military's attempts to control the dissemination of new mathematical coding systems that are virtually impossible to break. Vice Admiral Bobby Inman, then director of the National Security Agency (NSA), argued in 1980 that sharing such research could hinder U.S. intelligence gathering. In a two-year test, some cryptographers are submitting papers to the NSA for prepublication review. But many others have refused NSA offers of financial aid, fearing censorship or classification of their discoveries.

Keeping new cryptographic knowledge secure may not even be possible, Bok concludes. Voluntary controls will work only if researchers worldwide agree to them. And enough information has already been published to enable interested parties to discover for themselves the essential principles behind "unbreakable" codes.

RESOURCES & ENVIRONMENT

Acid Rain Ignored

"Acid Precipitation in Historical Perspective" by Ellis B. Cowling, in *Environmental Science & Technology* (Feb. 1982), 1155 16th Street N.W., Washington, D.C. 20036.

In 1962, U.S. author-biologist Rachel Carson stirred widespread surprise and public concern when she warned in *Silent Spring* of the "poison rain" that pollutes our lakes and streams, reduces fish populations, and sickens vegetation. Yet, notes Cowling, chairman of the National Atmospheric Deposition Program, scientists, mostly Europeans, studied "acid rain" and its links to industrial emissions for centuries, and they were virtually ignored.

That industrial emissions affect humans and plants was perceived as early as 1661–62, when English country gentleman John Evelyn and statistician John Graunt recommended building taller industrial chimneys to spread "smoke" to "distant parts." The term *acid rain* was coined in 1872 by Robert Angus Smith, a British chemist. He described how coal combustion altered the chemistry of rain and how contaminated precipitation harmed plants, textiles, and metals in industrial regions of England, Scotland, and Germany. Nine years later, geologist Waldemar Brøgger undertook a study of *smudsig snefeld* (dirty snowfall) in his native Norway. He pinpointed its cause: smoke from a manufacturing area in Britain.

Nevertheless, research on pollution proceeded piecemeal as specialists on the world's water systems, agriculture, and air tackled the question independently. In the late 1940s, German chemist Christian Junge and Swedish scientists Carl Gustav Rossby and Erik Eriksson pioneered in the new field of "atmospheric chemistry." And beginning in the 1950s, Eville Gorham, a Canadian ecologist, reported on acid rain's damage to aquatic ecosystems. He noted, too, that bronchitis in

RESOURCES & ENVIRONMENT

humans increased as rain became more acidic. A junior colleague of Rossby and Eriksson, soil scientist Svante Odén, combined all of these findings, and more, in 1967 and 1968. Somewhat flamboyantly, Odén described for the Swedish press a foul "chemical war" among the nations of Europe, in which pollutants of a single country could travel over 1,200 miles in the atmosphere. His reports finally aroused scores of European and North American scientists and politicians.

As of late 1981, 93 stations across the United States and 50 in Canada had been set up to monitor precipitation. The findings so far: Two-thirds of the two countries' land area regularly receive acid rain.

Private Resources

"Privatizing the Environment" by Robert J. Smith, in *Policy Review* (Spring 1982), The Heritage Foundation, 513 C St. N.E., Washington, D.C. 20002.

Environmentalists often blame businessmen—and the capitalist system itself—for air and water pollution. The entrepreneurs make their profits, and the public pays the "costs," they argue. However, Smith, a Washington consultant, contends that much pollution and other environmental abuse in the United States has been fostered by government failure to appreciate the advantages of private ownership.

Environmental pollution, Smith notes, seems to be worse in communist countries than in the West. A 1981 study found the populace of the heavily industrial Katowice region of Poland suffering 47 percent more respiratory disease than other Poles. The Soviets, meanwhile, have so polluted and overexploited their waterways that rivers leading to the major inland seas, the Caspian and the Aral, are now "little more than open sewers." And the Chinese under Mao Zedong let pollution, waterworks, and landfill projects ravage the freshwater fish population; fish has almost disappeared from the Chinese diet. State regulation of natural resources, Smith concludes, does not necessarily eliminate environmental abuse.

The problem with public ownership, says Smith, is that it fails to hold out an incentive to any individual to protect a natural resource. In America, backpackers, hunters, wildlife lovers, campers, cattlemen, and others all press public managers to allocate resources in often conflicting ways. Hence, the government sometimes permits the overharvesting of trees in national forests, excessive grazing on leased Western lands, and congestion of national parks. Private property owners, by contrast, can carefully tend their forests and grazing lands.

The federal government owns or manages one-third of America's 2.27 billion acres of land; when state and local government lands are added, about 40 percent of the country is in the public domain. Smith calls for putting some of the most abused wildlife refuges and parks under the control of the Audubon Society and other suitable private owners. Such an experiment would raise difficult questions about procedure and fairness. But America's resources, he writes, are worth the effort.