

Chapter 23

Lecture Outline

Economics,
Environment, and
Sustainability

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Ecological Economics



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Outline

- Perspectives on the Economy
 - ❖ Classical Economics
 - ❖ Neoclassical Economics
- Ecological Economics
- Population, Scarcity, and Technology
- Measuring Growth
- Can Markets Reduce Pollution?
- Green Development and Business

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Economic Worldviews

- Economy is the management of resources to meet needs in the most efficient manner possible.
- **Sustainable development** - meeting the needs of the present without compromising the ability of future generations to meet their own needs.

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Resources

- **Resource** - anything with potential use in creating wealth or giving satisfaction.
 - ❖ **Nonrenewable resources** - materials present in fixed amounts in the environment (e.g., minerals), or renew over geological time (e.g., fossil fuels).
 - ❖ **Renewable resources** - materials that can be replenished or replaced (e.g., sunlight).
 - ❖ **Intangible resources** - abstract resources such as open space, beauty, serenity, etc.

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Capital

- **Capital** - any form of wealth available for use in the production of more wealth
 - ❖ Natural - from nature
 - ❖ Human or cultural - knowledge, experience
 - ❖ Manufactured or built - tools, infrastructure
 - ❖ Social - shared values, trust, cooperation

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Classical Economics

- Originally a branch of moral philosophy concerned with how individual interests and values intersect with larger social goals
 - ❖ Adam Smith - Founder of modern Western economics
 - **Capitalist System** - Market competition between willing sellers and fully informed buyers is believed to bring about the greatest efficiency of resource use.
 - ❖ In a real market, low cost production of goods requires that some costs are externalized (i.e., passed off to someone else)

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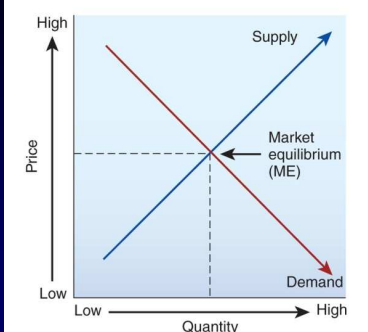
Classical Economics (cont.)

- David Ricardo further refined the relation between supply and demand.
 - ❖ **Demand** is the amount of a product or service consumers are willing and able to buy at various prices assuming they are free to express their preferences.
 - ❖ **Supply** is the quantity of that product being offered for sale at various prices.

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Supply and Demand Curves

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There is a direct, inverse relationship between supply and demand. 9

Classical Economics (cont.)

- In a free market, supply and demand should come into **market equilibrium** at the point of intersection of the two curves.
- In real life, prices are determined more by marginal costs and benefits.
 - ❖ **Marginal Cost** – for the seller, the cost of producing one more unit of a product or service
 - ❖ **Marginal Benefit** – for the buyer - How much would I benefit by buying one more unit?
 - ❖ **Price Elasticity** - item follows supply/demand curves exactly

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Neoclassical Economics Emphasize Growth

- The field of economics is divided into two camps:
 - ❖ **Political Economy** was concerned with social structures and relationships among classes (Karl Marx).
 - ❖ **Neoclassical Economics** adapted principles of modern science to economic analysis (Milton Friedman).
 - Retained emphasis on scarcity and supply and demand in determining prices and resource allocation
 - Claimed to be an objective, value-free approach

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Neoclassical Economics

- Constant growth is seen as necessary and desirable
 - ❖ Because factors of production are viewed as interchangeable, materials and services provided by the environment are not indispensable.
 - ❖ As one resource becomes scarce, substitutes will be found.

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Neoclassical Model of Economics



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Ecological Economics

- Assumes that natural resources are limited and valuable, while manufactured capital is abundant.
- Takes a systems approach, where all components are interconnected.
- Questions the idea of unlimited economic growth; concern about carrying capacity.
- **Steady-State economy** is characterized by low human birth and death rates, use of renewable energy sources, material recycling, and emphasis on efficiency (minimizing throughput) and stability.

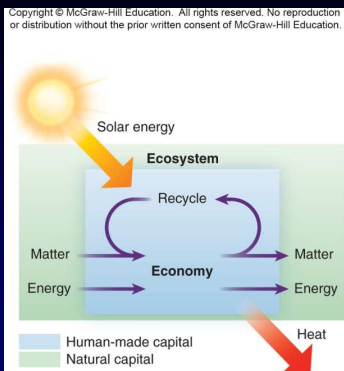
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Ecological Economics (cont.)

- Tries to make producers account for social as well as environmental costs.
- The Economics of Ecosystems and Biodiversity project of the UN has been working to improve the estimates of the value of ecosystem services.

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Ecological Economics



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Communal Property Resources

- **Garret Hardin - Tragedy of the Commons:**
 - ❖ Argued that commonly held resources are inevitably degraded because self-interests of individuals tend to outweigh public interests.
 - ❖ For example, everyone grazes cows on village commons. Each farmer maximizes his income if he adds another cow, but damage done by overgrazing degrades the commons.

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Communal Property Resources (cont.)

- Hardin was describing **open access system** with no rules to manage resource use, but many communal resources are managed by cooperative arrangements among users.
 - ❖ Examples: Native American management of hunting grounds; village-owned pastureland in Switzerland
 - ❖ Privatization often proves degrades communal resources.

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Population, Technology, Scarcity

- Scarcity can sometimes lead to innovation.
 - ❖ Greater efficiency can allow people to create the same amount of goods using fewer resources.
 - ❖ Substitution of new materials for scarce ones can extend supplies or create new ones.
 - ❖ Discovery of new reserves through better exploration techniques
 - ❖ Recycling as resources become more valuable

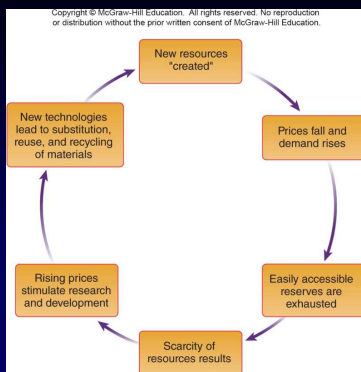
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Carrying Capacity is not Necessarily Fixed

- Technological developments have resulted in price decreases for many raw materials over the last hundred years.
 - ❖ Economists generally believe technological developments will help avoid catastrophe.
 - ❖ Ecologists generally disagree.
 - The fact that we have not yet run out of raw materials does not mean that it will never happen.
 - Ecological processes may be more irreplaceable than raw materials.

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Scarcity/Development Cycle



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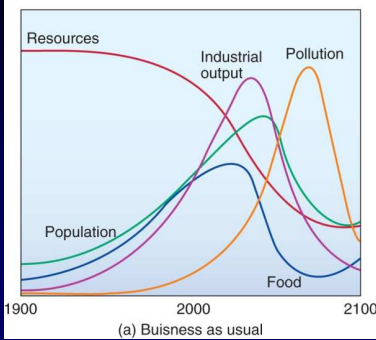
Economic Models

- "Limits to Growth" (1972) predicted catastrophe as population grew and resources became depleted.
- "Beyond the Limits" (1992) updated the model used in the previous book to include technological progress, pollution abatement, and population stabilization, and predicted an improved standard of living for everyone.
- Neither model shows what will happen, only what may happen.

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Business as Usual

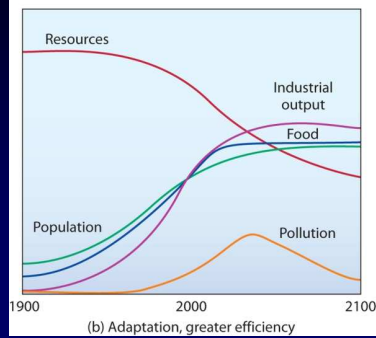
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Adaptation, with Efficiency

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Measuring Growth

- **Gross National Product (GNP)**
 - ✦ Two ways to calculate:
 - Flow of money from households to businesses in form of goods/ services purchased
 - Costs of production in form of wages, rent, interest, taxes, and profit
 - In both calculations, depreciation for wear and tear on machines, buildings, etc., is included.
- **Gross Domestic Product (GDP)** - only includes economic activity within national boundaries

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Environmental Effects of GNP/GDP

- Both GNP and GDP are criticized as measures of well-being because they do not distinguish between beneficial and harmful activities
 - ✦ Example: A huge oil spill shows up as positive addition to GDP because it creates cleanup jobs.
- Also, neither accounts for natural resources used up or ecosystems damaged

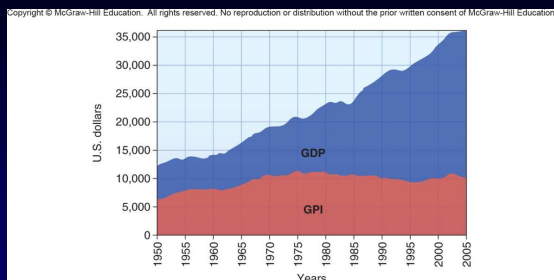
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Measuring Well Being

- **Genuine Progress Index (GPI)**
 - ✦ Takes into account real per capita income, distributional equity, natural resource depletion, and environmental damage
- **Environmental Performance Index (EPI)** - indicators are tracked in six areas: environmental health, air, water, productive natural resources, biodiversity and habitat, and sustainable energy
 - ✦ U.S. ranks 28th, below Malaysia
 - ✦ Sweden, Finland, and New Zealand are among the top-ranked countries

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Per Capita GDP vs. GPI in the United States



Although GDP has increased in the U.S. over time, Genuine Progress Index has (GPI) not..

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Measuring Well Being

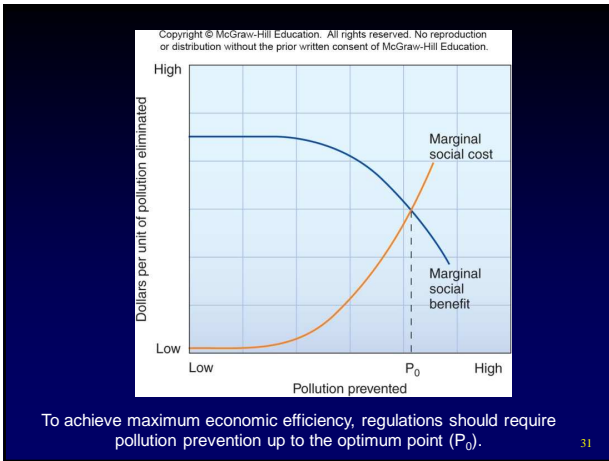
- **Human Development Index** - used by U.N.
 - ❖ Incorporates life expectancy, educational attainment, standard of living
 - ❖ Norway ranks first in HDI; Canada ranks sixth; U.S. ranks eighth
- **Gender Development Index** - HDI adjusted for inequality between men and women
- Poverty and child death rates are falling, while life expectancy is increasing in many places around the world.

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Cost-Benefit Analysis

- Attempts to assign values to resources and social and environmental effects of carrying out a given undertaking
- Tries to find optimal efficiency point at which the marginal cost of pollution control equals the marginal benefit

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Cost-Benefit Analysis

- Widespread since Reagan administration issued executive order requiring its use in regulatory decisions and legislative proposals
 - Many conservatives see it as a way to eliminate what they consider to be unnecessary requirements to protect clean air and water, human health, biodiversity
- Difficult to do in practice - what monetary value do you assign to being able to swim in a river?

Cost-Benefit Analysis

- Economic Policy Institute finds costs of compliance with environmental regulations are almost always less than projected.
 - Electric utilities said Clean Air Act would cost them \$4 to \$5 billion, but actually saved them \$150 million/yr.
 - Auto manufacturers said banning CFCs would add \$1,200 to cost of car. Actual cost was \$40.
- Placing monetary value on everything leads to belief that only money and profits count

Market Mechanisms Can Reduce Pollution

- Sir Nicholas Stern, former chief economist at World Bank, issued a report to the British government in 2006, which concluded that, if we do not act to control global warming, the damage caused by climate change could be equivalent to losing 20% of global GDP each year.
- Can use market forces to reduce pollution, e.g., taxing pollution
- Responding to climate change will create business opportunities in renewable energy, carbon reduction, etc.

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Emissions Trading

- Also known as Cap and Trade
 - ❖ Mandate upper limits on pollution (cap)
 - ❖ Companies that can cut pollution more than they are required to can sell the credit to other companies that are not meeting their mandated levels.
 - ❖ You can do this personally, as there are several organizations that will sell you an offset to make your lifestyle carbon neutral (e.g., air travel).

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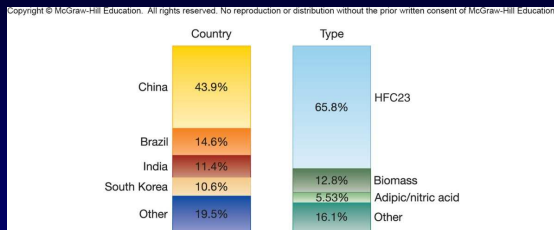
Sulfur and Carbon Trading

- The 1990 Clean Air Act mandated reduction in sulfur dioxide to cut acid rain. Targeted reduction was 10 million tons/yr. Sulfur exchange was set up and nationwide emissions have come down.
- There are still hot spots of air pollution where companies are buying credits.
- Carbon trading is a \$28 billion market
 - ❖ European Climate Exchange
 - ❖ U.S. only has voluntary caps on carbon.

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Emissions Reductions by Trading

- Currently more than 80% of emissions payments go to only four countries. Nearly 2/3 of the payments are for incineration of HFC23.



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Emissions Reduction by Trading (cont.)

- Critics point out that the original idea was to encourage renewable energy such as solar panels, wind farms, tree farms, etc., in developing countries.
- Instead, marketing emissions credits has so far benefited primarily bankers, consultants, and factory owners and is leading to short-term fixes rather than long-term solutions.

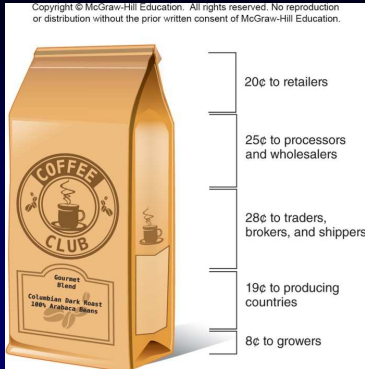
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Trade, Development, and Jobs

- Banking and trading systems that regulate credit, currency exchange, and commodity prices were set up by developed countries to benefit their own self interest.
 - ❖ Keep less-developed countries in a perpetual role of resource suppliers to more-developed countries.
 - ❖ Producers in developing countries make very little income generated by international trade.

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Growers Get 8¢ of Dollar's Worth of Coffee



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International Trade

- World Trade Organization (WTO) has issued numerous rulings that favor trade over preventing pollution and protecting endangered species.
- NAFTA has been accused of allowing companies to move across borders to countries with lax environmental standards and low labor costs.
- World Bank has tremendous influence on finances and policies of developing countries.

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International Aid Often Goes Awry

- Two-thirds of \$25 billion loaned annually for developing world projects comes from the World Bank.
 - Many projects have been environmentally destructive
 - Loans often go to corrupt governments
 - Load third world countries with debts that they cannot pay

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Microlending

- Microloans can aid the poorest of the poor.
- Grameen Bank, founded by Dr. Muhammad Yunus, has assisted millions of people (mostly low status women).
- Borrowers can take out loans in small groups in which everyone in group is responsible for other's performance. Provides support.
- Yunus won 2006 Nobel Peace Prize.
- Kiva.org raised 71 million dollars over 4 years to help 171,000 entrepreneurs in developing countries.

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Green Business

- Today business leaders are discovering that operating in a socially responsible manner consistent with principles of sustainable development can be good for business.
 - Fuel efficiency saves money as well as cutting greenhouse gases
- Green companies include Body Shop, Aveda, Patagonia, Johnson and Johnson

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Business Models Follow Ecology

- Paul Hawkin's book, *The Ecology of Commerce*, was seminal in convincing people to look at business and environment.
 - ❖ Nothing is wasted in nature; one organism's waste is another's food
 - ❖ Industrial processes should operate on similar principle
- Another approach to corporate responsibility is **triple bottom line** using environmental effects and social justice to measure success, as well as profits.

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Efficiency Starts with Product Design

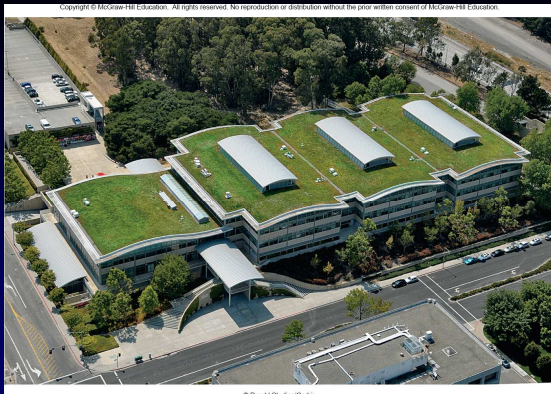
- For every truckload of goods produced in the U.S., 32 truckloads of waste are produced.
- Architect Wm. McDonough suggests re-thinking design. Products should be divided into 3 categories:
 - ❖ Consumables - can be composted
 - ❖ Service products - are durables such as TV. Should be leased to consumer but always belong to manufacturer who must dismantle at end of useful life
 - ❖ Unmarketables - toxic waste - should be molecularly tagged with manufacturer who would be held liable for illegal disposal

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Green Design

- The corporate offices of the Gap, Inc. have
- roof covered with native grasses
 - natural lighting
 - wood harvested sustainably
 - low toxicity paints
 - 1/3 more energy efficient building than California law requires

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Green Consumerism Gives Public a Voice

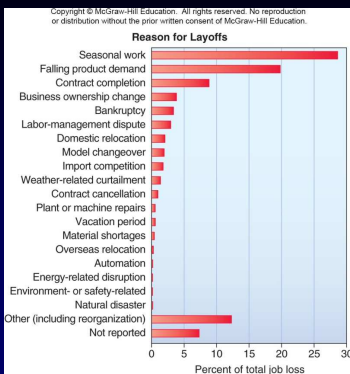
- Consumer choice can persuade businesses to be eco-friendly
 - ❖ Ecotravel agencies
 - ❖ Natural foods have grown into a \$7 billion market segment
 - ❖ Natural cosmetics and beauty products now represent 10% of market

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Environmental Protection Creates Jobs

- Business leaders used to claim that environmental regulations would cause job losses.
- Studies by ecological economists show that only 0.1% of all large scale lay-offs in the U.S. were due to government regulations.
- Environmental careers are expected to increase in areas such as:
 - ❖ Renewable energy
 - ❖ Recycling
 - ❖ Climate remediation
 - ❖ Ecosystem restoration

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