

# ECOLOGICAL AND ENVIRONMENTAL PROBLEMS IN THE APPLICATION OF BIOMATHEMATICS

BURTON E. VAUGHAN  
BATTELLE MEMORIAL INSTITUTE  
PACIFIC NORTHWEST LABORATORIES  
RICHLAND

## 1. Introduction

In view of the purpose of this symposium, I thought it appropriate to delineate some ecological aspects of pollution—aspects which require fairly sophisticated biomathematical approaches. If we are to have a plan to estimate health effects for any one of several suspected pollutants, be it DDT, a heavy metal, or a radionuclide, a good deal of descriptive information must be consolidated, quantized, and assigned priority. In some cases, the descriptive information still remains to be established, and in any event, we need a “road map” for the consolidation, quantizing, and assignment of priorities. We also need to be clear about objectives in such handling of the data, and I will have more to say on this at a later point.

During the past several days, considerable discussion about nuclear materials has taken place. It may be useful to take a brief look at the nuclear industry as regards other pollution problems. Let me say simply that the nuclear industry provides us with one of the few examples of a comprehensively planned technology. Operationally, it provided for the building of nuclear plants, their regulation, environmental monitoring, the setting of radiation exposure standards, and the support of studies on ecological and health problems. As a result, the assessment of risk to man and the underlying ecological pathways affected by discharge of radioactive wastes are probably more completely understood than any other kind of industrial risk. We have been taken by surprise with environmental deterioration (the poisoning of birds and fish by DDT) and with serious toxicity effects (the contamination of fish by mercury). Yet, the dissemination of many such pollutants, particularly persistent chlorinated hydrocarbon compounds, is analogous to the radiation situation. The attendant phenomena of dispersal, biological concentration, and concentration in feed webs were predictable.