Book Reviews

Geopollution Surveyed

Man's Impact on the Global Environment. Assessment and Recommendations for Action. Report of the Study of Critical Environmental Problems. M.I.T. Press, Cambridge, Mass., 1970. xxii, 320 pp., illus. Paper, $2.95.

Every time we learn that yet another man-made substance has been found to have distributed itself uniformly throughout the atmosphere, we are reminded that our planet is finite and vulnerable. The skills of atmospheric chemists are such, however, that the threshold for detection of a substance can be well below the level that would have a significant influence on our environment. The determination of what amounts may be significant was the task set for a group of about 50 specialists of various kinds who met last July in Williamstown, Massachusetts, under the sponsorship of the Massachusetts Institute of Technology. This book is their report.

The study was of the problems of geopollution, that is, the contamination by man of the whole atmosphere and ocean system, rather than of the more immediate and well-studied problems of regional pollution. Thus the planet was treated as a container within which it was possible to compute total budgets of material and energy. While some work groups balanced these budgets, others estimated the influence of the predicted concentrations on the climate and on living organisms. One work group specified the kind of physical and biological monitoring necessary to provide warning, and still another considered the social and political implications of attempted remedies.

The first part of the report is a 35-page summary of the findings of the study, with conclusions and recommendations. The second and larger part consists of separate reports of the work groups giving the technical bases for their findings. As is to be expected in such a collective report so rapidly published, there is some overlap in work and contradiction in conclusions. Yet I believe that this contradiction gives the reader a more honest view of the matter and clearly reveals the uncertainties in the estimates made.

What then are the critical environmental problems? Here there are no great surprises. We must worry about heavy metals, oil slicks, phosphates, CO_2, DDT, and the SST. Interesting examples of quite different kinds of problems are provided by DDT and the SST.

The physical aspects of DDT production and distribution are relatively well understood. The report gives figures on production and measured concentrations in rivers and rainwater and on the increase of concentrations in the food chain from plankton to pelicans. There is an impressive array of reports of damage in the reproductive processes of fishes and birds. We are assured that a catastrophic destruction of all plankton by DDT is unlikely because the required amount exceeds by tenfold its solubility in seawater, but, as a disquieting afterthought, we are reminded that DDT is soluble in oil, and a combination of DDT and oil slick might be dangerous.

The complex social aspects of pollution problems become evident in a discussion of the difference in attitude toward DDT of developed and developing nations. A nation still facing hunger and malaria is not yet concerned about the fishing streams, the deer parks, the forest preserves, and other amenities of the well-to-do.

Unlike the measurable problem of DDT, the possibility of climate modification by the SST is a future problem and involves somewhat uncertain theoretical predictions. The report gives the characteristics of the SST engine and its projected traffic and deduces estimates of resulting changes in the composition of the stratosphere. Two of these changes, in water vapor and in particulate matter, are thought to have possible climatic significance. Water vapor might be increased 10 percent globally and be doubled in air lanes with a possible consequent increase in stratospheric cloudiness and a "greenhouse" effect on temperatures. The amount of particulate matter might be doubled over that measured in 1960; but the eruption of Mount Agung in 1963 seems to have increased particulate matter in the stratosphere by an order of magnitude, so that of the amount measured in the late 1960's the projected increase is 10 percent globally and a doubling in air lanes. The Mount Agung eruption has had a measurable but small effect on the climate, having apparently produced a 5°C warming in the lower equatorial stratosphere. These figures have left with me the impression that SST traffic would probably not seriously influence the climate but that the scientific uncertainties involved are large enough that the possibility is not ruled out. The social values and damages associated with SST traffic are not discussed in the report.

The study was a month's work well done, and its report, though it was assembled hurriedly, provides the pertinent facts where known. It also reveals many areas of ignorance within which further research is needed.

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Seeing and Perceiving

The Intelligent Eye. R. L. GREGORY. McGraw-Hill, New York, 1970. 192 pp., illus. $7.95.

Richard L. Gregory, professor of bionics at the University of Edinburgh, delivered the distinguished Royal Institution Christmas Lectures in 1967–68 under the title "The Intelligent Eye." The present book is an essay of the same title rather than a record of the lectures. It is a lively and provocative discussion of the nature of visual perception, with a theory of its relation to the thought processes. The experiments here reported show Gregory to be an unusually talented and ingenious experimenter, and the illustrations and demonstrations with which the book is richly provided enhance it greatly. The stereoscopic drawings, for example, are exceptional (a viewing device for these is provided), and well-chosen engravings, op paintings, and many other