Farm irrigation systems

Management of Farm Irrigation Systems. G.J. Hoffman, T.A. Howell, and K.H. Solomon (Editors), Monograph No. 9, American Society of Agricultural Engineers, St. Joseph, MI, 1992, 1040 pp., US$ 89.00 non-member or US$ 54.50 member, ISBN 0-929355-11-3.

This monograph originated from a recommendation by a subcommittee of the American Society of Agricultural Engineers. It aims at presenting the current principles and practices applicable to managing farm irrigation systems. The list of contributors has 79 entries, including 19 contributors with an address outside the USA.

The book has 30 chapters which are divided into five sections: Introduction, Water Management Principles, Irrigation Scheduling, Irrigation Management Strategies, and Institutional Systems and Case Studies. The Introduction states that "the major management activity [in farm irrigation systems] involves irrigation scheduling; determining when and how much water to apply". Section 2 on Water Management Principles provides the theoretical background for this major management activity, with chapters on plant-soil-water relationships, evapotranspiration models, crop growth models, and crop yield response. The last chapter in Section 2 discusses irrigation efficiency and uniformity. Section 3 provides more theory related to irrigation scheduling, with subsequent chapters describing methods and hardware for determining irrigation needs, irrigation system controls, and the measurement of irrigation water. This is followed by chapters on water delivery control, the conjunctive use of irrigation sources, and the economics of irrigation management. The fourth section presents a variety of subjects under the heading "Irrigation Management Strategies." There are three chapters discussing irrigation for arid, humid, and tropical areas. The next chapter provides an optimizing strategy under which crops are deliberately allowed some degree of water deficit and yield reduction. Further chapters include salinity management, energy management, chemigation, water table control, irrigation for frost protection and heat stress reduction, and finally the management of irrigated soils. The last section has a chapter on information systems and irrigation institutions and five chapters with case-studies from Australia, Nepal, Pakistan, and the USA.

The monograph makes it clear that much progress has been made through research, hardware development and other innovations since the publication in 1980 of ASAE Monograph No. 3, on *Design and Operation of Farm Irrigation Systems.* Like its predecessor monograph, this monograph is meant for an international audience. Readers who are not familiar with irrigation in the USA may encounter some problems. One such problem, although of relatively minor importance, is found on p.8 of the Introduction, where it is stated that "Irrigation management has changed dramatically during the past half decade," without saying what these changes are. And again on the next page, with "Numerous developments have occurred that impact the application of water," without specifying these developments. More fundamentally, the Monograph Management of Farm Irrigation Sys-

tems lacks a clear definition or description of such systems. Readers who are not familiar with the much larger size of farms in the USA and the correspondingly large irrigation flows may have difficulty in deciding whether the principles and practices described in the various chapters are relevant for farm systems in their country or whether they apply at the main system level. Moreover, the monograph is not consistent in this respect, e.g. the section on Irrigation Management Improvements in Chapter 14 (Irrigation for Arid Areas) appears to discuss problems at main-system or project level, rather than at the farm level. My other concern, from the international perspective, is the over-emphasis on crop water requirements. A definition or procedure for calculating evapotranspiration is presented in Chapters 2, 3, 4, 5, 7, 8, 15, and 16. The contents of the monograph seem to reflect the view expressed in the introduction that the management of farm irrigation systems is mainly concerned with determining when and how much water to apply. Before being able to obtain practical benefits from this information, irrigation managers outside the USA still need to solve large number of problems related to the delivery of water. Yet, the monograph has only one chapter on water delivery control. This chapter mentions a low level of awareness of both control concepts and engineering solutions for improved canal control among irrigation engineers and managers in the US, and claims that both civil and agricultural engineering university curricula in the US have a major gap in this respect. This could mean that it takes some time before the ASAE will produce a monograph on irrigation management with a balance between irrigation scheduling and delivery that is appropriate for an international audience. Nevertheless, the book provides an informative overview of recent progress in the management of farm irrigation systems and is therefore recommended to researchers and practitioners in this field.

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