

Global Effects of Environmental Pollution

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An increased scale of human activity has brought with it pollution, defined as "an undesirable change in the physical, chemical, or biological characteristics of our air, land, and water that may or will harmfully affect human life or that of any other desirable species, or industrial processes, living conditions, or cultural assets; or that may or will waste or deteriorate our raw material resources" (1). Under certain circumstances, the natural processes are unable to keep pace with the increase of pollutants. Then serious problems arise—usually on a local scale. On occasion, however, pollution effects may persist long enough so that the atmosphere or the ocean circulation may spread them over the whole earth.

One classic example, well-documented, is the rise in the concentration of atmospheric carbon dioxide produced by the intensive burning of fossil fuels during the past few decades. The buffering action of the ocean has not been able to keep up with the increased rate of production, and we now find the CO₂ content increased by about 10 percent and still rising. But while there is little argument concerning the existence of such an increase, there is no agreement as to the consequences of this increase on the radiation balance of the earth and, therefore, on world climate. There are now many other examples of worldwide effects—pesticides and lead in the world's oceans, lead compounds in the atmosphere, to name a few. And there may be pollution effects extant which we have not yet recognized or whose consequences we cannot yet ascertain.

It is therefore important to examine the situation at frequent intervals to determine whether a pollutant released in our environment could have far-ranging geophysical effects or far-ranging effects in the biosphere, and to probe particularly all interconnections in order to expose any weak link in the ecological chain. We know that global oxygen

production depends greatly on photosynthesis of oceanic phytoplankton. As Lloyd Berkner and Lawrence Marshall pointed out a couple of years ago, if the minute but increasing amounts of pesticide in the ocean could affect the phytoplankton, then the worldwide oxygen production might be decreased. Most worrisome are situations in which a triggering action sets off a feedback mechanism which preexists in nature. Such feedback mechanisms are believed to be responsible for major changes in the climate and for the production of the Ice Ages. It behooves us therefore to examine very carefully and even conservatively all pollution effects from human activities. It is important also that this examination involve scientists from different specialties but with broad interests. Many disciplines must be represented, including geophysics, geology, biochemistry, biology, medicine, and ecology. The subject matter has obvious interest to the general public, to policymakers in the government and in the Congress, and to all who are concerned about the effects of man's activities on the environment.

A three-session symposium on Global Effects of Environmental Pollution will take place (26-27 December 1968) during the Annual Meeting of the AAAS. Participants will discuss the worldwide effects which may arise from local pollution, and try to uncover hitherto unsuspected effects which might have serious consequences. One session will deal with the balance of oxygen and of carbon dioxide in the earth's atmosphere, and with the problems arising from nitrogen compounds in the soil and water on the earth. The possible global climate effects produced by air pollution and the problem of toxic wastes discharged into the ocean will also be discussed. An assessment will be made by a panel of the urgency of various pollution problems, including a discussion of the public policy aspects.

Problems of environmental pollution

are causing increasing concern to many groups, both within and outside of the government. In the federal government, the Federal Council of Science and Technology has set up a Committee on Environmental Quality which includes representatives of government agencies having programs in environmental quality and pollution control. The President's Scientific Advisory Committee is setting up a Panel on the Environment. The National Academy of Sciences has been operating an Environmental Studies Board, under which there are organized a number of panels. Recently, the Congress organized a colloquium to discuss National Policy for the Environment, and the Daddario Subcommittee has held extensive hearings. The AAAS now has a Committee on Environmental Alteration concerned with environmental quality problems, and there are many private organizations for whom pollution effects are becoming of increasing concern. An outstanding example is the group of scientists which publishes *Scientist and Citizen*.

On an international basis, also, the need has become apparent for being alert to worldwide effects. The government of Sweden has called on the UN General Assembly to conduct a conference on problems of the human environment; and the need for a global network for monitoring environmental quality parameters has been stressed by the International Biological Program.

In setting up the Committee on Environmental Alteration, the AAAS Board of Directors leaned on a report, some of whose paragraphs are especially relevant to the forthcoming symposium:

Man's relation to the environment is surely one of the most important problems facing society today. Yet these changes are still of limited public concern and have been given insufficient attention, especially by natural and social scientists.

Improved public understanding is essential, for successful methods of preventing great and perhaps irreversible damage to the environment will often require public financing and public acceptance, and may require changes in law or in social customs or institutions.

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Reference

1. "Waste Management and Control," Committee on Pollution (National Academy of Sciences-National Research Council, Washington, D.C., 1966).

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