WILD NATURE

Conservation of Natural Resources

Edited by Guy-Harold Smith. Third edition. Pp. xi + 533. (New York and London: John Wiley and Sons, Inc., 1965.) 75*s*.

RAYMOND DASMANN'S *Environmental Conservation* (1960) is probably the most useful text-book yet available on resource conservation viewed ecologically. Although concerned in the main with American situations, Dasmann's wide coverage provides not only a satisfactory basic appraisal of the subject for students—in a form suitable for elaboration by teachers—but also it presents clearly and concisely a readily understandable introduction to conservation acceptable to the general reader.

Guy-Harold Smith's *Conservation of Natural Resources* is concerned entirely with the United States. It is another, but very different, text, the usefulness of which for reference is well established. The first edition was published in 1950, the second appeared in 1958, and now we have this third and largely re-written edition of 1965. Both because its facts and figures have once again been brought almost entirely up to date and because it has sought to keep abreast of advances in conservation thinking and application, it will undoubtedly in the United States be a helpful complement to *Environmental Conservation* for university purposes. In Britain, however, it will be used mainly as a source of reliable factual information, and for an understanding of the American approach.

The book comprises twenty-three chapters, written by nineteen authorities, almost all of whom are university professors; it is arranged in eight parts. The first deals with conservation in the United States, with the public domain, and with economics and conservation; the second is concerned with soils, soil use and soil conservation, irrigation and wetland reclamation, grassland resources and agricultural land use. The five succeeding sections cover a variety of aspects of forest, water, mineral, wildlife and recreational resources, and the conservation of man; the final part summarizes the situation with regard to state and local planning, and national planning and the conservation of resources. There are numerous photographs, figures, tables and maps interspersed in the text, and each chapter is amply referenced. There is an adequate index.

Because of its immediate relevance to the situation in Britain, and perhaps particularly in Scotland, the following extract from the chapter on recreational resources may be quoted: "There are great opportunities for greater public use of private land for recreation. After all, more than two thirds of all land in the United States is privately owned and much of it has a large recreation potential. The large amount of the probable future demand for outdoor recreation makes it probable that public areas will not expand fast enough to satisfy the demand. Recreation could well develop as the dominant use for some private areas or as one use among several on larger areas". Partly militating against such development in the United States, as also in Britain, is the fact that so many public recreation areas are open without charge or for a very low fee. "Although the private providers often charge primarily for the service they render, rather than for their resources as such, the competition from public areas is certainly a factor. The American public, or at least a large part of it, has become accustomed to free or low-cost outdoor recreation and does not realize the value of the resources it so obtains." Surely, there is food for thought here.

Although it is entirely laudable that in a book of this nature controversies should be neither ignored nor dramatized, it is nevertheless remarkable that nowhere in it is there any reference either to Rachel Carson or to Robert L. Rudd's *Pesticides and the Living Landscape* (1964). It is notable that the word 'pesticides' occurs only once, coupled with 'insecticides'. The latter word has four index references but only twice in the text and in one caption is there any mention—and that, as it were, in passing—of the threats inherent, in the form of side-effects, in the widespread use of so many persistent killer chemicals—leading to accumulations of toxic levels.

W. J. EGGELING

A SUMMARY OF BEGINNINGS

Cybernetics and Development

By Michael J. Apter. (International Series of Monographs in Pure and Applied Biology. Division: Zoology, Vol. 29.) Pp. xi + 188. (London and New York: Pergamon Press, Ltd., 1966.) 50*s*. net.

BIOLOGISTS interested in the theory of development have, in the past few years, had their expectations raised by the news that the physical and mathematical sciences are developing new bodies of theory concerned with processes of control and organization. These go under a variety of names, such as systems theory, information theory and the like; perhaps "cybernetics" is the most generally accepted way of referring to the whole range of these new developments.

Dr. Apter's short monograph is a summary of these recent developments in so far as they have been applied, or seem capable of application, to problems of biological development. In it can be found short accounts of most of the recent cybernetical work in this field, such as Turing's work on patterns, the application of the Turing machine to macromolecular processing by Stahl and Goheen, Maruyama's and Ulam's work on the algorithmic generation of patterns, Goldacre's model in terms of electrical circuits, discussions by Ashby, Pask, von Neumann and many others. This makes the work a valuable source-book for what might be called "new-fangled" approaches to developmental theory. As such it is to be welcomed and has a place on the shelves of anyone interested in theoretical biology.

The sceptical biologist is, however, likely to ask just what these new mathematical approaches really amount to. Have they produced definitely proved theorems and, if so, can these theorems be applied to biological entities? One is not very encouraged by some of the franker remarks in Apter's book. On page 2 we read: "It is difficult to say what cybernetics is. . . . There appear to be genuine differences of opinion among cyberneticians themselves as to what cybernetics is and what it should be". Or again, on page 71, "A developing system is closed to information, although not of course to energy, . . . (of course energy can also be said to possess information; indeed, information can be referred to almost anything . . .)".

The biologist, accustomed for a long time to analysing organisms into cells and such concepts as stimulus and response, knows already something of the weaknesses as well as the strengths of such an approach. When confronted with a mathematician who talks impressively about "axiomatization" which "means this: we assume that the elements have certain well defined, outside, functional characteristics; that is, they are to be treated as 'black boxes' ", he is tempted to reply: "Yes, fine, as far as it goes but now go on and say something new". After all, what Apter calls "Wiener's major insight that organisms can be discussed . . . in terms of 'homeostasis' and 'negative feedback' " had actually been applied by embryologists to developmental processes long before Weiner appeared on the scene; for example in ideas of the canalization of development. What one hopes for from the mathematicians is a clear-cut body of theory about the manner in which the individual processes are organized so as to result in homeostatic systems. Such a body of theory certainly exists in certain special systems,