

conomic, and social impacts, and indirect effects through damage to various ecologic communities.

Merely to secure this kind of information involves a major research effort. Reasonably precise determination of the public health impact of pollution is a major project because of the very large number of pollutants, the differing forms of pollution—air, water, and land—and the differing exposures to pollution. Clearly, however, if there is any element of pollution which is a health hazard, it must be eliminated. An understanding of the actual health hazards would provide a very positive goal with respect to certain pollutants. The ecologic impact of pollution is an even larger and more complicated research topic. The number of pollutants, the differing forms of pollution, and the differing exposures all remain and are compounded by the very large number of ecologic communities which need to be considered. The effects of pollution on fish involve considerably more than the mere poisoning of the fish themselves by direct contact with pollutants. Pollutants which in themselves would do no harm to fish may in some way break the food chain and seriously interfere with fish production. Even in evaluating the effect of a specific pollutant on fish, there are problems with respect to the young fingerling, the adult fish, the spawning fish, and fish egg, and so forth. A test made on a group of fingerling in a tank may not at all disclose the true impact of a pollutant which may not be sufficient to kill the fingerling fish, but which might in some way prevent the hatching of fish from their spawn.

A considerable body of information on the physical effects of pollution on man and his environment is available. One suspects that it needs to be organized and that this process would disclose gaps which need to be filled by systematic investigation. The economic impact of pollution is a relatively untouched problem area. Air pollution is known to damage certain crops. Is the crop loss suffered as a result of air pollution a significant cost to the Nation? Does it in itself justify the cost of air pollution control? Does it in combination with other losses justify the cost of air pollution control? Increased salinity of water imposes an additional cost on downstream users, both agricultural and industrial. How big are these costs? We have only yet begun to assess such factors. Economic factors may not be decisive in decisions on pollution abatement but they should certainly play an important role. The task of assembling this information should be relatively small as compared to other tasks in pollution abatement planning.

The debate on pollution control has strong esthetic overtones. People are offended by the appearance of a polluted stream or in some cases by the mere knowledge that it is polluted. To the extent these intangible factors enter our decisions, we need to know more accurately than we do how the public perceives pollution problems. Basically, we are all against pollution, just as we are against sin. But being against pollution and being willing to spend perhaps, a hundred billion dollars to effect a fairly slight visual change which would go unnoticed by most of the population may not be justified. We have many other uses to which \$100 billion may well be spent. Quantitative procedures in the social sciences are less well developed than in other areas but the importance of this problem should make it an intriguing research area for the social scientist. In fact, I have an engineering