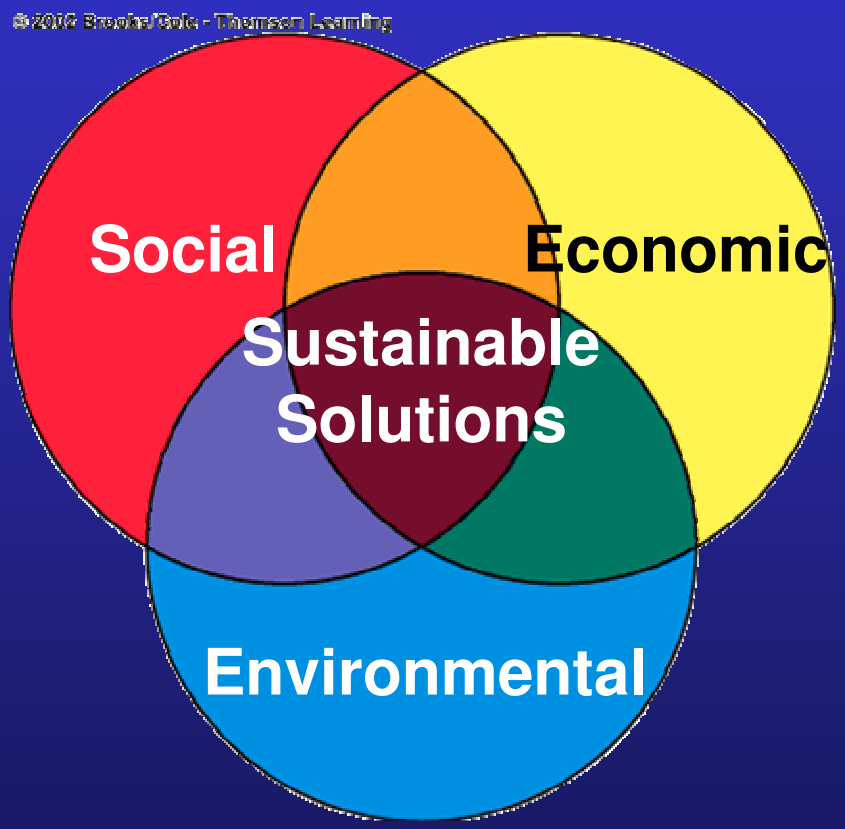
Environmental Worldviews

- **Environmental Wisdom**- human beings are like other species and rely on the earth to survive
  - Nature does not exist just for us; we need the earth but the earth does not need us
  - Limited Resources should not be wasted
  - Some economic growth is good, other types are not; encourage the good
  - Understand the earth to learn to live in harmony with it; the more informed, the better our decisions

Environmentally-Sustainable Economic Development



Traditional decision making



Decision making in a sustainable society

Assignment:

- Read chapter 1 handout
- Do ecological footprint activity and complete internet assignment
- Answer Critical Thinking questions p. 19
  - #2, 3, 5, 6 (self-reflection), 7, 8