

Chapter 20

Sustainability, Economics, and Equity

Module 65

Sustainability and Economics

After reading this module you should be able to

- explain why efforts to achieve sustainability must consider both sound environmental science and economic analysis.
- environmental science and economic analysis.
- describe how economic health depends on the availability of natural capital and basic human welfare.

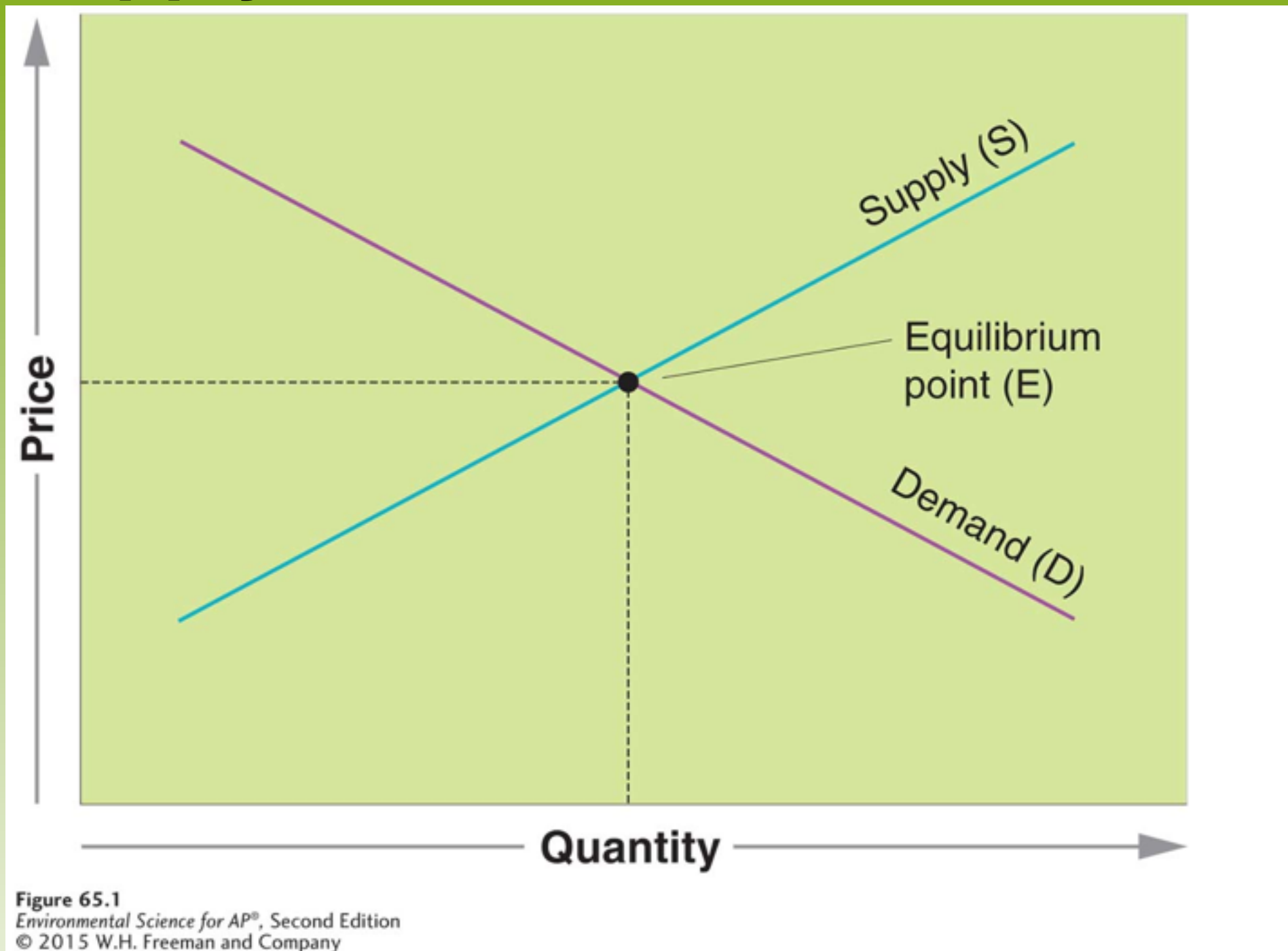
Achieving sustainability requires both sound environmental science and economic analysis.

- **Well-being** The status of being healthy, happy, and prosperous.
- **Economics** The study of how humans allocate scarce resources in the production, distribution, and consumption of goods and services.
- **Sustainability** Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

Supply, Demand, and the Market

- A market occurs whenever people engage in trade.
- In a market economy, the cost of a good is determined by supply and demand.
- Price is the way that producers and consumers communicate the value of an item and allocate the scarce item.

Supply, Demand, and the Market



Supply and demand with externalities. When the cost of emitting pollutants is included in the price of a good, for any given quantity of items, the price increases. The supply curve shifts from S to S_1 . Since the law of demand states that when the price of a good goes up, demand falls, amount demanded falls, and the market reaches a new equilibrium, E_1 .

Supply, Demand, and the Market

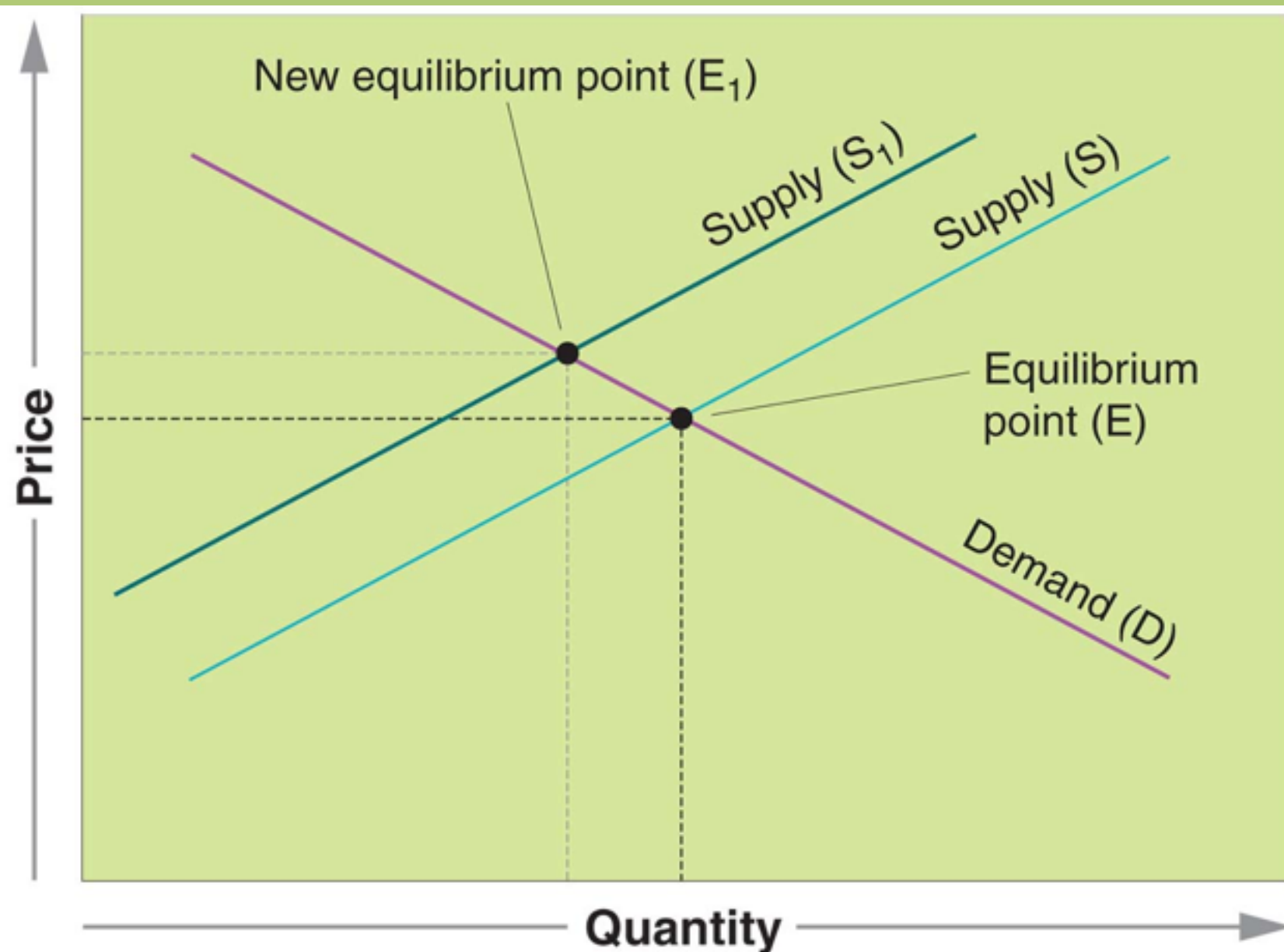
- The intersection of the supply and demand curves determines the market equilibrium point for that item.
- The supply curve shows how many units suppliers of a given product or service are willing to supply at a given price.
- The demand curve (D) shows how much of a good consumers want to buy at a given price.
- Factors that determine demand include income, price of the good, tastes, expectations, and the number of people who want the good.

Supply, Demand, and the Market

- According to the laws of demand and supply, when the price of a good rises, the quantity demanded falls and when the price falls, demand rises.
- When the price of a good rises, the quantity supplied of that good will rise and when the price of a good falls, the quantity of the good supplied will also fall.
- However, the costs or impact of a good or service on people and the environment not included in the economic price of that good or service.

Supply, Demand, and the Market

- When the cost of emitting pollutants is included in the price of a good, for any given quantity of items, the price increases.



Supply and demand with externalities. When the cost of emitting pollutants is included in the price of a good, for any given quantity of items, the price increases. This causes the supply curve to shift to the left, from S to S_1 . Since the law of demand states that when the price of a good goes up, demand falls, the amount demanded falls, and the market reaches a new equilibrium, E_1 .

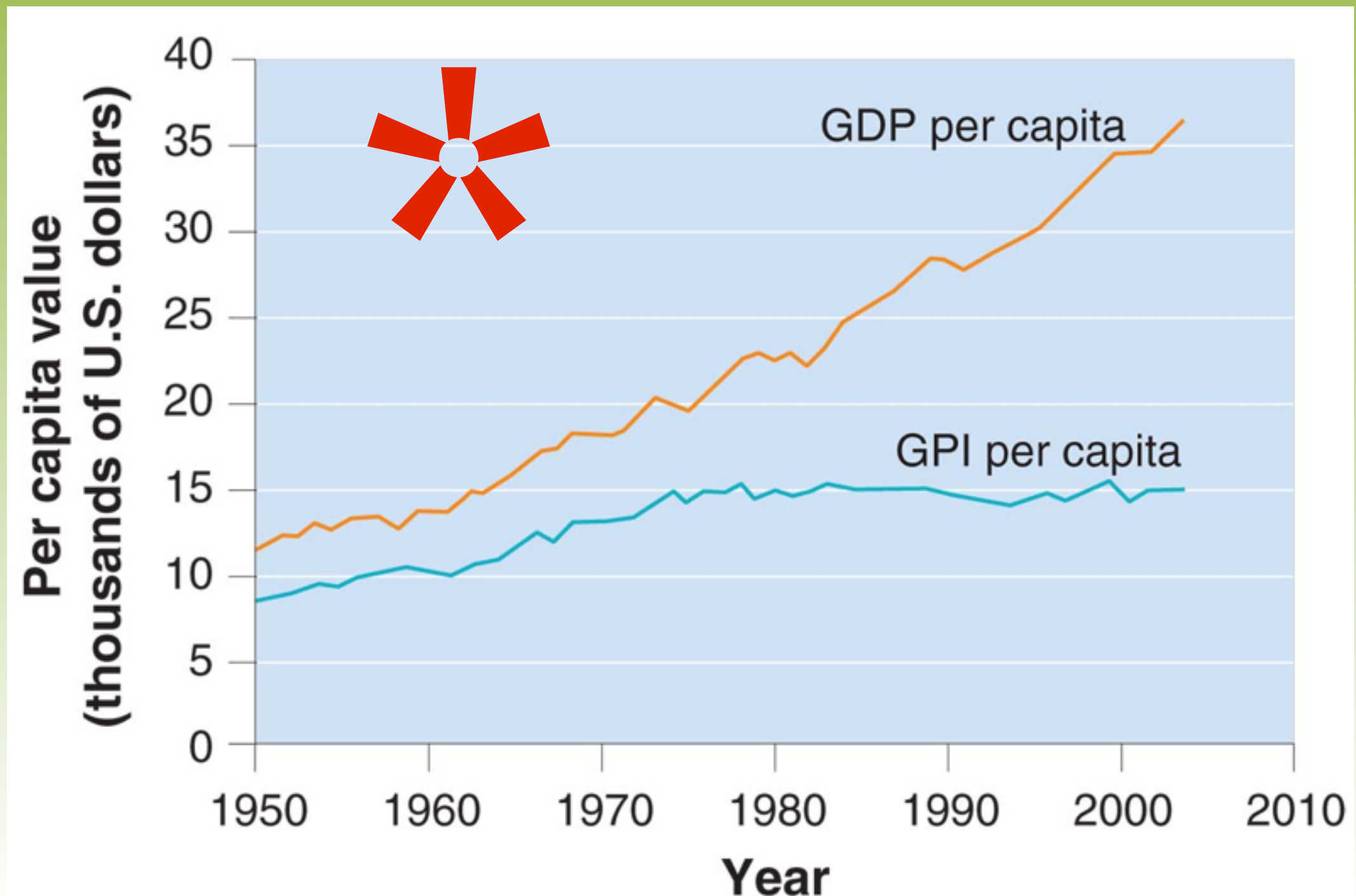
Measuring Wealth and Productivity

- **Gross domestic product (GDP)** is the value of all products and services produced in a year in a given country. GDP does not reflect externalities such as pollution.
- **Genuine progress indicator (GPI)** A measure of economic status that includes personal consumption, income distribution, levels of higher education, resource depletion, pollution, and the health of the population.

What is difference between these two in your words?

Measuring Wealth and Productivity

Genuine progress indicator versus gross domestic product, per capita, for the United States from 1950 to 2004. While gross domestic product measures the value of all products and services a country produces, the genuine progress indicator attempts to include the level of education, personal consumption, income distribution, resource depletion, pollution, and the health of the population.



The Kuznets Curve

The Kuznets curve. This model suggests that as per capita income in a country increases, environmental degradation first increases and then decreases. In many respects, China is on the first part of this curve while the United States is on the second part of the curve.

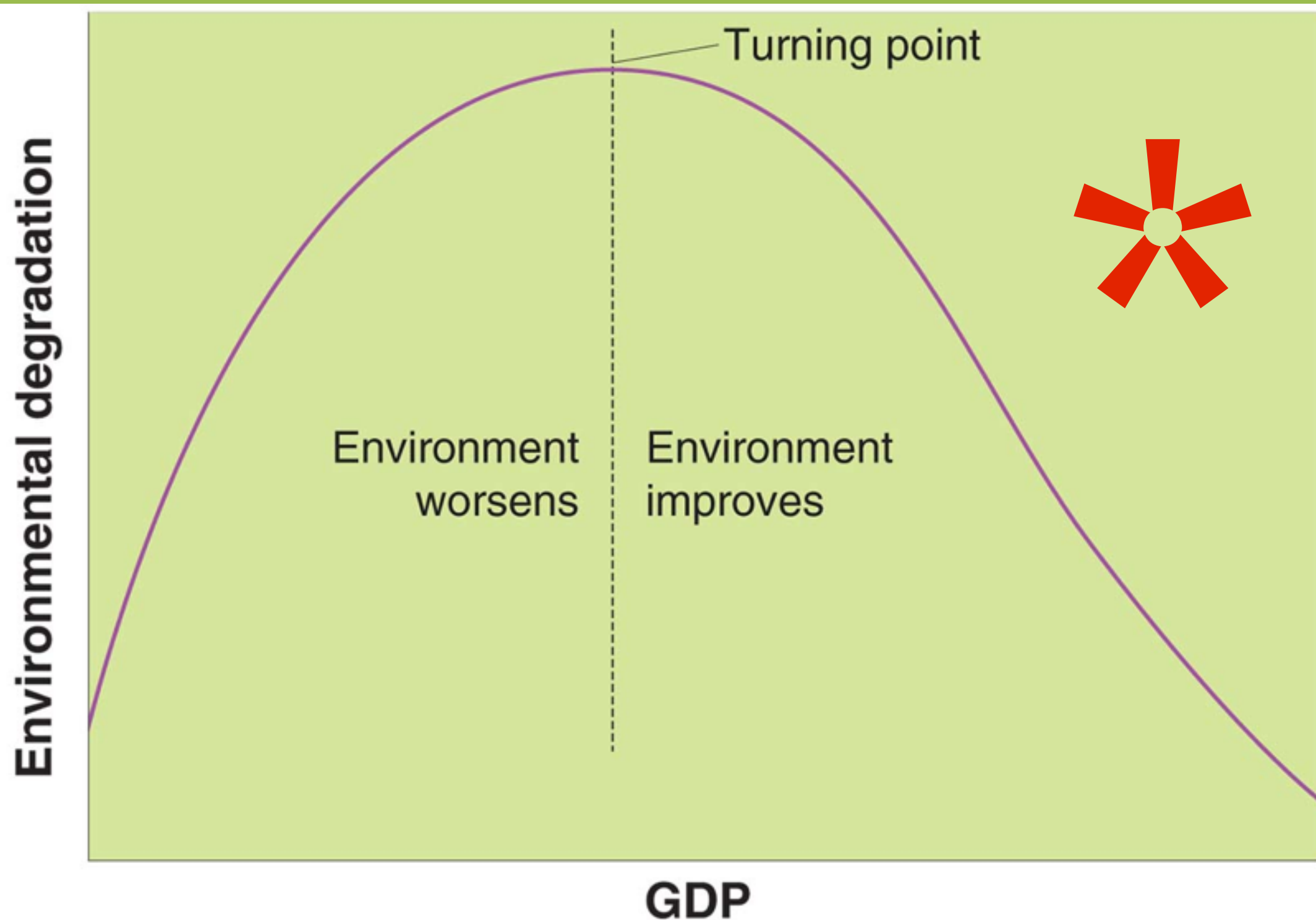


Figure 65.4

The Kuznets Curve

- **Technology transfer** The phenomenon of less developed countries adopting technological innovations developed in wealthy countries.
- **Leapfrogging** The phenomenon of less developed countries using new technology without first using the precursor technology.

How PV panels an example of leapfrogging?
How have developing nations benefited from this phenomena?

Economic health depends on the availability of natural capital and basic human welfare

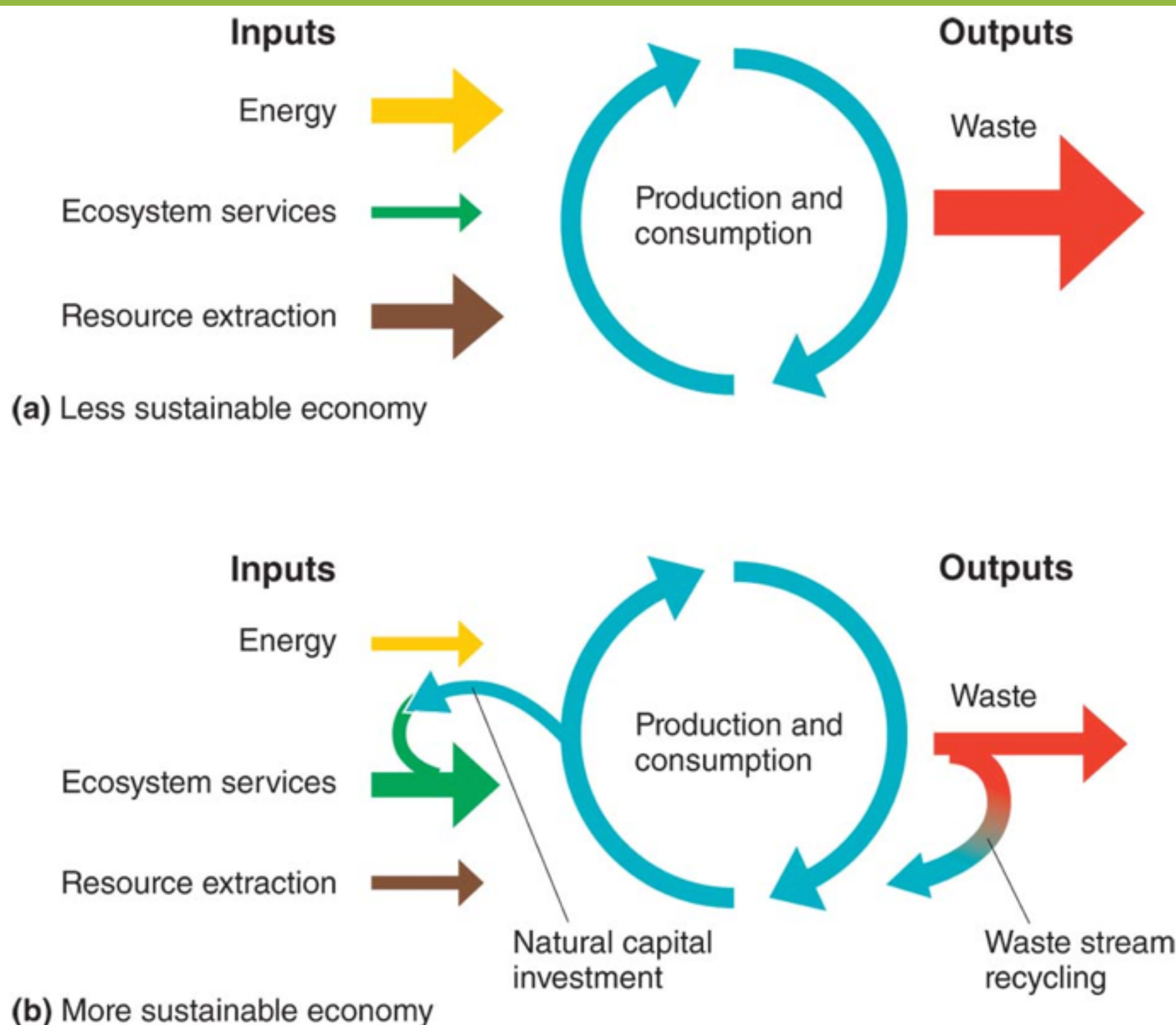
- **Natural capital** The resources of the planet, such as air, water, and minerals.
- **Human capital** Human knowledge and abilities.
- **Manufactured capital** All goods and services that humans produce.
- **Market failure** When the economic system does not account for all costs.

Economic health depends on the availability of natural capital and basic human welfare

- **Environmental economics** A subfield of economics that examines the costs and benefits of various policies and regulations that seek to regulate or limit air and water pollution and other causes of environmental degradation.
- **Ecological economics** The study of economics as a component of ecological systems.
- **Valuation** The practice of assigning monetary value to intangible benefits and natural capital.

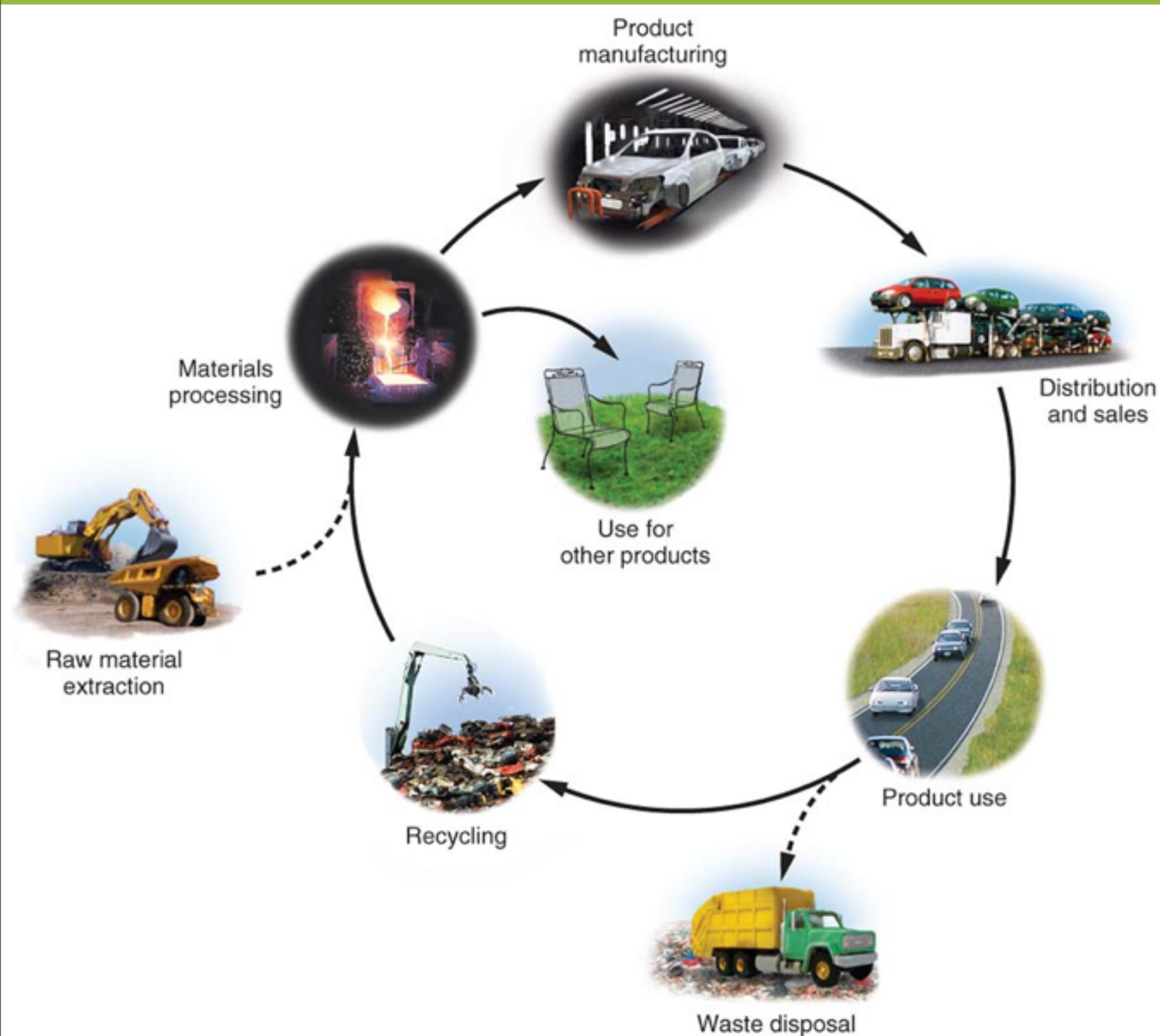
Sustainable Economic Systems

Systems diagrams of two economic systems. (a) A less sustainable system, like our current economy, is based on maximizing the utilization of resources and results in a fairly large waste stream. (b) A more sustainable system is based on greater use of ecosystem services, less resource extraction, and minimizing the waste stream.



Name an example of an externality that has been added to the cost of a good or service.

Sustainable Economic Systems



A cradle-to-cradle system for material use and waste recycling. The manufacture of automobiles serves as one example. Products made at a factory use recycled materials whenever possible. Products are designed and manufactured with the goal of recycling as much of the automobile as possible when its useful life is over. Energy costs in manufacturing, distribution, and use are all taken into consideration when designing the automobile and the distribution network.

Module 66

Regulations and Equity

After reading this module you should be able to

- explain the role of agencies and regulations in efforts to protect our natural and human capital.
- describe the approaches to measuring and achieving sustainability.
- discuss the relationship among sustainability, poverty, personal action, and stewardship.

Agencies, laws, and regulations are designed to protect our natural and human capital

How people look at the world influences policy making.

Environmental Worldviews and Regulatory Approaches

- **Environmental worldview** A worldview that encompasses how one thinks the world works; how one views one's role in the world; and what one believes to be proper environmental behavior.
- **Anthropocentric worldview** A worldview that focuses on human welfare and well-being.
- **Stewardship** The careful and responsible management and care for Earth and its resources.
- **Biocentric worldview** A worldview that holds that humans are just one of many species on Earth, all of which have equal intrinsic value.
- **Ecocentric worldview** A worldview that places equal value on all living organisms and the ecosystems in which they live.

RECALL...

- **Innocent-until-proven-guilty principle** A principle based on the belief that a potential hazard should not be considered an actual hazard until the scientific data definitively demonstrate that it actually causes harm.
- **Precautionary principle** A principle based on the belief that action should be taken against a plausible environmental hazard.

What do critics of the precautionary principle argue?

World Agencies

- **United Nations (UN)** A global institution dedicated to promoting dialogue among countries with the goal of maintaining world peace.
- **United Nations Environment Programme (UNEP)** A program of the United Nations responsible for gathering environmental information, conducting research, and assessing environmental problems.
- **World Bank** A global institution that provides technical and financial assistance to developing countries with the objectives of reducing poverty and promoting growth, especially in the poorest countries.

World Agencies

- **World Health Organization (WHO)** A global institution dedicated to the improvement of human health by monitoring and assessing health trends and providing medical advice to countries.
- **United Nations Development Programme (UNDP)** An international program that works in 166 countries around the world to advocate change that will help people obtain a better life through development.

U.S. Agencies

- **Environmental Protection Agency (EPA)** The U.S. organization that oversees all governmental efforts related to the environment, including science, research, assessment, and education.
- **Occupational Safety and Health Administration (OSHA)** An agency of the U.S. Department of Labor, responsible for the enforcement of health and safety regulations.
- **Department of Energy (DOE)** The U.S. organization that advances the energy and economic security of the United States.

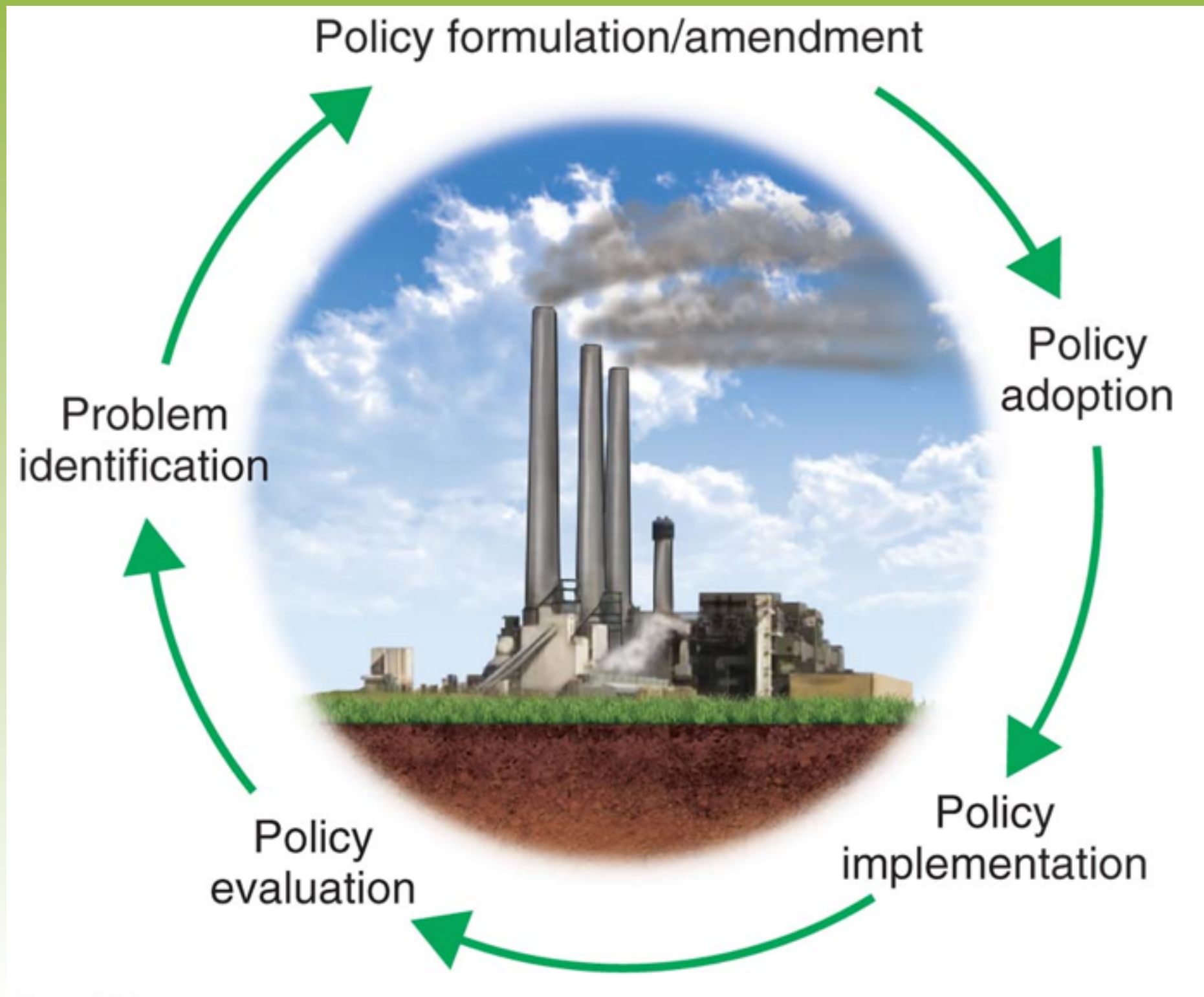
There are several approaches to measuring and achieving sustainability

- **Human development index (HDI)** A measurement index that combines three basic measures of human status: life expectancy; knowledge and education.
- **Human poverty index (HPI)** A measurement index developed by the United Nations to investigate the proportion of a population suffering from deprivation in a country with a high HDI.

What might a high HDI value along with a high HPI value indicate about a country?

The Policy Process in the United States

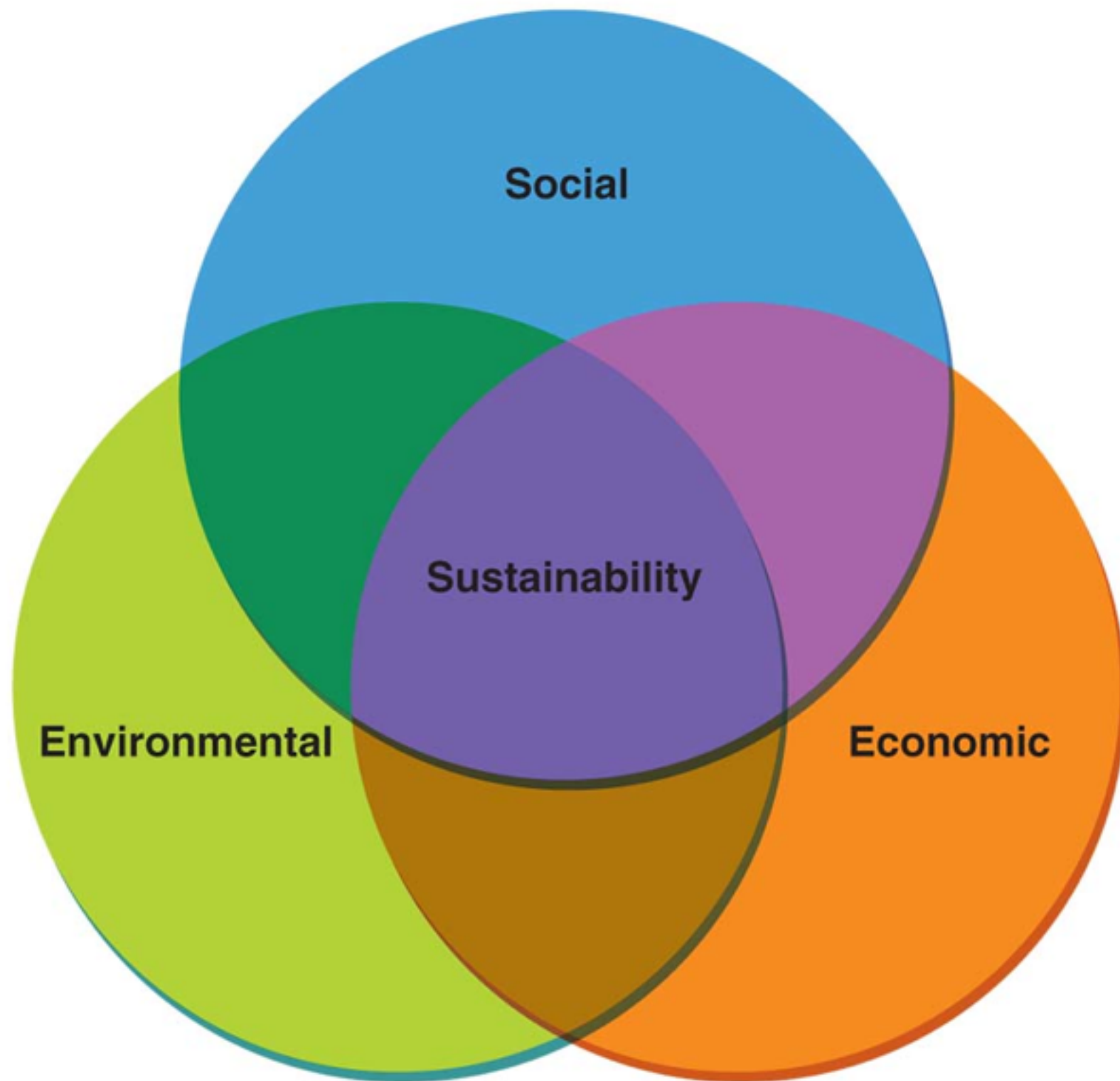
The environmental policy cycle. After an environmental problem is identified, environmental policy is formulated or modified. After a policy is adopted and implemented, it is evaluated and, if necessary, adjustments to the policy are made.



Legislative Approaches to Encourage Sustainability

- **Command-and-control approach** A strategy for pollution control that involves regulations and enforcement mechanisms.
- **Incentive-based approach** A strategy for pollution control that constructs financial and other incentives for lowering emissions based on profits and benefits.
- **Green tax** A tax placed on environmentally harmful activities or emissions in an attempt to internalize some of the externalities that may be involved in the life cycle of those activities or products.
- **Triple bottom line** An approach to sustainability that considers three factors—economic, environmental, and social—when making decisions about business, the economy, and development.

Legislative Approaches to Encourage Sustainability



The triple bottom line. Sustainability is believed to be achievable at the intersection of the social, economic, and environmental factors that influence most development endeavors.

How is sustainability addressed by incorporating this idea?

U.S. Policies for Promoting Sustainability

TABLE 66.1 Major U.S. legislation for promoting sustainability

Act	Abbreviation	Year enacted	Purpose	Prime example of a success
National Environmental Policy Act	NEPA	1970	Enhance environment; monitor with a tool: the Environmental Impact Assessment	Protection of coral formation and sea turtles has occurred.
Occupational Safety and Health Act	OSHA	1970	Prevent occupational injury, illness, death from work-related exposure to physical and chemical harm	Worker training and knowledge of toxins has increased.
Endangered Species Act	ESA	1973	Protect animal and plant species from extinction	Bald eagle, peregrine falcon, and gray wolf populations have recovered
Clean Air Act	CAA	1970	Promote clean air	Sulfur dioxide reductions from cap-and-trade have occurred.
Clean Water Act	CWA	1972	Promote clean water	Swimmable and fishable rivers across the United States have increased.
Resource Conservation and Recovery Act	RCRA	1976	Govern tracking and disposal of solid and hazardous waste	Numerous brownfields and contaminated lands have been cleaned up.
Comprehensive Environmental Response, Compensation, and Liability Act	CERCLA, also called Superfund	1980	Force and/or implement the cleanup of hazardous waste sites	Dozens of Superfund sites have been cleaned up around the United States.

Two major challenges of our time are reducing poverty and stewarding the environment

Millennium Development Goals:

- Eradicate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria, and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

Environmental Justice

- The inequitable distribution of pollution and of environmental degradation with their adverse effects on humans and ecosystems.
- People that are of lower incomes and minorities that have a disproportionate exposure to environmental hazards.

Give some examples.

What is the connection between poverty and inequity?