

---

## RESOURCES & ENVIRONMENT

---

### *Back to Basics*

"Forgotten Fundamentals of the Energy Crisis" by Albert A. Bartlett, in *American Journal of Physics* (Sept. 1978), 335 East 45th St., New York, N.Y. 10017.

When the consumption of a resource, such as oil or coal, is growing at a fixed rate per year, the growth is said to be exponential and consumption doubles at predictable intervals. We are ignoring the arithmetic of exponential growth at our peril, says Bartlett, physicist at the University of Colorado, Boulder.

When the rate of consumption of a resource grows at a mere 7 percent per year, the consumption of that resource in one decade equals the total of its previous consumption through history, and consumption continues to double every 10 years. The current energy crisis, says Bartlett, is due to exponential growth in consumption of a finite resource.

If geologists could discover as much oil remaining in the earth as we have used in the past, that new oil would be sufficient for only 10 years given the present annual increases in consumption (roughly 7 percent). Officials who confidently predict that U.S. coal supplies will last for centuries, regardless of increasing production, are ignoring the arithmetic of exponential growth.

Conservation alone cannot solve the problem of finite resources. For example, a 10 percent reduction in consumption of fossil fuels achieved through massive development of solar heating would be wiped out by two years of 5 percent growth in consumption of fossil fuels. "The most effective way to conserve," argues Bartlett, "is to stop the growth in consumption."

This can be done by educating people to abandon the dogma that "growth is good," by recycling everything possible, and by investing great sums in research to develop alternative energy sources (solar, tidal, etc.), while also solving the problems of nuclear fission and fusion.

### *Eroding the Great Plains*

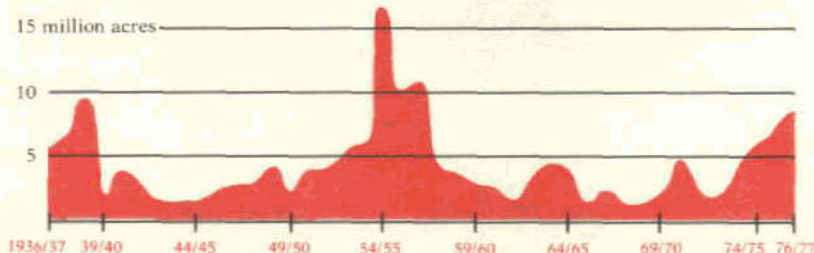
"The Lessons of the Dust Bowl" by William Lockeretz, in *American Scientist* (Sept.-Oct. 1978), 345 Whitney Ave., New Haven, Conn. 06511.

Stirred up by 60-mile-per-hour winds, the dust storms of the 1930s did serious damage to almost 7 million acres of land in Texas, New Mexico, Colorado, Oklahoma, and Kansas. Even in areas where the storm damage was less severe, the consequences of the "Dust Bowl" winds were shattering because of prolonged drought and the economic depression.

The causes and prevention of wind erosion were well understood at the time, writes Lockeretz, research associate at Washington University's Center for the Biology of Natural Systems.

But for 100 years, agriculture in the Great Plains had followed a

## RESOURCES &amp; ENVIRONMENT

Adapted from *American Scientist*

*Despite improved conservation techniques, more acreage in the Great Plains was damaged by wind erosion in the 1950s than during the 1930s.*

"boom-or-bust" pattern. The transition on the Plains from cattle grazing to cultivated crops, especially wheat, was accomplished by successive waves of farmers who arrived during periods of plentiful rainfall and later faced episodes of severe drought, dust storms, bankruptcies, and foreclosures. (Precipitation data for Dodge City, Kans., show five different periods between 1875 and 1936 when, for at least three successive years, annual rainfall totaled less than the 20-inch average needed to cultivate crops.)

When drought returned to the Dust Bowl region during the 1950s, strip cropping, windbreaks, and other measures helped to soften the blow; even so, some 10 to 16 million acres were damaged by winds each year between 1954 and 1956. And again, in 1976-77, says Lockeretz, wind erosion damage "reached levels comparable to the 1930s." Why? The boom-or-bust pattern continued. Sharply higher wheat prices, fostered this time by world food shortages, brought a rapid expansion of crop production on acreage that should have been left uncultivated as grassland.

The manmade cycle of overcultivation followed by attempts at conservation shows no sign of ending. With future droughts inevitable, says Lockeretz, this means more damaging dust storms are likely too.

### *Cleaning Up the Volga*

"The New Soviet Environmental Program: Do the Soviets Really Mean Business?" by Thane Gustafson, in *Public Policy* (Summer 1978), Journals Dept., John Wiley & Sons, Inc., 605 Third Ave., New York, N.Y. 10016.

In 1973, the Soviet Union launched its first large-scale environmental program, aimed especially at improving water quality in the Moscow area and the Ukraine, where 80 percent of Soviet industrial and agricultural production is concentrated and where demand for clean water for irrigation is growing.