Environmental Economics
Lecture 2

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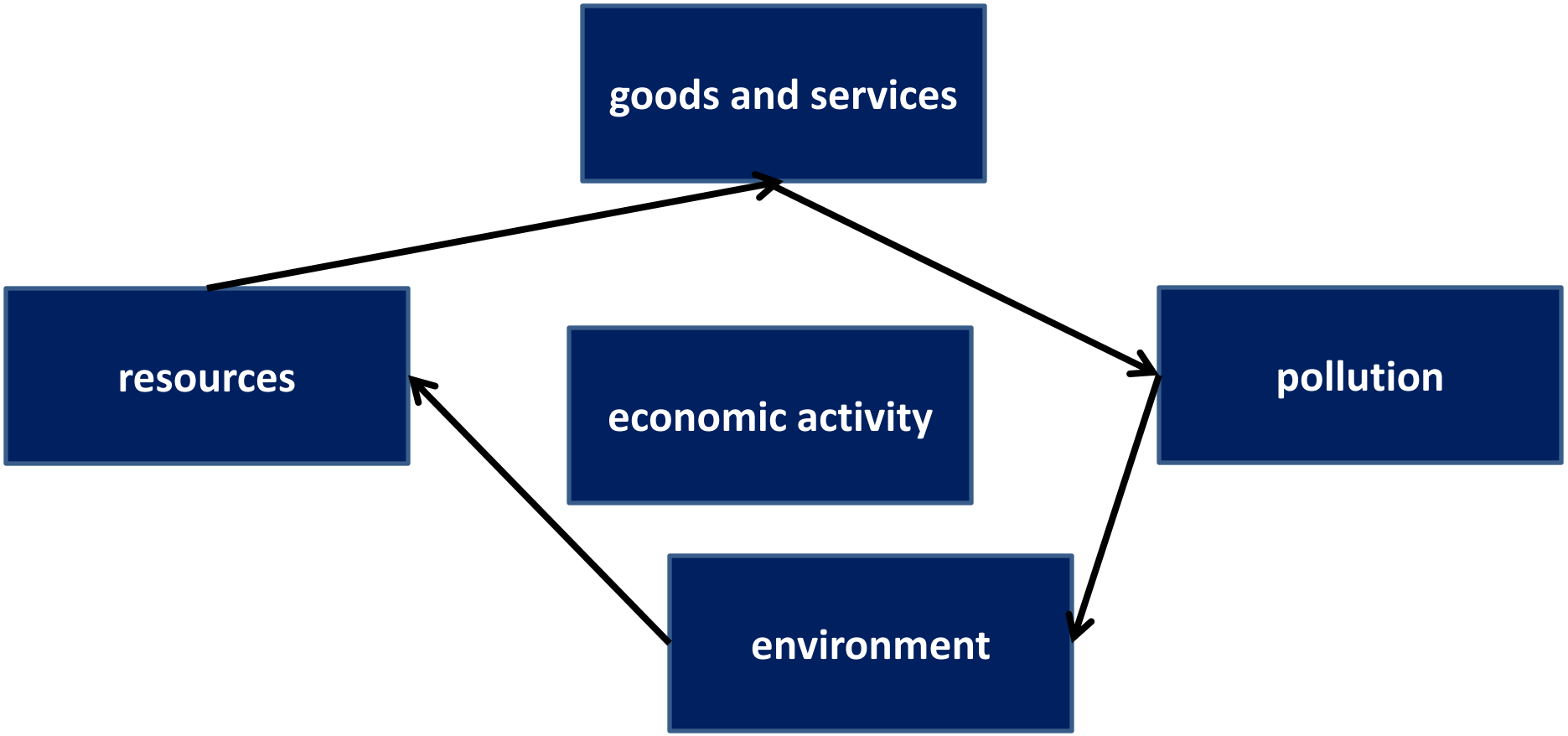
Economic growth
and
environmental performance
must go
hand in hand.

The natural environment is central to economic activity and growth, providing the resources we need to produce goods and services, and absorbing and processing unwanted by-products in the form of pollution and waste.



CHAPTER FOCUS QUESTIONS

What is the relationship between **economic growth** and the **environment**?

Will **economic growth** encounter planetary limits?

How can **economic development** become environmentally sustainable?

The natural environment and the economy

The natural environment plays an important role in supporting economic activity. It contributes:

- **directly**, by providing resources and raw materials such as water, timber and minerals that are required as inputs for the production of goods and services.
- **indirectly**, through services provided by ecosystems including carbon sequestration, water purification, managing flood risks, and nutrient cycling.

Natural resources are, therefore, vital for securing economic growth and development, not just today but for future generations.

This called **Sustainable development**

Sustainable development

(**SD**) is a pattern of economic development in which resource use aims to meet human needs while preserving the environment,
So that these needs can be met not only in the present, but also for the next generations.

Sustainable development

Recall that ---

the standard view of economic growth is defined in terms of per capita GDP, meaning that total GDP must rise faster than population. Sustainable development requires different measures. Increased output of goods and services can certainly be part of the desired outcome, but equally important is the maintenance of the ecological base of the economy—fertile soils, natural ecosystems, forests, fisheries, and water systems.

Sustainable Development Versus Standard Views of Economic Growth

On the production side, it is important to differentiate between renewable and nonrenewable resources. Every economy must use some nonrenewable resources, but sustainable development implies conservation or recycling of these resources and greater reliance on renewables.

On the consumption side, an important distinction must be drawn between wants and needs. In contrast to the standard economic paradigm, in which "dollar votes" command the marketplace and determine which goods are to be produced, sustainable development implies putting a priority on supplying basic needs before luxury goods.

Population and Sustainable Development

Population policy must be an essential element of sustainable development. Population policy must include elements of education, social policy, economic policy, and health care, including contraceptive availability, and often runs into conflict with established religious and social mores.

Population and Sustainable Development

For developing economies with rapid population growth rates, it means that limiting population growth is a critical element in successful development.

For developed economies, the role of population is different. In much of Europe and in Japan, population has stabilized, and for countries such as Germany and Russia concern has shifted to an emerging pattern of population decline.

Population and Sustainable Development

In the United States, however, population increase continues to put pressure on both national and global ecosystems. Although the U.S. population growth rate is less dramatic than that in many developing nations

the much larger U.S. per capita consumption means that each additional U.S. resident creates several times the additional resource demand of, for example, an additional resident of India.

Agriculture and Sustainable Development

1- When we consider agricultural production systems, the general principle of relying as much as possible on renewable resources runs counter to much of standard agricultural "modernization."

2- Modern food production is based on **input-intensive agriculture,** meaning that it depends heavily on additional fertilizer, pesticides, water for irrigation, and mechanization.

Agriculture and Sustainable Development

3- All of these in turn depend on fossil fuel energy.

4- Traditional agriculture, based on solar energy, animal power, and human labor, has generally produced lower yields than modern agriculture.

Agriculture and Sustainable Development

5-The concept of **sustainable agriculture** combines elements of traditional and modern techniques. It emphasizes maximum use of renewable resources such as crop wastes and animal manure, as well as crop rotation, intercropping of different plant types, agroforestry, efficient irrigation, minimum-till techniques, and integrated pest management

Energy and Sustainable Development

1- A similar issue arises as to whether **renewable energy sources** (including **solar energy**) have the capacity to replace fossil fuel dependence.

2-The challenge is a daunting one, because renewables now supply less than 10 percent of energy in the developed nations.

Energy and Sustainable Development

3- The picture is different in developing nations, where a large portion of current energy supply comes from **biomass** (wood, plant, and animal wastes).

4- Efficient use of biomass and maintenance of forest resources can thus play an important role in energy policy. Technological advances in solar, wind, and biomass energy systems have lowered the prices of these renewable sources, and their potential for future expansion is significant both in developed and developing nations.

Sustainable Management for Natural Resources

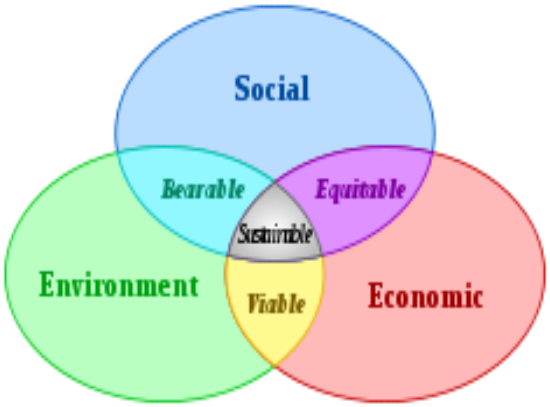
Sustainable natural resource management implies a combination of economic and ecological perspectives. The economic theory of natural resource management

Measuring Growth Rates

In approaching complex growth issues, we can start with a simple economic **analysis of the relationship between population and economic activity**.

Measuring economic output in conventional terms as **gross domestic product (GDP)**, we have the simple identity That :

GDP = (Population) * (Per Capita GDP)



Resources, Environment, and Economic Development

which can then be expressed in terms of rates of growth as a relationship among **GDP growth rate**, **population growth rate,** and **per capita GDP growth rate:**

GDP Growth Rate = (Population Growth Rate) * (Per Capita GDP Growth Rate)

real GDP, nominal GDP , inflation

To correct for the effects of **inflation**, we should use **real GDP** rather than **nominal GDP** in this equation

GDP Growth Rate = (Population Growth Rate) * (Per Capita GDP Growth Rate)

Real GDP is a way for economists to compare figures across years or decades. It strips out inflation and deflation to allow one year's GDP to be compared to another.

Nominal GDP is not adjusted for changes in price levels. It uses the prices that were in place from the year in which the GDP is calculated. It doesn't take into consideration inflation or deflation but is just a snapshot of the goods and services produced at prevailing prices for that quarter or year.

Inflation/Deflation

To understand the difference between real and nominal GDP, one must also grasp inflation and deflation.

Inflation : when prices increase, leading to a reduction in purchasing power of a currency unit. Or the annual percent change in the overall price level. (usually in the CPI)

Deflation : when prices fall, leading to a currency having more pricing power. Or a decline in the rate of inflation

Calculating Real GDP

To adjust nominal GDP into real GDP, economists first create an index that measures the price of goods and services from one year compared with another.

That price index is used to lower nominal GDP when prices rise and increase nominal GDP when prices fall.

Here is the equation that is used:

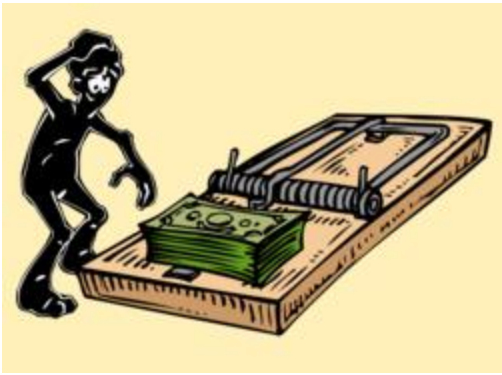
GDP = (Nominal GDP/Price Index) * 100.

Real per capita GDP will rise steadily, as long as real GDP growth remains consistently higher than population growth.

For this to occur, productivity must also rise steadily.

This increasing productivity is the key to escaping the **Malthusian trap**.

Malthusian Trap



the Malthusian Trap an expression of the **sustainability problem**, which could also be called the **Sustainability Trap**. Thus the Malthusian Trap is an important abstraction to understand.

It ensures that gains in income per person through technological advances are inevitably lost through subsequent population growth.

Thomas Malthus (1766–1834)

Factors Essential to Economic Growth

What determinants of increased productivity make this steady growth possible?

What determinants *Economic Growth*?

Investment

Technological Innovation

Energy Supply

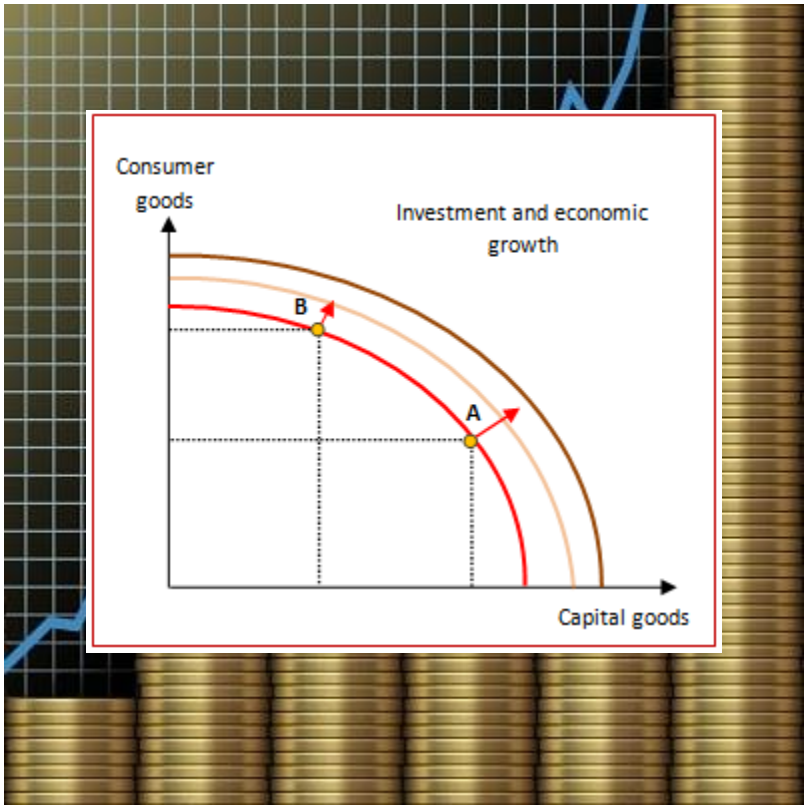
Supplies of Land and Natural Resources

The Absorptive Capacity of the Environment

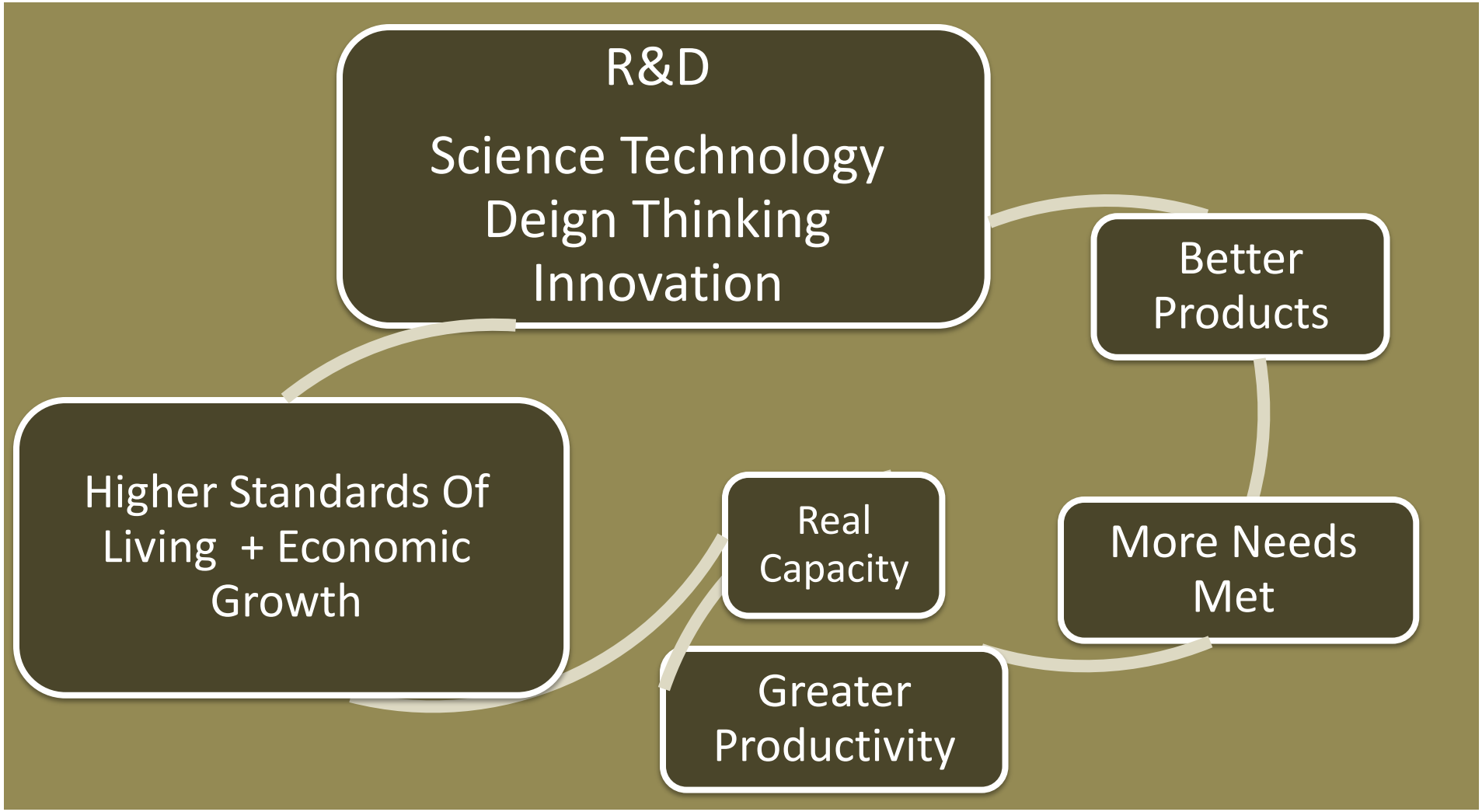
Factors Essential to Economic Growth

What determinants *Economic Growth*?

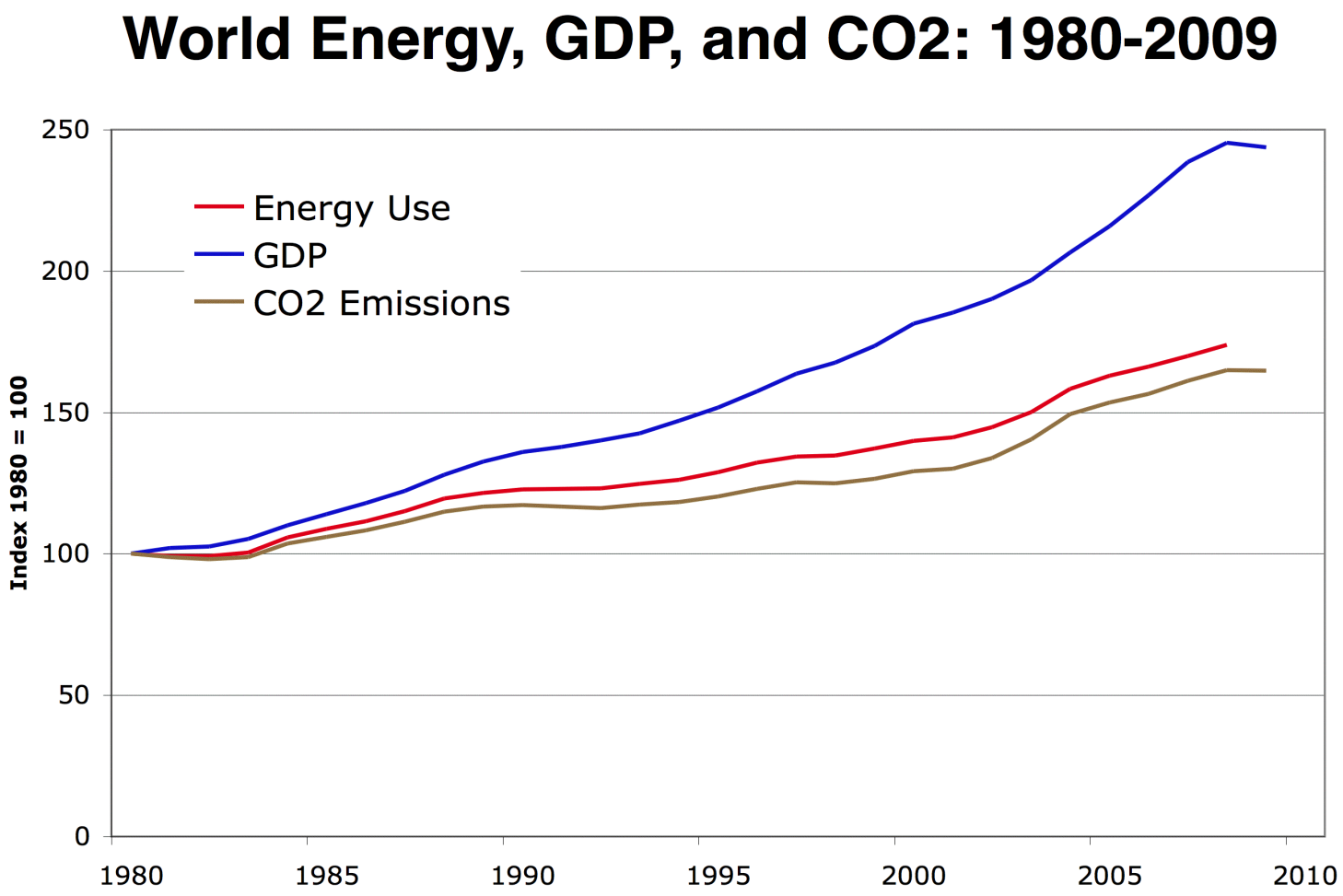
1. **Investment** allows growth of **capital stock** over time: as capital stock per worker increases, the productivity of each worker increases.



2. technological innovation raises the productivity of both capital and labor..



3. Energy supply.



4. Supplies of land and natural resources.
Almost all economic activities require some land use.

5. The absorptive capacity of the environment for the waste products of industrial development.

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WEBSITES

1. **http://www.iisd.org/** The homepage for the International Institute for Sustainable Development, an organization that conducts policy research towards the goal of integrating environmental stewardship and economic development.
2. **http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/homepage/** The website for the National Center for Environmental Economics, a division of the U.S. Environmental Protection Agency that conducts and supervises research on environmental economics. Their website includes links to many research reports.
3. **http://www.ase.tufts.edu/gdae/** The homepage for the Global Development and Environment Institute at Tufts University, "dedicated to promoting a new understanding of how societies can pursue their economic goals in an environmentally and socially sustainable manner." The site includes links to many research publications.
4. **http://www.wri.org/** The World Resources Institute website offers the biennial publication *World Resources* as well as extensive reports and data on global resource and environmental issues.