
RESOURCES & ENVIRONMENT

nomics, and environment will become "absolute." Unyielding environmentalists could then face a "devastating confrontation" with other interests—as happened during last winter's energy shortage in Ohio and Pennsylvania, where environmental regulations were suspended to free industry and boost employment. "When push comes to shove," Brownstein writes, "environmental criteria run a distant second to economic and political concerns." One solution: the government should seek an overall level of environmental quality without dictating the specific methods (such as flue gas desulfurization) to reach it.

Cohen, an official at the Argonne National Laboratory, agrees. Since significant improvements in pollution control technology are extremely unlikely, a flexible approach to air pollution, he argues, should include such proven but little-used techniques as land-use and market controls, along with greater economic incentives. Land-use controls, for example, were used in the San Francisco Bay Area in 1976 to block construction of a Dow Chemical plant. Authorities can also encourage more efficient use of existing technology by inducing firms with effective emission control systems to reduce emissions by more than is required, while permitting other firms greater leeway. Finally, says Cohen, Congress should approve stronger economic incentives, such as penalties for delayed compliance.

Viruses and Pest Control

"Viruses and the Biological Control of Insect Pests" by T. W. Tinsley, in *BioScience* (Oct. 1977), 1401 Wilson Blvd., Arlington, Va. 22209.

Farmers rely heavily on chemical sprays to protect field crops, orchards, and forests against harmful insects. But public concern over environmental damage, says Tinsley, a scientist at England's Natural Environment Research Council, has led to new interest in *biological* methods of insect control.

Biological control will never supplant chemical control, Tinsley writes, but it could become an important complement. Why? Some insect species have already developed resistance to chemical insecticides; the price jump in petrochemicals is pushing insecticide costs ever higher; and toxic chemical residues have been found in fish and wildlife. Pathogenic viruses offer the greatest potential for biological pest control and can spread rapidly through insect populations. (In 1938, a virus accidentally introduced into Canada cleared the spruce sawfly from 31,300 square kilometers of forest.)

Release of pathogenic viruses involves a calculated risk. Scientists must make sure that toxic effects are limited to insects. However, insect pathologists have discovered at least one viral strain (baculoviruses) whose "host range" is, indeed, limited to invertebrates. Other viruses will infect butterflies and moths, for example, but not sawflies, bees, or wasps. Used properly, Tinsley maintains, viruses could be applied against many parasitic pests with little harm to beneficial insects.