Are We Running Out of Resources?

***Full Length* Text** — Part: 6 Chapter: 12
***Micro Only* Text** — Part: 4 Chapter: 9

To Accompany "Economics: Private and Public Choice 12th ed."
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Is the World Running Out of Resources?

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Is the World Running out of Resources?

- Economic growth and the technological advances that help to fuel it, have accelerated the use of many natural resources.
- Population growth has also added to the rate of resource use.
- Many fear that the world will soon run out of key resources.
- What does economics have to say about the answer to this question?

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Doomsday Forecasts

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Doomsday Forecasts

- Many doomsday forecasts have occurred through the years …
- In 16th-century England, fear arose that the supply of wood – widely used for energy – would soon be exhausted.
  - Higher wood prices, however, encouraged conservation and led to the development of coal which dissipated the crisis.

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Doomsday Forecasts

- America's first oil crisis took place in the middle of the 18th century, when fear arose that the world would soon run out of whale oil, the primary source of artificial light.
  - Whale oil prices rose sharply, causing both consumers and suppliers to search for alternatives.
  - The crisis ended with the development of kerosene, which was first produced from coal and later from petroleum.
  - By the 1890s whale oil was a small fraction of its earlier price, but few still used it.

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Doomsday Forecasts

- After people switched to petroleum, dire predictions about its depletion soon arose.
  - In 1914 the Bureau of Mines reported the U.S. supply of oil was 6 million barrels -- less than the U.S. produces every 2 years.
  - In 1926 the Federal Oil Conservation Board announced that oil would be depleted in the U.S. within 7 years.
  - In 1939, the Interior Department predicted petroleum supplies in this nation would run out within 20 years.
  - In the 1972 report "The Limits of Growth," the authors used large computer models to project that the world would run out of several key minerals in the 1980s and 1990s.

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Why Have the Doomsday Forecasts Been Wrong?

- When resources are allocated by markets, increased scarcity leads to higher prices.
- Higher prices strengthen the incentive for
  - users to reduce their consumption,
  - suppliers to search for ways to expand future supply, and,
  - both producers and users to search for substitutes.
- All of these adjustments will increase future supply relative to demand and make it highly unlikely that the resource will be depleted.

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Why Have the Doomsday Forecasts Been Wrong?

- *Proved reserves* have often been used by doomsday forecasters to calculate the future date when we exhaust a resource. But this is a misapplication of the concept.
  - ***Proved reserves*** are the verified quantity of a resource available given current prices and assuming today's technology.
  - Proved reserves are quite different than the total quantity of the resource in the ground.
  - Proved reserves can be expanded with improvements in technology and will increase with higher prices.

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Proved Reserves and Production

World Reserves and Cumulative Production
(select minerals -- millions of metric tons)

Mineral	Reserves 1950	Production 1950-2000	Reserves 2000
Tin	6	11	10
Copper	100	339	340
Iron Ore	19,000	37,583	140,000
Lead	40	150	64
Zinc	70	266	190

- As shown by the data above, proved reserves of most mineral resources are continually being used up, but they are also being amply replaced by the "proving" of new reserves from existing resources in the ground.

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Are Resources Becoming More Scarce?

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Resource Prices and Information About Scarcity

- Resource price trends provide information about how a resource's scarcity is changing.
  - If the scarcity of a resource is increasing relative to demand, the price of the resource will rise when it is allocated by markets.
  - The trend in the price of most mineral resources has been downward for at least a century, indicating that the relative scarcity of those resources has been declining.
  - A classic study by Barnett & Morse found the real price of resources fell during 1870-1963.
  - A recent study by Baumol & Blackman found a composite index of mineral prices declined from 185 in 1905 to 100 in 2000, a reduction in mineral prices, on average, of 46%.

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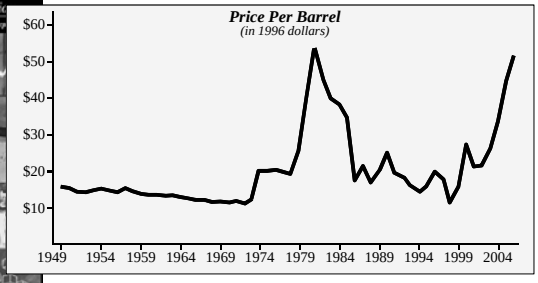
Trends in the Real Price of Crude Oil



- The real price of crude oil did not rise above $16 (in 1996 dollars) until 1973. It then rose sharply, fell back in the late 1980s, but it has increased sharply again since 2000.

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The Scarcity of Renewable Resources

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Property Rights and the Supply of Renewable Resources

- Renewable resources are those that can be renewed in nature, like water flows, and those that can be grown, like timber.
- When property rights are well defined and market forces used to allocate resources, the future supply of renewable resources like forests will be ample.
- Several commentators have concerns about the future availability of forests.
- Are forests disappearing?

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Property Rights and the Supply of Renewable Resources

- The United States has about the same amount of land today devoted to forest as it did in 1920 – and far more timber is growing on it.
- A study by two natural resource economists (Roger Sedjo & Marion Clawson) found that timber volume in the temperate climates, including countries such as the U.S., former Soviet Union, and Canada, is growing rapidly.

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Absence of Property Rights

- When property rights are poorly defined or regulations make a resource non-tradable, waste will result because the resource will often be directed toward less valuable uses.
  - Water supply problems often arise because water markets are missing or are incomplete.
  - The smoothly functioning market that might bring more effective cooperation among users and suppliers, or buyers and sellers, is absent.
  - As we learn from the small *(but increasing)* number of water trades allowed, economists and thoughtful environmentalists are working to introduce more market trading to displace the environmentally destructive and high-cost alternatives when water shortages develop.

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Questions for Thought:

1. If the world were about to run out of a highly-valued resource, what would happen to its price? How would this affect the future supply of the resource relative to demand?
2. "If China and India continue their economic expansion, the world cannot provide enough raw materials without terrible shortages worldwide." Evaluate this statement.

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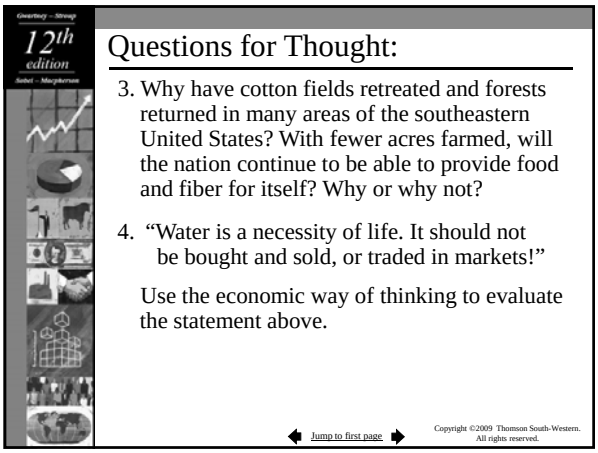
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Questions for Thought:
3. Why have cotton fields retreated and forests returned in many areas of the southeastern United States? With fewer acres farmed, will the nation continue to be able to provide food and fiber for itself? Why or why not?
4. "Water is a necessity of life. It should not be bought and sold, or traded in markets!"
Use the economic way of thinking to evaluate the statement above.
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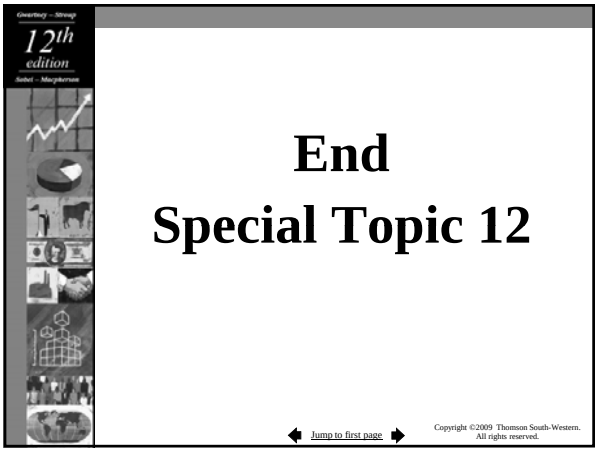
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