Design and Evaluation of Irrigation Methods
By A. M. Michael, Shri Mohan, and K. R. Swaminathan. Water Technology Center, Indian Agricultural Research Institute, New Delhi. 207 pages.

The first 50-page chapter (which is too sketchy to be of much value) provides an overview of soil-water and plant-soil-water relationships and on selected aspects of water application. All the various kinds of efficiencies associated with irrigation are listed and defined. Procedures for estimating or measuring water flow rate, land surface slope, infiltration rate, depth of flow of water during irrigation, and hydraulic resistance to flow on the surface are presented, including complete plans for much of the equipment used. The remaining chapters describe evaluation and design procedures for border, basin, furrow, sprinkler, and drip irrigation systems, although the design of drip systems is omitted.

Appendices include (in metric units) orifice and weirs tables, tables of friction head losses in pipes, sprinkler equipment specifications, English-metric conversions, and computer programs for calculating water-front advance in border irrigation.

The style is instructional rather than readable, with numerous step-wise solutions given to example problems. Indeed, the book is preoccupied with procedure, with usually inadequate indication of rationale, and little discussion of possible limitations or errors. For example, the double-ring infiltrometer is advocated for determining the critical infiltration-time relationship for flood irrigation with no warning that infiltration rates during actual irrigation often differ substantially from ring infiltrometer values. Also, there is inadequate discussion of variability inherent in all infiltration rate measurements.

From the standpoint of evaluation of existing water application systems, the book is very valuable, since it provides relatively complete, systematic formats for analyzing performance. Variability and errors inherent in the procedures or assumptions may lead to some misinterpretations, but they will have no serious impact. Such evaluations provide a better understanding of the systems and their operation and should result in better irrigation practice.

On the other hand, I believe the value of the design procedures for the surface irrigation systems is very limited. The design of border systems is based on simplified assumptions and possibly incorrect infiltrometer data. The authors recognize the even greater complexity of furrow systems, and base the design information from test furrows. This minimizes many of the problems, but certainly not all design can be based on prototype testing. An actual system operates with different hydraulic roughness, required depth of water application, and infiltration rate within its period of use, but all designs involve only single values.

Hopefully, this book will be a first step in the transformation of the design of these complex surface irrigation systems from an art to a science by spurring work to improve available procedures.—D. W. Henderson, Water Science and Engineering Section, Land, Air and Water Resources Department, University of California, Davis.

Microbial Ecology

This volume contains four extensive review papers concerning various aspects of microbial ecology. Two of the articles deal with microbe-pesticide interactions, one with general aspects of bacterial growth, while the remaining one is specifically concerned with the activities of soil microorganisms. The papers previously appeared in issues of CRC Critical Reviews in Microbiology, a quarterly journal published by CRC Press during the period 1972–1973. The quality of the papers is generally high, and the volume offers the reader easy access to the recent literature of microbial ecology. The relatively limited depth of the book’s index will be a handicap, however.

The article by G. Stotsky, entitled “Activity, Ecology, and Population Dynamics of Microorganisms in Soil,” will likely be the one of greatest interest to soil microbiologists. Included in this very comprehensive review is a bibliography containing nearly 400 citations. The main strength of this article is its discussion of the action of physical factors, especially clay mineral surfaces, on microbial activities in soil.

P. F. Pfister reviews the recent literature concerning interactions of microorganisms with halogenated hydrocarbon pesticides. Although his literature coverage is extensive, the author makes little attempt to integrate the information he presents, resulting in a paper which is essentially a collection of abstracts.

J.-M. Bollag provides an excellent review of the role of soil fungi in transforming various pesticides. Unfortunately, the list of cited articles which have served as the basis for this paper has been cut short, leaving the reader without bibliographic details on 12 papers included in the review.

The paper by J. L. Meers treats various aspects of bacterial growth in mixed cultures. Although the author provides very little information concerning relationships in the soil environment, the general principles he presents will be of interest to those studying microbial growth in soil.

Microbial Ecology should be a valuable guide to recent developments in several areas of microbial ecology. The advanced student of soil microbiology and biochemistry will find it to be a useful and timely reference volume.—K. G. Doughty, Department of Agronomy Colorado State University, Fort Collins.

Forensic Geology: Earth Sciences and Criminal Investigation

In the title of this book, the term “forensic” means related to law, courts, and trial evidence and the term “geology” includes earth sciences in general, but particularly geology, mineralogy, and soil science. The authors, who have taken part in numerous investigations of criminal cases, state that they address themselves to three audiences: first, forensic chemists, attorneys, and law enforcement officers; second, professional geologists; and third, practicing or potential forensic geologists.

In a citation of 22 general classes of evidence in auto thefts, for example, they indicate that forensic geology could be of major significance to four, namely, dust, glass or plastic fragments, soil material, and inorganic and mineralogical substances. Three chapters describe soil and geologic materials, their composition, origin, distribution, and identification. The remainder of the book outlines the problems of sampling, comparison methods for soils and related material, and applications of geological information and instruments. For example, procedures are briefly outlined for analysis of materials including use of the hydrometer, stereo binocular microscope, petrographic microscope, reflecting polarizing microscope, phase contrast microscope, electron microscopes, X-ray diffraction, differential thermal analysis, and identification of rocks in thin sections. Many other laboratory procedures are briefly described and their potential as sources of evidence evaluated. The final chapter is a glossary of terms from geology and soil science. Throughout the book examples are given from actual cases of the value of evidence obtained by analysis or correlation of earth science data.

This book introduces a reader to the kinds and amounts of data which can be collected and analyzed. It is not a handbook of methods and procedures, nor does it deal with court cases other than to identify those points which involve earth sciences. It is rather a guide to possible methods and their potential value when applied. The numerous citations of court cases add interest to each chapter and indicate the extensive experience of the authors in securing evidence. Indeed, Forensic Geology should be available to major libraries, research laboratories, attorneys, judges, and court officials, as well as to soil scientists, geologists, and others who may be called upon as expert witnesses.—R. J. Muckenheim, Department of Soil Science, University of Wisconsin, Madison.

Catalog of United States Contributions to the International Hydrologic Decade 1965–1974

This catalog is one of a series of reports summarizing the activities of the United States and the U.S. National Committee for the International Hydrologic Decade in support of the Decade program. It contains 198 entries, including relevant resolutions and summaries of contributing projects. The project summaries include project title, agency, principal investigator, objectives, significant results, and reports available publicly. They are organized under 37 different headings covering most aspects of hydrology. Of particular interest to soil scientists may be the projects on: incidence and spread of continental drought; relations between soil moisture and runoff; genesis and physical chemistry of natural waters; evapotranspiration processes; application of mathematical models for runoff predictions; influence of man on the hydrologic cycle; and application of nuclear techniques in hydrology.

The Committee has reported that the projects included are only a sampling of the projects in the United States which relate to the objectives of IHD. However, those included were approved as national program activities. The catalog will appear as an appendix to the final report of the Committee.—Daniel D. Evans, Professor, University of Arizona, Tucson, Arizona.