

Environmental Science, 15e

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17

Environmental Economics, Politics, and Worldviews

Core Case Study: The United States, China, and Sustainability

- The U.S. and China lead the world in both resource consumption and in the production of wastes and pollutants
 - In the U.S., public awareness has given rise to environmental laws that improve environmental quality
 - If everyone in the world used resources equal to what the average American uses, we would need about five planet Earths to support them

Core Case Study: The United States, China, and Sustainability

- China has the world's largest population and the second largest economy
 - Severe environmental problems; may soon have the world's largest ecological footprint
- What is the difference between a per capita and a total ecological footprint?
- How will the combined ecological footprints of the U.S. and China impact global sustainability?

17.1 How Are Economic Systems Related to the Biosphere?

- Human economic systems are regarded as subsystems of the biosphere by ecological economists

Economic Systems Depend on Natural Capital

- Economics deals with the production, distribution, and consumption of goods and services
 - Market-based economies: buyers and sellers interact competitively for goods and services
 - Free-market economies: decisions are based on supply, demand, and price
 - When demand exceeds supply, prices rise
 - When supply exceeds demand, prices fall

Free-Market Economic Systems

- In fully-developed free-market economies:
 - No one company can control prices
 - Prices include direct and indirect costs (full-cost pricing)
 - Consumers have access to the beneficial or harmful information about environmental and health effects
- Most economies are not truly free-market

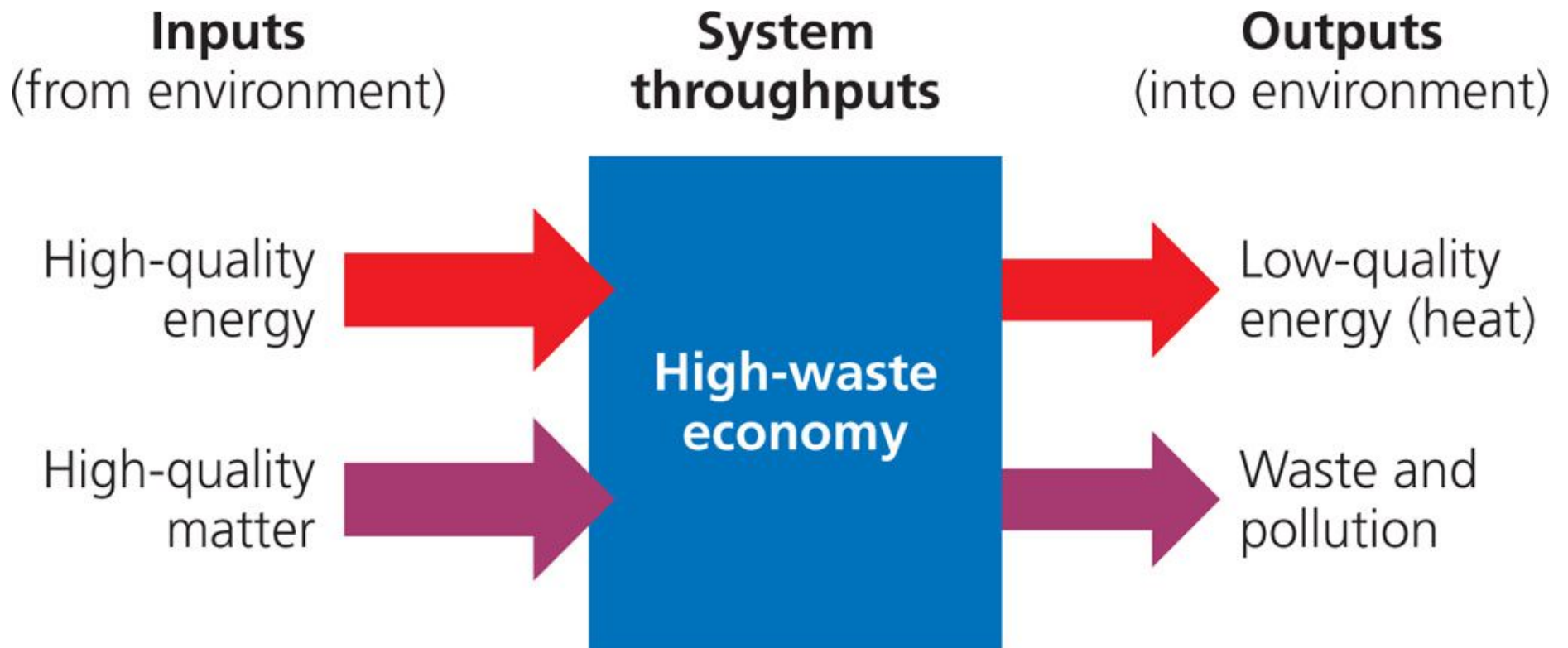
Types of Capital and Resources Used To Produce Goods and Services

- Natural capital: resources and ecosystem services produced by the earth's natural processes
- Human capital: labor, organizational, and management skills of people
- Manufactured capital: machinery, materials, and factories created to process natural resources

The Sustainability of Economic Growth

- Economic growth: increase in capacity of nation, city, or company to provide goods and services
 - High throughput economy boosts economic growth by increasing the flow of resources, goods, and services
 - This high throughput converts large quantities of high quality matter/energy into waste, pollutants, and low-quality heat

High Throughput Economies



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Economies and Sustainability

- Neoclassical economies: unlimited growth
 - Natural capital is important, but not indispensable
 - substitutes can be found
- Ecological economies:
 - Human economies are subsystems of the biosphere, and dependent on its resources
- Environmental economies
 - Favor adjusting economic policy and tools to be environmentally beneficial

Ecological Economies

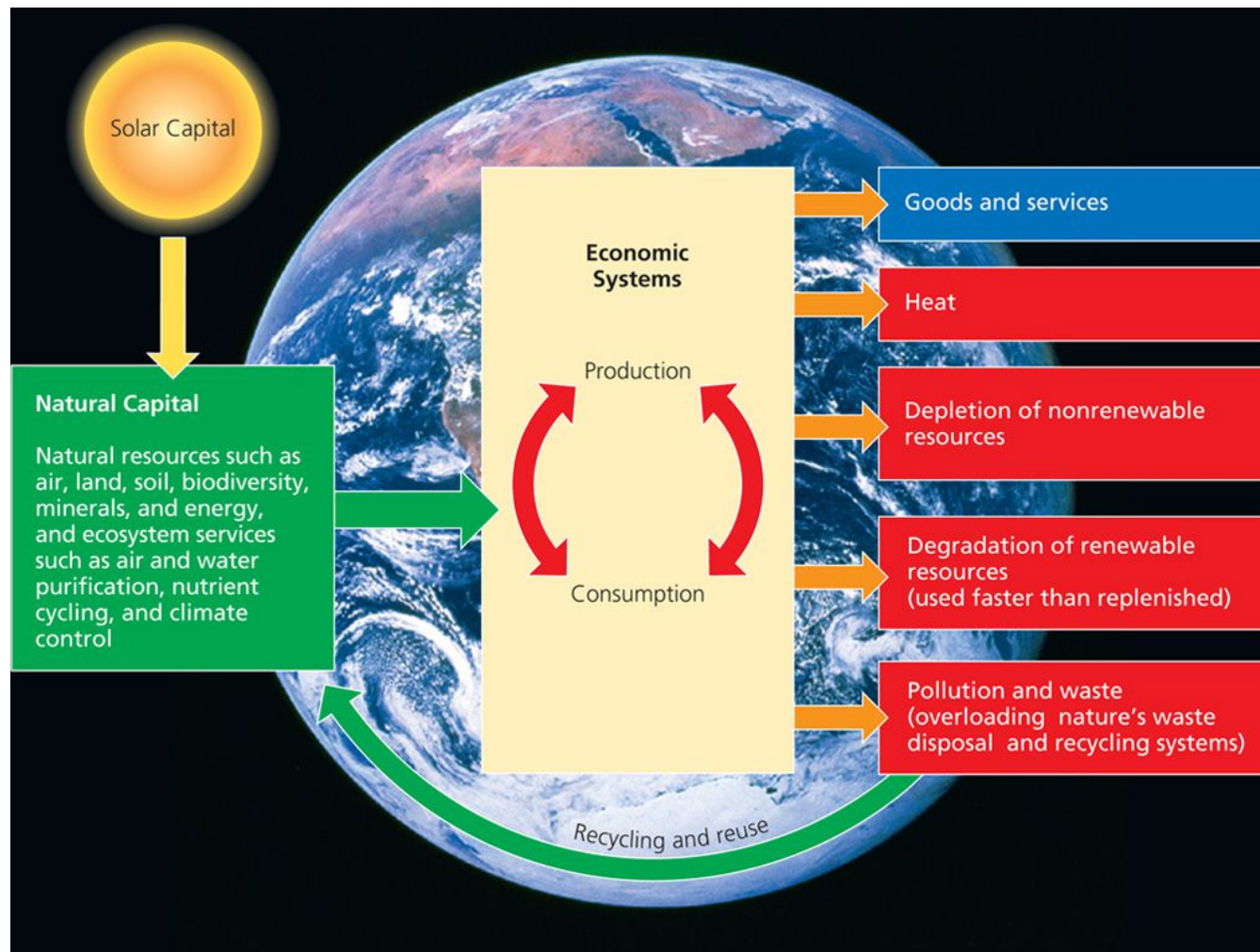


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17.2 How Can We Use Economic Tools To Deal with Environmental Problems?

- By including full-cost pricing of goods and services in market prices, subsidizing sustainable production, and taxing pollution/waste resources

Applying the Principle of Full-Cost Pricing

- Direct or market pricing usually ignores the hidden cost of harm to the environment and human health
 - Full-cost pricing reduces resource waste/pollution/environmental degradation, improves human health, and supports principles of sustainability – informed spending decisions
 - Not used widely as producers of harmful goods and services oppose it – difficult to determine these indirect costs

Shifting from Environmentally Harmful to Environmentally Beneficial Subsidies

- Subsidies can be used to encourage companies to move toward environmental sustainability
 - Some subsidies and tax breaks that encourage degrading of the environment should be eliminated
- Political interests stand in the way of these changes – often, harmful subsidies stand in the way of beneficial ones

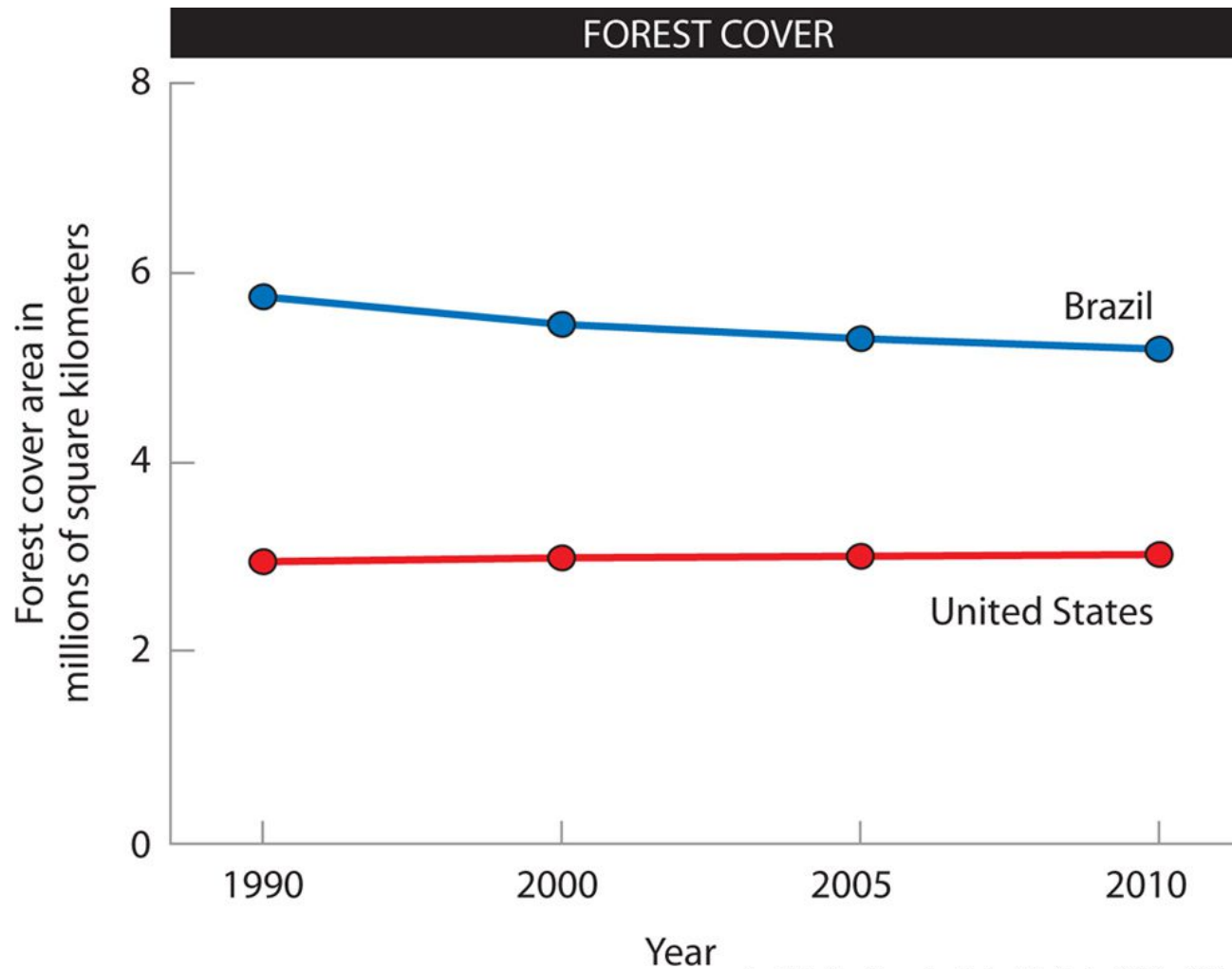
Historic Economic Indicators

- Gross domestic product (GDP) – annual value of all goods and services produced or operating within a country
 - Economic growth is the percentage of change per year in the GDP
 - A country's economic growth per person – $\text{GDP} / \text{country's total midyear population}$
- These indicators are used for measuring and comparing national economic outputs

Newly Proposed Environmental Economic Indicators

- Genuine progress indicator (GPI)
 - GDP + the estimated value of beneficial transactions – harmful costs of all transactions
- The United Nations has developed a set of environmental indicators measuring CO₂ emissions, forest cover, and water supplies

Monitoring Environmental Progress



Compiled by the authors using data from United Nations Statistics Division.

Taxing Pollution and Wastes Instead of Wages and Profits

- Green taxes can be applied to those who produce large amounts of pollution and hazardous waste
 - Increases applied over time – 10-20 years
 - Reduces other taxes to equal increase in green taxes, resulting in no net tax increase
 - Provides a safety net for lower-income populations
- Many countries already have such taxes

Environmental Laws and Regulations Can Discourage or Encourage Innovation

- Environmental regulation: government intervention to reduce environmental degradation
 - Command-and-control approach: regulations that focus on cleanup rather than prevention
 - Incentive-based environmental regulations: incentives for companies to innovatively reduce pollution and waste – motivates companies to develop green products and industrial processes that create jobs

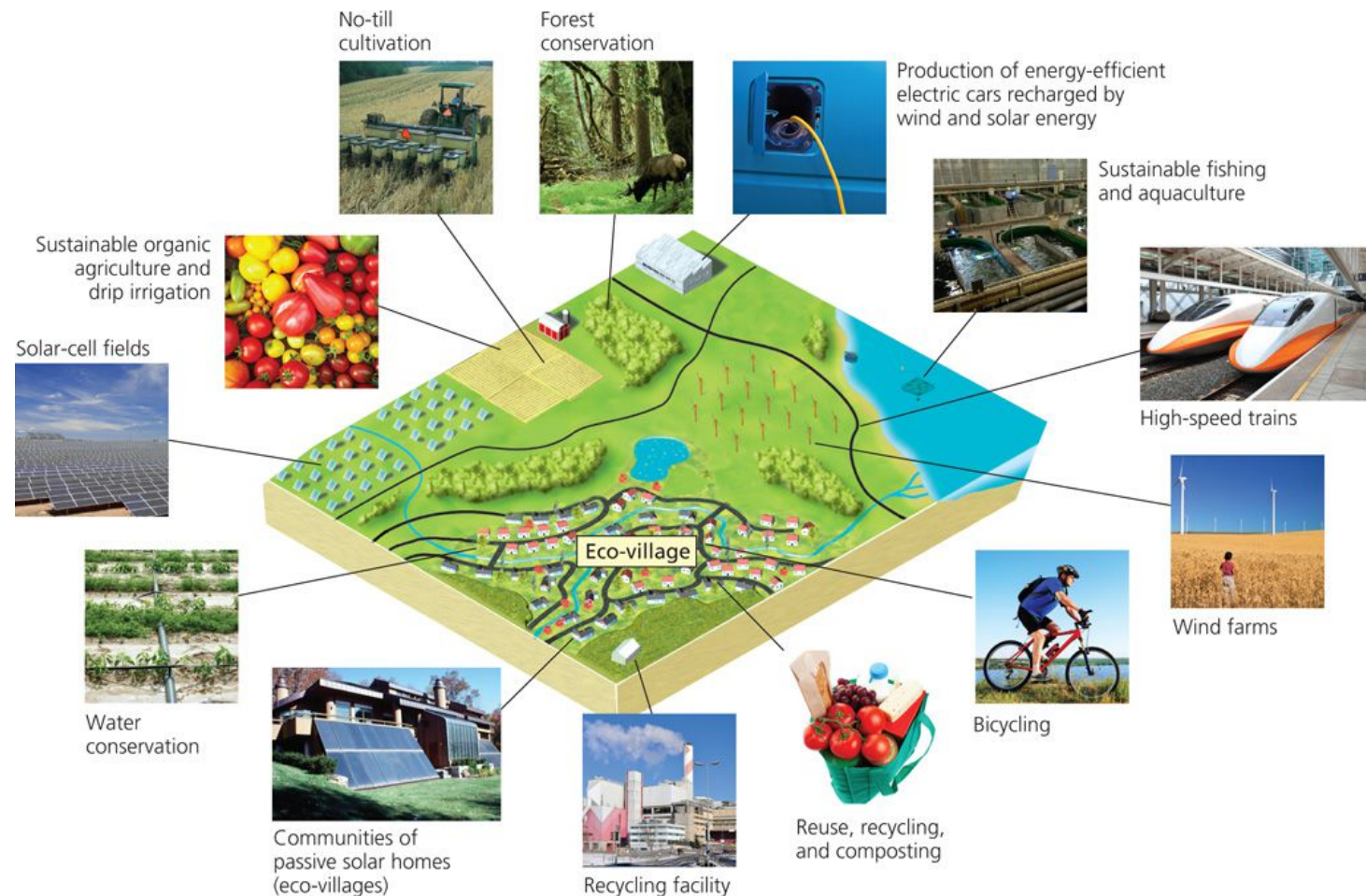
How Incentive Based Environmental Regulations Can Work

- Cap-and-trade approach
 - Government gives/sells companies tradable pollution or resource-use permits (unused credits can be saved for future expansion)
 - Reduces pollution and resource waste by selling services instead of things
 - Reduces the harmful health effects of pollution by reducing poverty

Shifting To More Environmentally Sustainable Economies

- Migration away from high throughput (high-waste) economies and towards low-throughput (low-waste) economies
- Reuse, recycle, and compost solid waste
- Improving environmental sustainability
 - Fosters the development of major growth industries
 - Increases profits and creates green jobs

Details of Environmentally Sustainable Economic Development



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17.3 How Can We Implement Sustainable and Just Environmental Policies?

- People must be involved in the political processes that affect how sustainable environmental policies are made and enforced

Why Developing Environmental Policies Can Be Difficult

- Special-interest groups pressure governments for subsidies/tax breaks, and the passage of laws/regulations favorable to their cause
- Discord among regulatory agencies and the creation of policies (often at cross purposes)
- Politicians may be more concerned with re-election than environmental policies

Environmental Justice, an Important Priority for Policy Makers

- Environmental discrimination
 - In the U.S., most polluting factories, hazardous waste dumps, incinerators, and landfills are located near low-income communities
 - Led to the development of the environmental justice movement
 - Proponents argue that ethical principles should carry as much weight as economic factors in deciding where facilities are located

Certain Principles Can Guide Us in Making Environmental Policy

- Environmental policies should be governed by seven principles:
 - Reversibility
 - Net energy principle
 - Precautionary principle
 - Prevention principle
 - Polluter-pays principle
 - Environmental justice principle
 - Holistic principle

Working Together Can Make a Difference

- Individuals matter – joining together brings about change (grassroots approach)
 - Digital technology, social media, and global action networks can work to affect change
 - Inspire change at regional/national/global level
- Individual environmental leadership
 - Lead by example, work within existing economic and political systems, run for local office, propose and work for better solutions

Citizen Environmental Groups Play Important Roles

- Thousands of nonprofit, non-governmental organizations (NGOs) make up the backbone of the environmental movement
 - These politically powerful groups fight attempts to weaken or repeal laws, and influence Congress in the passage and strengthening of environmental laws/policies
 - Loosely connected network of NGOs is the emerging citizen-based global sustainability movement

Historical Timeline of Environmental Law Enactment



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Students and Educational Institutions Can Play an Important Role

- Students can make environmental audits of their campus – gathering data/working together to affect environmental change
 - Propose sustainable changes to reduce costs
 - Buying locally grown food, shifting to renewable energy, and making universities retrofit buildings to make them more energy efficient
 - Pressure universities to stop investing endowment funds in environmentally harmful companies

Environmental Security Will Become Increasing Important

- The U.S. currently lacks adequate safety/inspection/maintenance programs for protecting hazardous waste producing facilities
- Why?
 - Not enough citizens/lobbyists have pressured Congress to designate funds for improving security around these facilities
 - This is an ongoing issue

17.4 What Are Some Major Environmental Worldviews?

- Major environmental worldviews differ as to the importance of human needs and wants versus the overall health of ecosystems and the biosphere

Environmental Worldviews Differ in Important Ways

- Not everyone agrees on the seriousness of the issues or what should be done about them
 - The same data can be interpreted to reach different conclusions
- Environmental worldviews: human-centered, life-centered or earth-centered
- Environmental ethics play a role in environmental decision-making

17.5 How Can We Live More Sustainably?

- Everyone needs to become more environmentally literate – by learning from nature, living more simply and lightly on the earth, and by becoming active environmental citizens

Learning to Live More Sustainably

- Foundations of environmental literacy
 - Natural capital matters
 - Our ecological footprints are immense and expanding rapidly
 - We should not exceed estimated planetary boundaries or ecological tipping points
- The bottom line: minimize the impacts of food production, transportation, and home energy use/overall resource use

Living More Lightly On the Earth

Food

Reduce meat consumption
Buy or grow organic food
and buy locally grown food

Transportation

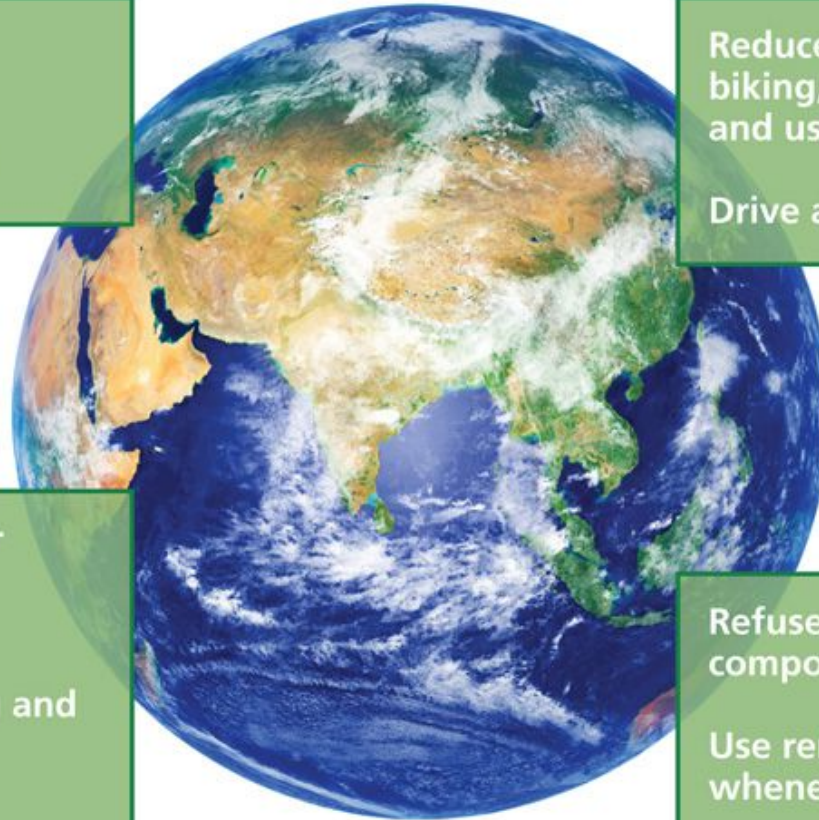
Reduce car use by walking,
biking, carpooling, car-sharing,
and using mass transit
Drive an energy-efficient vehicle

Home Energy Use

Insulate your house, plug air
leaks, and install energy-
efficient windows
Use energy-efficient heating and
cooling systems, lights, and
appliances

Resource Use

Refuse, reduce, reuse, recycle,
compost, and share
Use renewable energy resources
whenever possible



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Ethical Guidelines For Developing Environmentally Sustainable Societies

- Consider the effects activities can have on people and other organisms – mimic nature's sustaining processes
 - Protect natural capital/repair ecological damage caused by humans
 - Use matter/energy resources efficiently
 - Celebrate and protect biodiversity
 - Leave the earth in better condition for future generations – a sustainable revolution

Bringing about a Sustainable Revolution

Current Emphasis

Energy and Climate

Fossil fuels
Energy waste
Climate disruption

Sustainability Emphasis

Direct and indirect solar energy
Energy efficiency
Climate stabilization

Matter

High resource use and waste
Consume and throw away
Waste disposal and pollution control

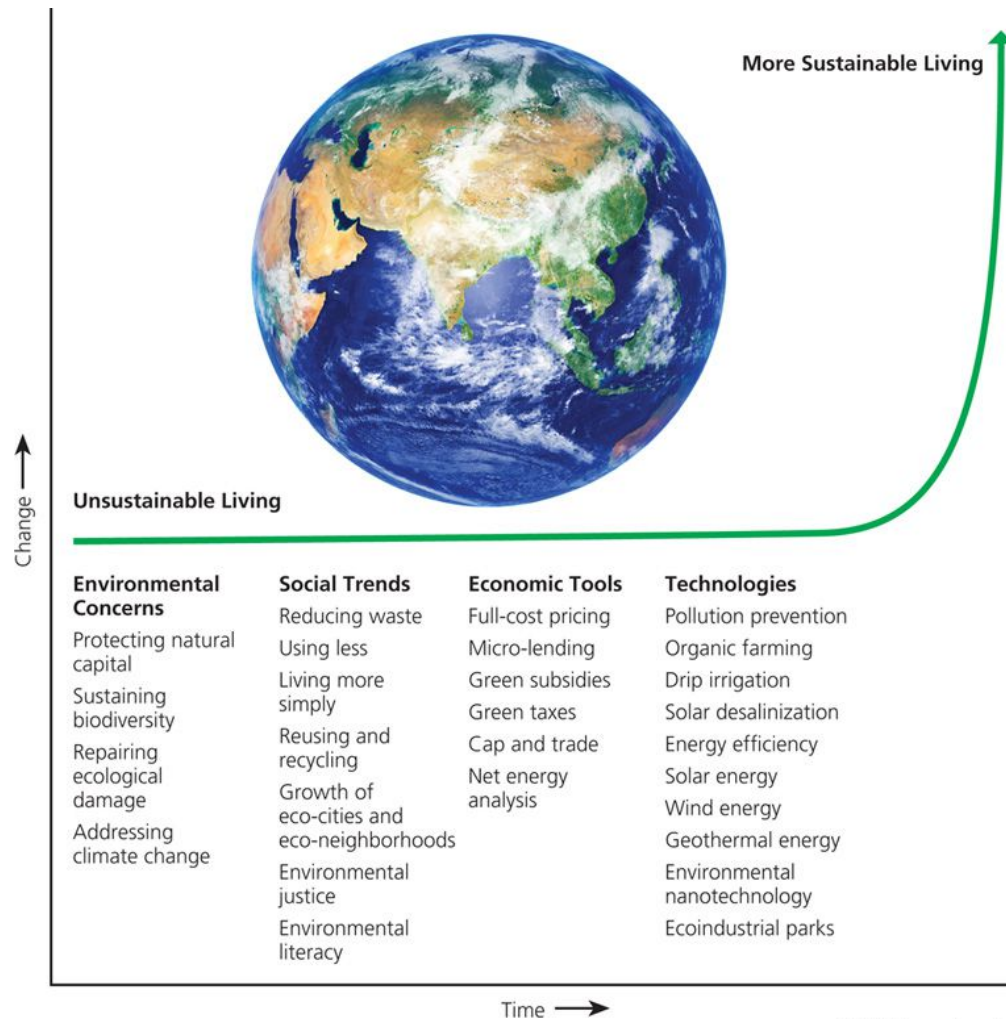
Less resource use and waste
Reduce, reuse, and recycle
Waste prevention and pollution prevention

Life

Deplete and degrade natural capital
Reduce biodiversity
Population growth

Protect natural capital
Protect biodiversity
Population stabilization

Major Shifts Towards Sustainability



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Additional Case Study: Denmark and Proactive Environmental Sustainability

- What separates Denmark from its European neighbors is its proactive approach to sustainability issues
 - Understands and values good science, benefits of collaboration, social responsibility, and wealth distribution – hallmarks of the modern sustainability movement
 - While Danes may understand environmental sustainability, this does not necessarily translate into effective practice

Additional Case Study: Denmark and Proactive Environmental Sustainability

- Denmark's early regulation of industrial waste/pollution evolved into tax incentives
 - In 2005, Denmark funded a national sustainability campaign that provided help to small businesses.
 - In 2008, an Action Plan for Social Responsibility was established
 - Updated in 2012, this Action Plan is now an integral part of sustainable business

Additional Case Study: Denmark and Proactive Environmental Sustainability

- Why is Denmark winning the race to environmental sustainability?
- Denmark is known for its windmills – what have they developed as a modern equivalent to them? How does this new technology fit into environmental sustainability?
- What makes Copenhagen's UN Headquarters sustainable?

Denmark's Proactive Sustainability and the Three Big Ideas

- Denmark has a significant history of providing subsidies and tax breaks for low-carbon technology and renewable energy generation
- Denmark's Action Plan for Social Responsibility influences how the country's environmental policies are made and implemented
- Danes are active environmental citizens