

Somewhere along the line in an organism in the hierarchy of organisms from the primary producers up to the higher consumers, there will be a buildup of silver and a toxic level will be reached in the tissue.

Since so little is known about silver and its biogeochemistry, it would behoove us to look at this matter. How is silver managed in ecosystems? We are using it very extensively in cloud seeding operations at the present time. Of course this same concept applies to the question of biocides which Dr. Cole has covered quite adequately.

Another question is, What are the economic implications of environmental quality control via recycling of wastes and regulation of technological productivity? I think you dealt with this question in your report on "Environmental Pollution." This is an unanswered question that needs to be given serious consideration.

Still another question is, What are ecological implications of the quest to broaden man's resource base, for example, the quest for water and food? One of the programs aimed at broadening the water resource base is weather modification. In this context a high priority is modeling ecosystems. With mathematical models of ecosystems, one can experiment through the use of computers rather than actually manipulating natural processes. Dr. O. W. Roberts has stressed this viewpoint in a number of recent talks. It would be much less disastrous for man to examine the ecological consequences of weather modification by manipulating the meteorological factors in a mathematical model than to proceed empirically with intervention in natural processes.

In our quest to increase our capability to produce food, we introduced fertilizers and pesticides; these practices have produced problems such as those Dr. Cole has alluded to. We can look on agriculture really as dealing with manmade ecosystems. These ecosystems have to be managed by man and they have to be kept rather primitive so they will have maximum productivity. Because it did seem to be a major factor enhancing productivity, we have greatly augmented the nitrogen used as fertilizer. This material is now running off into our ground waters where it may lead to nitrate intoxication in those drinking the water. Eutrophication of streams and lakes is another end result of such wasteful use of fertilizers.

So these implications have to be looked at very carefully. One matter that has increasingly bothered me about the handling of the environmental quality problems is that we have fragmented our approach. Separate agencies, groups, boards, and committees tend to focus their attention only on water or only on land or only on air or only on the urban environment. Each is really a part of one system and I think in order to make an effective approach to these problems we have to work more closely together. The interactions among these various system components, as we understand from ecology, is very great. Therefore we need to focus our attack on environmental pollution more broadly more ecologically.

In your report of 1966, you urged that a way to attack these problems would be to create an effective consortium of government, industry, university, and community. My feeling here is that the university must play a stronger role than it has in the past. The ecological problems are truly exciting and they are as worthy of serious attention from scholars and students as the problems adopted by the so-called basic sciences.