IV. Environment & Epidemics

Introduction

EE406: Contemporary Economic Issues
Semester 1/2020
Faculty of Economics, Thammasat University

Human-Environment interaction

- Human–environment interactions involve not only the question of resource use per person, but also
  - our ability to understand the science of the environment
  - our ability to regulate our impact on the environment
  - our beliefs in the value of the environment
  - our attitudes to the future
  - our ability to negotiate solutions at both the local and the global level

Livelihood and natural resources

- Our livelihoods are ultimately natural resource dependent.
- Natural resources provide us with the land and water for agriculture, trees for firewood and timber, ocean and freshwater resources for fisheries, wildlife for meat, animal products, tourism, oil, gas and coal for energy, and also mineral resources
- Many economies are dependent on natural resources.
  - At the household and community level, this can be in the form of agriculture or natural resource products gathered and sold
  - At the national level, most countries rely on their natural resource base to meet basic needs and provide the resources for economic development
  - Globally, we rely on natural resources for ecosystem regulation.

Population–environment theories

- As national populations grow, and the demand for natural resources increases, worries that we shall exceed the resources of the planet have been expressed by many over the years.
- In 1798, Malthus predicted that human population growth would be checked by food supply.

Population–environment theories

- However, Such numbers-versus-resources calculations are far too simplistic.
- Other factors are involved
  - Inequality and distribution of resources
  - Technological and knowledge development
  - Changing lifestyles
- The human population also affects the environment through what it leaves behind.

Population–environment theories

- The impact of the human population on the environment is seen as, among other things, land use change, urbanization, pollution of water, seas and landscapes.
- The impact of population on the environment is determined by the size of the population, its affluence (and hence consumption *per capita*) and the type of technologies used.

Our relationship with nature

- Are we a part of nature, and one of many animals in a global ecosystem, or are we separate from nature, placed ‘above’ nature and entitled to control it and use it to further our own needs regardless of the effect on the remaining ecosystem?

Our relationship with nature

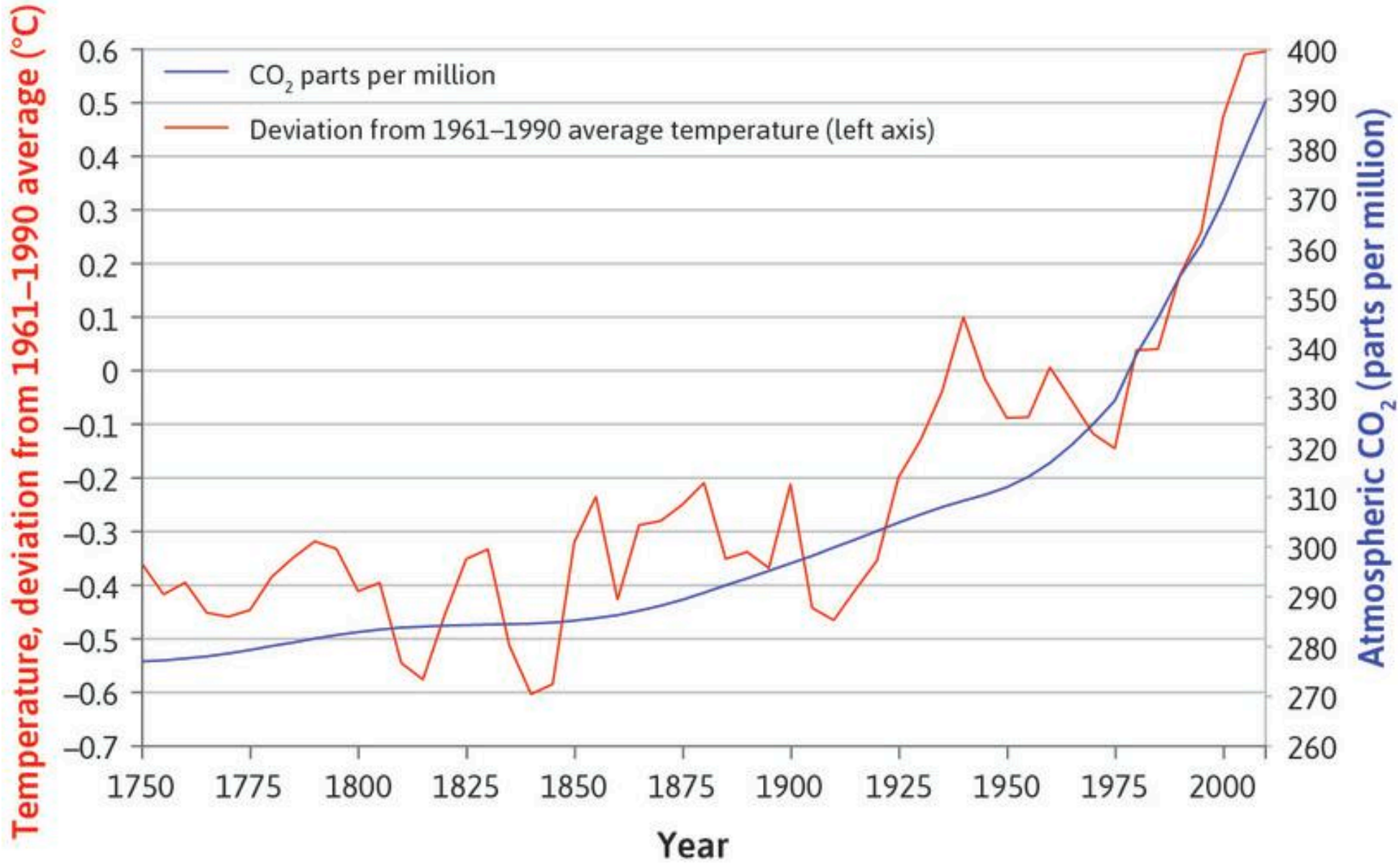
- Are we a part of nature, and one of many animals in a global ecosystem, or are we separate from nature, placed 'above' nature and entitled to control it and use it to further our own needs regardless of the effect on the remaining ecosystem?
  - Technocentrics have more faith in science and technology. They believe in man's dominance over nature, and furthermore are more optimistic that future scientific and technological developments will enable us to overcome environmental problems and constraints.
  - Ecocentrics, on the other hand, believe in a greater degree of equality between humans and nature, and even the subordination of man to nature. As such, they believe we are just one part of a global ecosystem, which must be respected.

Current Environmental Issues

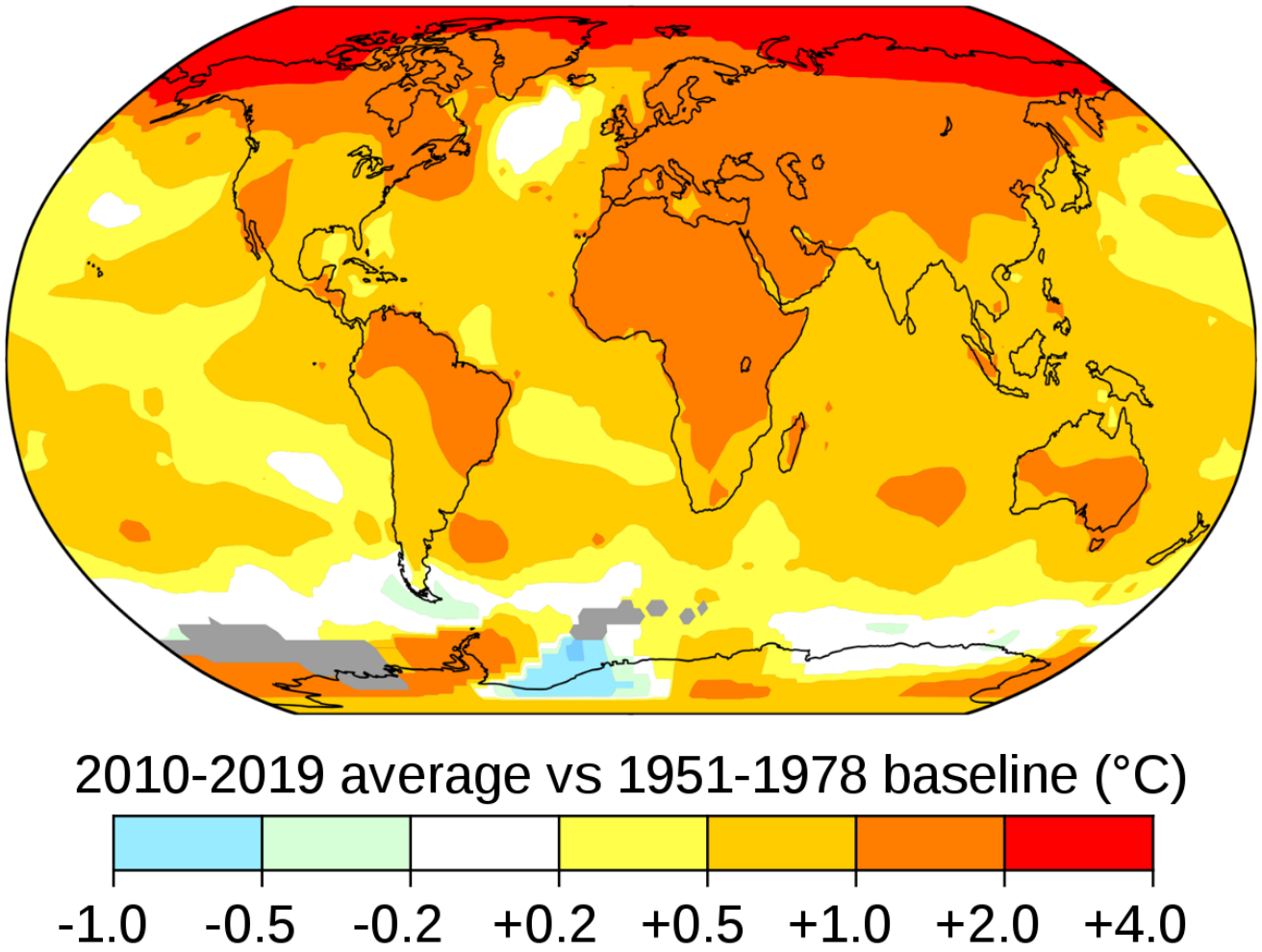
There are so many of them!

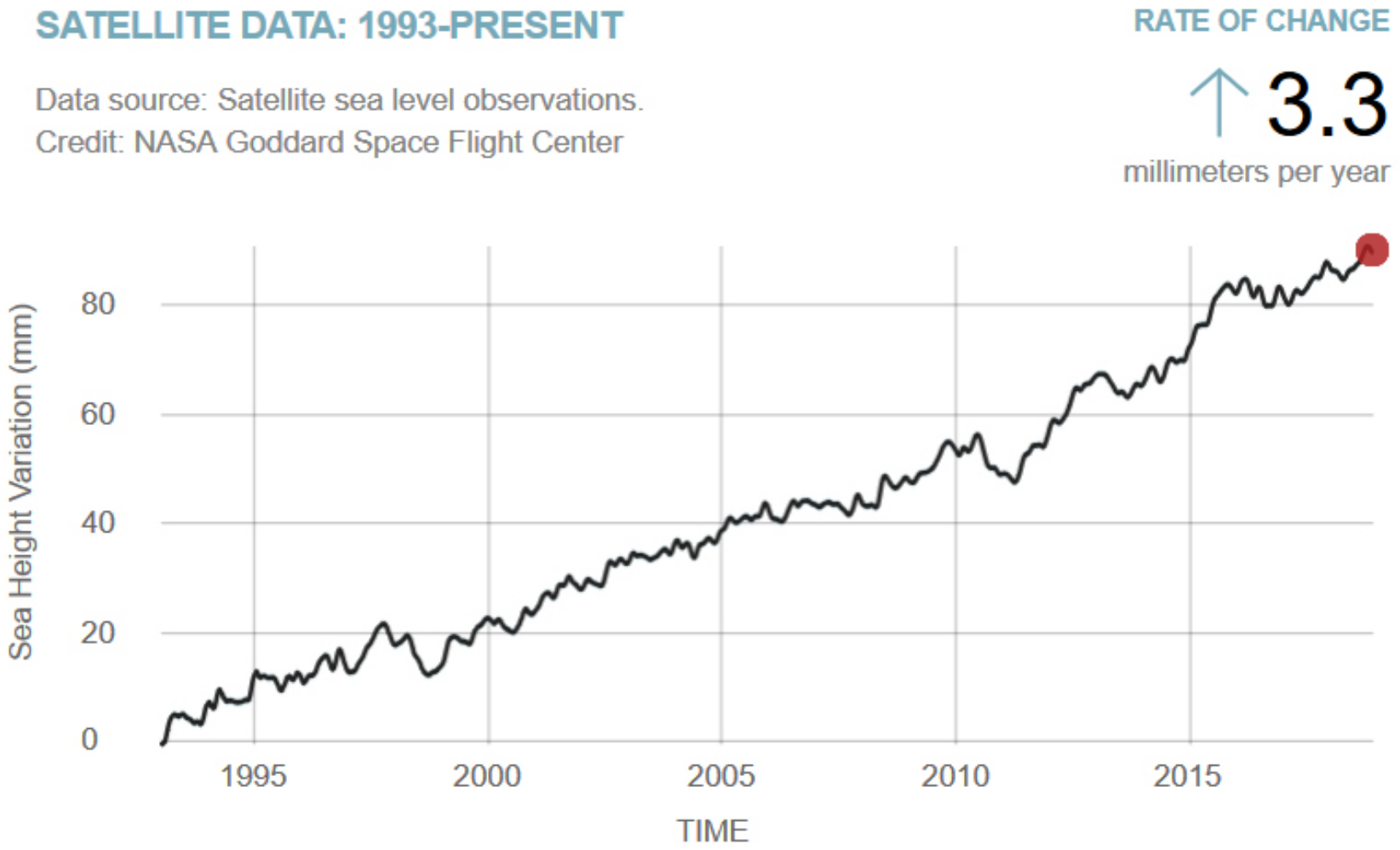
Our biosphere has been radically altered by our production and distribution of goods and services. The resulting climate change will be a major threat to us and our children.

Depleting natural resources is easier to fix since they tend to self-correct. It is much, much harder to deal with negative external environmental effects.

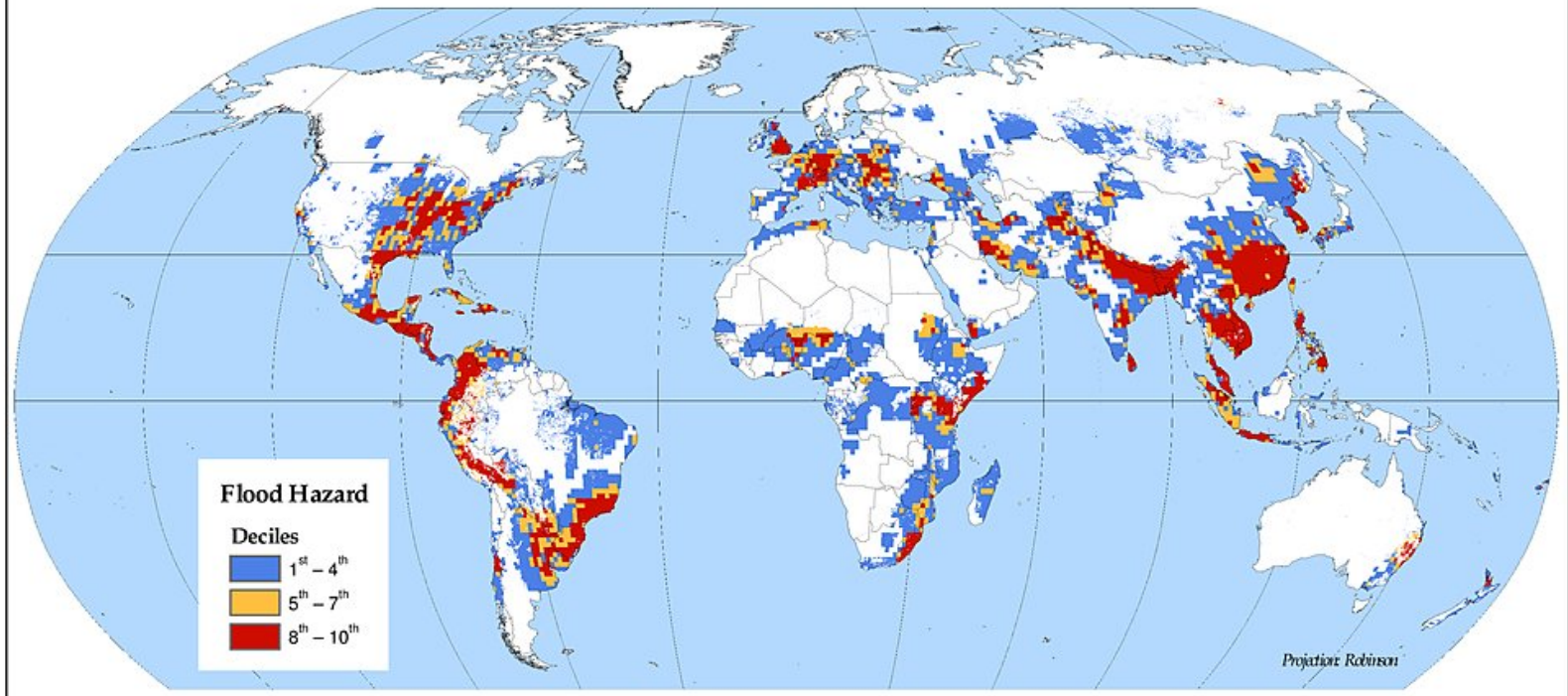

Temperature, deviation from 1961–1990 average (°C)
0.6
0.5
0.4
0.3
0.2
0.1
0
–0.1
–0.2
–0.3
–0.4
–0.5
–0.6
–0.7
CO2 parts per million
Deviation from 1961–1990 average temperature (left axis)
400
390
380
370
360
350
340
330
320
310
300
290
280
270
260
Atmospheric CO2 (parts per million)
1750
1775
1800
1825
1850
1875
1900
1925
1950
1975
2000
Year

Temperature change in the last 50 years




SATELLITE DATA: 1993-PRESENT
Data source: Satellite sea level observations.
Credit: NASA Goddard Space Flight Center
RATE OF CHANGE
3.3
millimeters per year
Sea Height Variation (mm)
80
60
40
20
0
1995
2000
2005
2010
2015
TIME

Global Flood Hazard Distribution



The data set comes from the Dartmouth Flood Observatory's global listing of extreme flood events compiled from various sources for the 19-year period from 1985 – 2003. Some flooding is evident in more than one-third of the world's land area.

Source:
Dilley, Maxx, Robert S. Chen, Uwe Deichmann, Arthur L. Lerner-Lam, and Margaret Arnold. 2005. *Natural Disaster Hotspots: A Global Risk Analysis*. Washington, D.C.: World Bank.

Air Pollution

Soil Pollution

Water Pollution

Noise Pollution

Acid rain

Endangered Species

“Economics of Environment”

A famous bet: Ehrlich vs. Simon

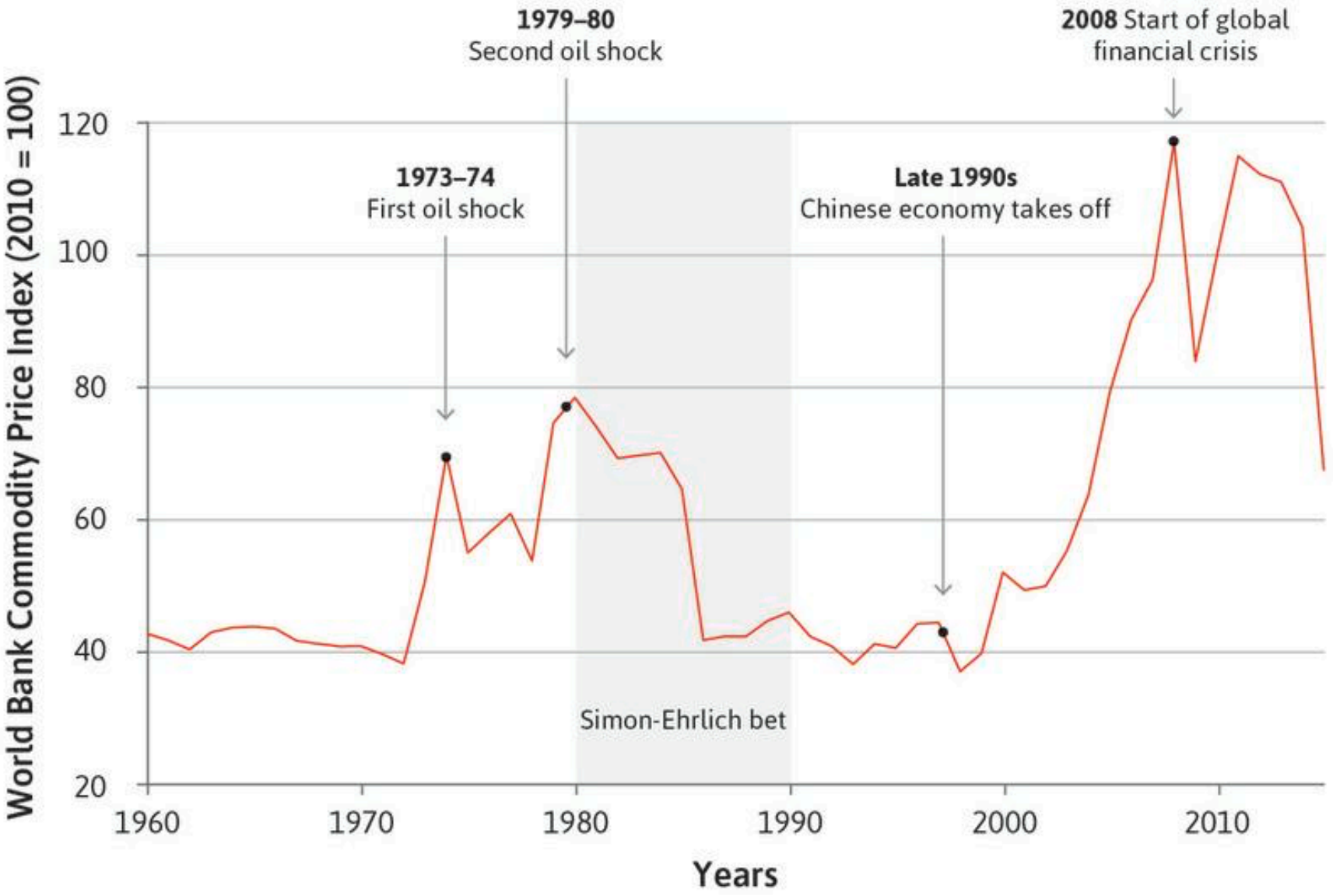
- In 1980, one of the most famous bets in science history took place.
- Paul Ehrlich, a biologist, predicted that rapidly increasing population would make mineral resources scarcer.
- Julian Simon, an economist, thought that humanity would never run out of minerals because higher prices would stimulate the search for new reserves, and ways of economizing on the use of resources.
- Ehrlich bet Simon that the price of a basket of five commodities—copper, chromium, nickel, tin, and tungsten—would increase

A famous bet: Ehrlich vs. Simon

- On 29 September 1980, they bought $200 of each of the five commodities (a total wager of $1,000).
- If price increase faster than inflation over the next decade, Simon would pay Ehrlich the difference between the *inflation-adjusted prices* and the $1000.
- And vice versa.
- Who do you think win?

The famous question

- The Ehrlich-Simon bet was motivated by the question of whether the world was 'running out' of natural resources
- but an interval of 10 years is unlikely to tell us much about the long-run scarcity of raw materials.
- Commodities such as copper or chromium generally have inelastic (steep) short-run demand and supply curves because there are few substitutes for these resources.


1979–80
Second oil shock
2008 Start of global financial crisis
1973–74
First oil shock
Late 1990s
Chinese economy takes off
Simon-Ehrlich bet
World Bank Commodity Price Index (2010 = 100)
120
100
80
60
40
20
1960
1970
1980
1990
2000
2010
Years

So what about the long run?

- Example: copper or chromium
- As the price of copper rises,
  1. producers have an incentive to invest in new technologies that will make its extraction cheaper.
  2. Consumers will substitute away from copper to other raw materials.
- As prices of copper begin to fall, firms cut down on new extraction investments and consumers demand more copper.
- The presence of market prices for raw materials therefore ensures that despite increases in population and affluence, we do not 'run out of resources'.

Capitalist revolution and resources

- Some, like hydrocarbons and mineral resources, are still abundant.
- Others, like
  - unpolluted air,
  - biodiversity (including coral reefs and many land and marine species),
  - forests (due to deforestation and desertification),
  - and clean water, are becoming scarce.
- Notice a pattern?

Self-reinforcing collapse

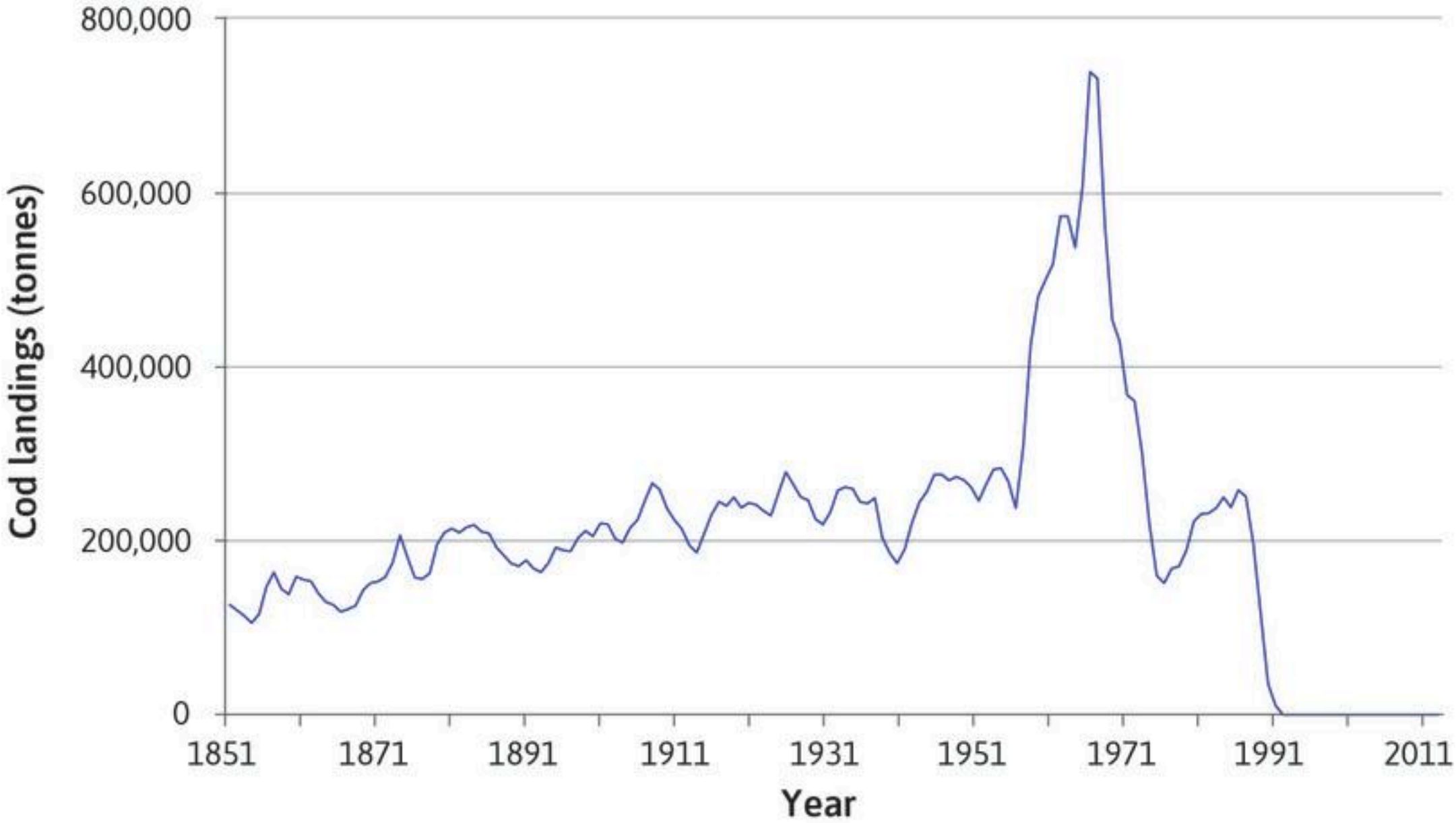
- But the absence of prices is not the only reason why managing renewable natural resources is so hard.
- the fragility of our environment under pressure from the growth of economic activity can lead not only to progressive degradation, but also to accelerating, self-reinforcing collapse.

Story time: Grand Banks cod fishery

- In the eighteenth and nineteenth centuries, legendary schooners such as the Bluenose raced back to port to sell their catch to be the first on the market, and to offer fresh fish.
- By the late twentieth century, the Grand Banks had sustained the livelihoods of the US and Canadian fishing communities for 300 years.

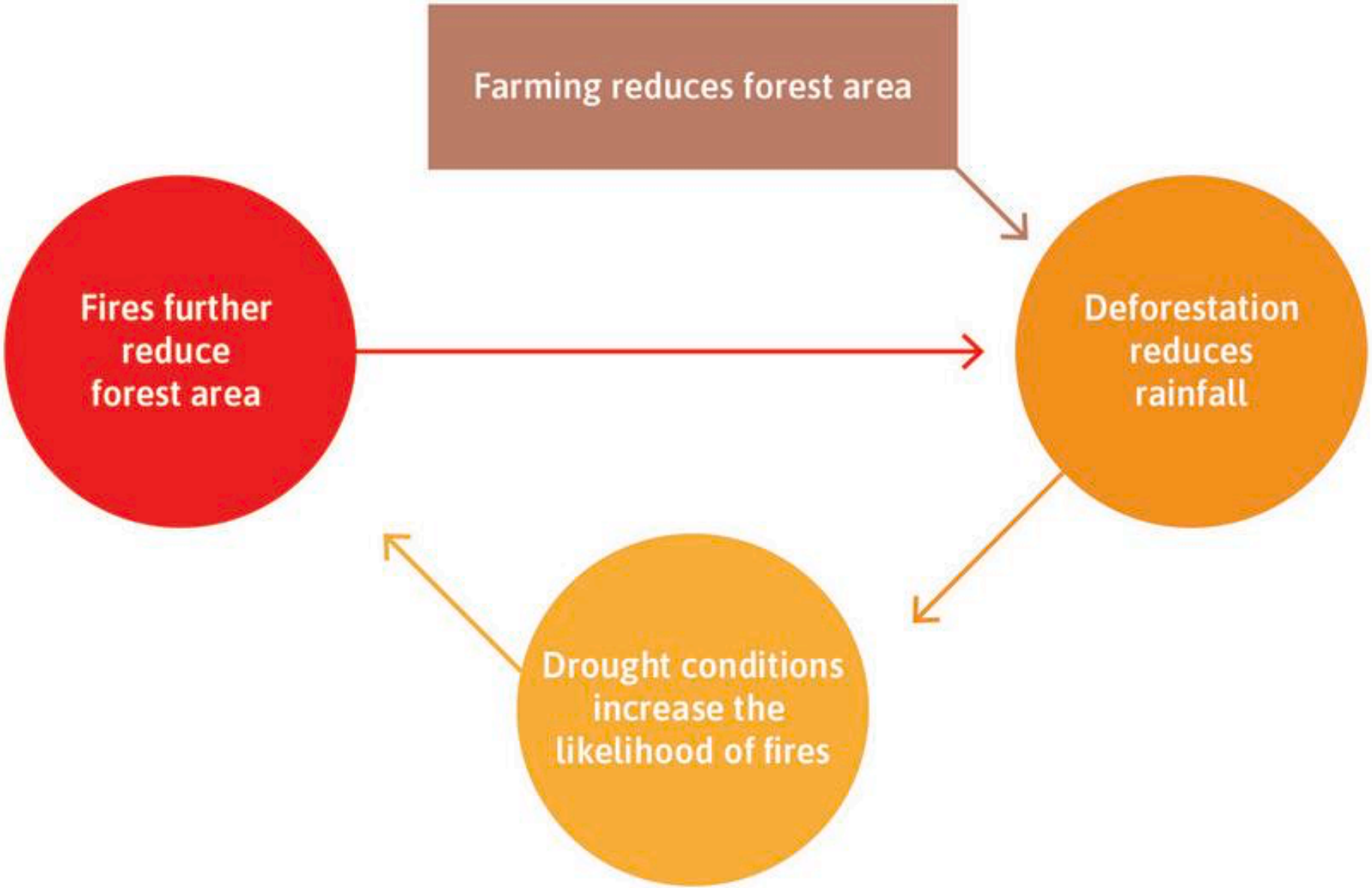
Grand Banks cod fishery

- Then suddenly, the fishing industry in the Grand Banks died and, along with it, many of the old fishing towns.


800,000
600,000
400,000
200,000
0
Cod landings (tonnes)
1851
1871
1891
1911
1931
1951
1971
1991
2011
Year

Grand Banks cod fishery

- Then suddenly, the fishing industry in the Grand Banks died and, along with it, many of the old fishing towns.
- In the Amazon, for example, change may become self-reinforcing due to the positive feedback processes.


Farming reduces forest area
Fires further reduce forest area
Deforestation reduces rainfall
Drought conditions increase the likelihood of fires

Positive feedback process

- Similarly, the process of global warming can be self-reinforcing due, for example, to its impact on Arctic ice cover
- The depletion of commodities and global warming are two aspects of environmental degradation.
- But there are an important differences between the two. (what?)

Understanding economics of environment

- Environmental problems are as diverse as nature itself
- Understanding the economics of the environment will require you to employ not only the tools you have learned already,
- but also to study the interaction of physical and biological processes with human economic activity.