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El-Sayed E. Omran · Abdelazim M. Negm
Editors

Technological and Modern Irrigation Environment in Egypt

Best Management Practices & Evaluation

 Springer

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Preface

The idea of writing this book was conceived in late 2016. The demand for writing this book is also increasing due to the great challenge facing Egypt as a poor country in water resources. The purpose of this book is to shed light on advanced technology and modern irrigation environment in Egypt, which can solve part of the problem. New irrigation technologies might be a significant contribution toward helping us reach that goal. Emerging technologies are to improve agricultural procedures and the use of modern irrigation techniques. Modernization of an irrigation system is defined as the act of upgrading or improving the system capacity to enable it to respond appropriately to the water service demands of the current times, keeping in future perspective needs, or as a process of technical and managerial upgrading (as opposed to mere rehabilitation) of irrigation schemes with the objective to improve resource utilization (labor, water, economics, environment) and water delivery service to farms.

This book consists of 16 chapters and contributed by more than 25 scientists, specialists, and researchers from Egypt. Keeping in mind the philosophy of “The Art of Irrigation,” the first chapter introduces this book by providing the salient features of each chapter under its theme. The 14 main chapters of this book were grouped into five main parts, which sequentially examine the technological and modern irrigation environment in Egypt. A brief description of each is given here.

The first part is organized to present a comprehensive overview of basic irrigation practice: problems and evaluation. This part consists of three chapters. Three approaches shed light on the main problems and irrigation evaluation in Egypt. The first approach deals with water resources, types, and common problems in Egypt. The second approach calls for an evaluation of irrigation schemes and irrigation systems. The third approach is the evolution of irrigation system, tools, and technologies.

The second part, which consists of three chapters, describes the smart irrigation technology concepts. This part covers three potential approaches, which are identified for using new and modern technology to increase sustainable agriculture in Egypt. A first potential approach is the smart sensing system for precision agriculture. The second potential way is the development of recent information and data

on irrigation technology and management. The third potential approach is the medicinal plants in a hydroponic system under water deficit conditions as a way to save water.

The third part, which involves three chapters, reviews the various irrigation management. This topic is covered in detail in three approaches, which were identified for managing irrigation as a potential way for sustainable agriculture—first, accurate estimation of crop coefficients for better irrigation water management in Egypt. Second, vermicomposting influences agriculture in Egypt. There is a nice prospect for vermicomposting adaptation by municipal waste systems in country operation—finally, irrigation water use efficiency and economic water productivity of different plants under Egyptian conditions.

The fourth part comprises three chapters. It discusses the different methods and approaches for irrigation system design. Three distinct technologies are identified for irrigation system design. First, improving the performance of surface irrigation system by designing pipes for water conveyance and on-farm distribution. The second technology is the micro-sprinkler irrigation of orchard. The orchard sprinkler is a small spinner or impact sprinkler designed to cover the inter-space between adjacent trees; there is little or no overlap between sprinklers. The third is the drip irrigation technology. The drip irrigation system is suitable for a wide variety of horticultural and agronomic crops, and in many respects, it applies to those crops presently under surface drip irrigation.

Part five consists of three chapters to provide a comprehensive overview of water reuse and treatment. Two techniques were identified to treat water irrigation with a magnetic field. The first technique is to use irrigation with magnetically treated water induces antioxidative responses of *Vicia faba* L. to Ni and Pb stress at the harvest stage. The second technique is to use irrigation with magnetically treated water to enhance plant growth and rehabilitates the toxicity of nickel and lead. The management of wastewater as a new resource of water is also referred to enlighten the readers on the important items of reusing treated water. Selection of the most effective and proper wastewater treatment is an essential part of generating a new water resource as well as protecting the discharge environments.

This book ends with the sixteenth chapter, which briefly summarizes the most significant findings and recommendations of this book. The concluding chapter highlights major challenges to achieving equitable and sustainable water security in Egypt and offers cautious prospects for the future.

This book on the technological and modern irrigation environment in Egypt emerged at this point. There are various books written worldwide on the subject; however, this book aims to put forth and focus on the recent advances of technological and modern irrigation environment in Egypt. A group of experts has come together to write this book who target to pass recent available knowledge and information to the readers. One of the important features of this book is that it does not have a textbook structure when the chapters, in order to be understood, need to be read in the sequence given. You can start the journey from any part, based on your interests and preferences. The readers and beneficiaries vary from academicians, professionals, and scientists, to undergraduate and graduate students.

This book is intended to be of interest to all stakeholders of the irrigation sector: irrigation agencies, financing institutions, water users' associations, planners, designers, training, and research institutions. We wish it would act as a handbook for those interested readers on the technological and modern irrigation. We believe that the information presented here will be most helpful to policy makers, managers, and researchers interested in a broad perspective of urgent water issues in Egypt and hope that this book will contribute to some real if modest, progress toward the beneficial management of the irrigated agriculture. It is hoped that it will stimulate and bring a useful contribution to the debate on irrigation sector reform and modernization and to the success of efforts to improve the performance of irrigation and to provide a better service to the farmers, by increasing the awareness of the critical importance of proper modernization procedures and design criteria.

Advances in this book would not have been possible without the great efforts paid by all the authors, and we are sure their valuable contributions increase the significance of this book. Without their patience and significant efforts in writing and revising the different versions of the chapters to satisfy the high-quality demand of Springer, it would not have been possible to produce this book and make it a reality. All appreciation and thanks must be extended to include all members of Springer team who have worked long and hard to produce this volume and make it a reality for the researchers, graduate students, and scientists around the world. We must thank all the experts who contributed to the review processes of the book chapters. We hope this book is widely read. Now, we can avoid the blunders of the past by changing the direction and start benefiting from the knowledge base created by the scientists. We did not have this chance a decade ago. Now, it is the right time during the sustainability era.

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The editors welcome any comment which might contribute to enriching the next editions of this book during the next editions.

Ismailia, Egypt
Zagazig, Egypt
May 2019

El-Sayed E. Omran
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