

with the quantitative revolution in the first place, but also by many who have since stepped off that particular bandwagon. The question will undoubtedly be asked as to whether an endless string of Kolmogorov-Smirnov tests, dendograms, discriminant functions, and the like will really contribute all that much to the solution of such basic problems as the origin of drumlins, the reasons for hillslope convexity, and the tendency of rivers to meander. Notwithstanding all the evidence Doornkamp and King muster in favour of the case for "quantitative methods," one suspects that many will still regard it as "not proven."

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With Thanks

Physical Geography: A Systems Approach, by RICHARD J. CHORLEY and BARBARA A. KENNEDY, Prentice-Hall International, 1971, xxi + 370 pp., £2.00.

TO BEGIN (as do the authors in their preface) with what it is not. *Physical Geography* is not written as a course text "although it may become one." Neither is it a reference work – in fact to attempt to use it in this way is a rare struggle, as not a single reference appears in the text or footnotes. The book is no more or less than a point of view – a paradigm of physical geography in the most basic, respectable, Kuhnian sense. The systems approach is defined, categorized, a few analytic tools are established, and then each component part is exemplified at length with both new and familiar material from across the field. There will be few readers of this excellent treatment who do not themselves become followers of the paradigm.

"Systems thinking" is not a clearly defined concept. Adams, Abler, and Gould in *Spatial Organization* (Englewood Cliffs: Prentice Hall, 1971) mention the teleological notion of functional explanation – a fish has fins because a fish needs them in order to swim. A. G. Wilson, in *Entropy in Urban and Regional Modelling* (London: Pion, 1970) builds on the highly mathematical, operational notion of the maximization of probability. Neither of these structures plays much part in Chorley and Kennedy, which uses the term "systems approach" more in the sense of the organicist against the reductionist. Briefly, the whole is more than its component parts, so that to attempt to build a science by studying its components in minute detail and then combining the results can never be as effective as a study of the behaviour of the whole.

The earlier chapters are concerned with the establishment of a classification of systems, into morphological, cascading, process-response, and control, and with the definition of various associated terms, such as feedback, relaxation, and threshold. This classification is followed systematically throughout the book. Definitions are not too rigid or exhaustive, which is part of the book's divide-and-conquer subtlety; one questions the use of specific terms and categories, but never the whole approach.

Each type of system forms the basis for a further chapter, with a discussion of suitable analytic methods, and a great deal of illustrative material. Many of the examples are new; others are drawn from a great variety of previous work. Inevitably some of them are becoming old familiar faces, like the diagram of a random-walk stream network. In general, it would be difficult to follow the discussion without a good background in geomorphology. But this level of treatment contrasts a little surprisingly with the elementary approach taken to analytic tools. Simple and multiple regression and analysis of variance are introduced conceptually, at a very basic level. Some of the more recent pragmatic techniques developed essentially for the analysis of systems like these, such as path analysis, or AID, could have been described.

The main weakness of the book is bibliographical. All references are grouped at the ends of chapters, with no links to the text. Books and articles are listed which have in some way contributed to the authors' thinking, but where and how? Book references lack page numbers. Figures are acknowledged, but often the full reference is omitted from the list at the end of the chapter. Finally, the index has been amazingly poorly ordered.

That aside, Chorley and Kennedy's book is eminently valuable. It brings together a rather scattered viewpoint for the first time, and presents it in such a way that the reader will never look at physical geography with quite the same eye again. The argument for or against a systems approach is clearly not one of truth or falsity but of utility: the point of view or framework which the authors present is so obviously useful.

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Economics of Outdoor Recreation, by MARION CLAWSON and JACK L. KNETSCH, Toronto, Copp Clark, 1971, xx + 328 pp., \$3.25 (paperback) (Originally published in hard cover, in 1966, for Resources for the Future, Inc., by the Johns Hopkins Press, Baltimore).

THIS BOOK has been recognized as the single most important achievement in the field of outdoor recreation, since its first appearance in 1966. But "What is written here," the authors then stated in their Foreword, "will be partially out of date in five years, or at least we hope it will." Five years later the book was reissued, unchanged, as a paperback, thus affording an appropriate occasion for testing the accuracy of the authors' prediction.

Let it be stated at once that Clawson and Knetsch have been proved right. For reading the book after precisely the five years they mention brings a shock. Its many excellences remain impressively evident; yet even more impressive is the evidence of how revolutionary these five years have been, in ways that Clawson and Knetsch may *not* have envisioned. They expected gaps to be uncovered in knowledge and understanding, and these have indeed appeared; but gaps in the very coverage of the field, which originally went unnoticed, or were accepted as inevitable on the very reasonable grounds that no book can be expected to cover everything, have been so much widened by subsequent events that they now appear serious indeed. And yes, there has been, as they hoped, a great deal of new research; new techniques have been devised, new ideas proposed. But whether insights have become much more deepened or refined in those five years is not so certain.

In a way it is surprising, and a tribute to the authors' competence, that their book should have been, as it continues to be, the one indispensable authority on outdoor recreation, because its very title severely circumscribed it: the authors, after all, pretend to deal with no more than the *economics* of the subject. Yet they take an ambitious view; what may be called their "credo" goes something like this (p. 46): It is misleading to contend that economic analysis is inadequate and inapplicable because of personal attitudes, idiosyncratic decisions, and so on; and that it is impossible to measure the economic worth of either the recreational experience as such or the recreational site. The personal values of recreation are reflected by what people are willing to give up to obtain them.

I never could subscribe to this "credo," and still cannot. Clawson and Knetsch are particularly perceptive on the question of "demand," on which Jack Knetsch has in the past concentrated his attention (indeed, he was the designer of the original version of Statistics Canada's Canadian Outdoor Recreation Demand Study), and in the book the ambiguities in the use of this word are gone into with great effect (see particularly pp. 46-7 and 115-16). Yet their "credo" does not take the ambiguities that they themselves uncover sufficiently into account. "What people are willing to give up" may - and frequently does - have no market value, and it may be impossible to assign a price to it in any realistic way. But since, as Clawson and Knetsch emphasize, price is an essential component of demand, they have relegated ambiguity in the use of the term to a different and undoubtedly more sophisticated level - but ambiguity nevertheless remains.

The major thrust of the book is towards a realistic application of macro-economic techniques to the formulation of governmental policy on outdoor recreation, and therefore towards assessing present supply and use of recreational facilities, and attempting to pre-