

Gis Based Irrigation Water Management

This volume of *Advances in Intelligent Systems and Computing* highlights key scientific achievements and innovations in all areas of automation, informatization, computer science, and artificial intelligence. It gathers papers presented at the IITI 2017, the Second International Conference on Intelligent Information Technologies for Industry, which was held in Varna, Bulgaria on September 14–16, 2017. The conference was jointly co-organized by Technical University of Varna (Bulgaria), Technical University of Sofia (Bulgaria), VSB Technical University of Ostrava (Czech Republic) and Rostov State Transport University (Russia). The IITI 2017 brought together international researchers and industrial practitioners interested in the development and implementation of modern technologies for automation, informatization, computer science, artificial intelligence, transport and power electrical engineering. In addition to advancing both fundamental research and innovative applications, the conference is intended to establish a new dissemination platform and an international network of researchers in these fields.

Practices of Irrigation & On-farm Water Management: Volume 2 Springer Science & Business Media

Water deficiency in many arid and semi-arid regions in Southern Europe is becoming a major constraint for economic welfare and sustainable regional development. These regions are characterised by high spatial and temporal imbalances of water demand and supply, seasonal water uses, inadequate water resources and poor institutional water management. The aim of this book is to formulate appropriate strategies and guidelines for water management necessary for the formulation and implementation of integrated sustainable management of water resources. Lessons are learned from various case studies, which examine competing water use patterns, compare governance structures and how these have evolved in response to scarcity, and structural and non-structural instruments to address water deficiency. *Water Management in Arid and Semi-Arid Regions* will appeal to policymakers in relevant countries as well as to scholars and researchers of environmental studies and economics.

This book provides concerns useful to promote an increase of the productivity of crops by using functional genomics. Fundamental thematic areas have been addressed: metabolic engineering, plant breeding tools, renewable biomass for energy generation, fibres and composites, and biopharmaceuticals. The gained know-how is relevant to identify bottlenecks in the major production chains and to propose actions for moving these issues forward.

GIS and Geocomputation for Water Resource Science and Engineering not only provides a comprehensive introduction to the fundamentals of geographic information systems but also demonstrates how GIS and mathematical models can be integrated to develop spatial decision support systems to support water resources planning, management and engineering. The book uses a hands-on active learning approach to introduce fundamental concepts and numerous case-studies are provided to reinforce learning and demonstrate practical aspects. The benefits and challenges of using GIS in environmental and water resources fields are clearly tackled in this book, demonstrating how these technologies can be used to harness increasingly available digital data to develop spatially-oriented sustainable solutions. In addition to providing a strong grounding on fundamentals, the book also demonstrates how GIS can be combined with traditional physics-based and statistical models as well as information-theoretic tools like neural networks and fuzzy set theory.

The book is the first of its kind to deal with almost the entire swath of water resources assessment, development and sustainable management. The idea of the book crystallized during the long journey of the Editors on various facets of water issues in India and abroad during their extended association, at all levels with the Ministry of Water Resources, River Development and Ganga Rejuvenation, as well as International Organizations dealing with

water. Currently water-stressed, India is likely to become water scarce in not too distant a future. The global freshwater supply and its sustainable use for human consumption, and conservation of the ecosystem have never come under such a rigorous scrutiny before. The unplanned and reckless exploitation of this precious resource have led to a crisis situation, compounded by a real threat of climate change. This book is, therefore, timely and of particular relevance not only to India but the entire world. The book contains 20 chapters, beside the lead article by the Editors. The chapters are contributed by the eminent professionals, researchers, academicians and civil society representatives having an in-depth understanding of the issues. The contents of the chapters have been chosen to represent all aspects of water. The assessment of water resources using satellite data and in-depth analyses of groundwater sector like, the Aquifer Mapping Programme initiated by Government of India, application of gravity satellite data to assess the resource build up, artificial recharge of aquifers and its contamination, are dealt with by eminent experts. The articles on sustainable management of water through good governance by community participation and involvement of civil society are placed. Flood management both through a basin level approach as well as by building resilience in vulnerable areas is discussed. Other critical issues like water bodies management, constitutional provisions, water governance and financial issues, hydro-power and need of research and development in this sector are also dealt with aptly. In view of emerging crisis and complexities in this sector the future pathways and the paradigm shift that is required in administrative and policy level is also discussed.

Richtlijnen voor de werker in het veld om problemen te ondervangen ten aanzien van de waterkwaliteit voor irrigatie-doeleinden. Tenslotte worden praktijkervaringen uit diverse gebieden vermeld

Modeling aspects have added a new dimension in research innovations in all branches of engineering. In the field of soil and water engineering, they are increasingly used for planning, development, and management of land and water resources, including analysis of quantity and quality parameters of surface and ground water, flood forecasting and control measures, optimum allocation and utilization of irrigation water. The application of these models saves considerable time in decision support systems and helps in conservation and optimum allocations of scarce precious natural resources.

Irrigation land suitability assessment and mapping play an imperative role for sustainable utilization of scarce physical land resources. The study was conducted at Fogera catchment, South Gonder. Soil and water sampling spots were selected based on free and grid survey techniques and their locations were taken using Global Positioning System (GPS). Geographical Information System (GIS) techniques were used to develop irrigation land suitability map of the study area. Attributes of parameters were collected and used for suitability assessment. Attributes used as criteria for irrigation suitability analysis were E_{Ce}, ESP, soil depth, texture, PH, top and sub soil stoniness, water table depth, flood hazard, ground water quality (SAR and EC) and slope. On the basis of stoniness, soil salinity, soil alkalinity, soil depth and groundwater quality it was concluded that 72% of the study area is potentially suitable for irrigation and 28% was classified as unsuitable (N) due to drainage limitation, flood hazard, texture and slope factors. Of the potentially suitable land, 1% was highly suitable (S₁), 28% was moderately suitable (S₂), and 43% is marginally suitable (S₃). Agricultural Water Management: Theories and Practices advances the scientific understanding, development and application of agricultural water management through an integrated approach. This book presents a collection of recent developments and applications of agricultural water management from advanced sources, such as

satellite, mesoscale and climate models that are integrated with conceptual modeling systems. Users will find sections on drought, irrigation scheduling, weather forecasting, climate change, precipitation forecasting, and more. By linking these systems, this book provides the first resource to promote the synergistic and multidisciplinary activities of scientists in hydro-meteorological and agricultural sciences. As agricultural water management has gained considerable momentum in recent decades among the earth and environmental science communities as they seek solutions and an understanding of the concepts integral to agricultural water management, this book is an ideal resource for study and reference. Presents translational insights into drought, irrigation scheduling, weather forecasting, climate change and precipitation forecasting Advances the scientific understanding, development and application of agricultural water management Integrates geo-spatial techniques, agriculture, remote sensing, sustainable water resource development, applications and other diverse areas within earth and environmental, meteorological and hydrological sciences

This book advances the scientific understanding, development, and application of geospatial technologies related to water resource management. It presents recent developments and applications specifically by utilizing new earth observation datasets such as TRMM/GPM, AMSR E/2, SMOS, SMAP and GCOM in combination with GIS, artificial intelligence, and hybrid techniques. By linking geospatial techniques with new satellite missions for earth and environmental science, the book promotes the synergistic and multidisciplinary activities of scientists and users working in the field of hydrological sciences.

As the age of Big Data emerges, it becomes necessary to take the five dimensions of Big Data- volume, variety, velocity, volatility, and veracity- and focus these dimensions towards one critical emphasis - value. The Encyclopedia of Business Analytics and Optimization confronts the challenges of information retrieval in the age of Big Data by exploring recent advances in the areas of knowledge management, data visualization, interdisciplinary communication, and others. Through its critical approach and practical application, this book will be a must-have reference for any professional, leader, analyst, or manager interested in making the most of the knowledge resources at their disposal.

Water resources are under extreme pressure today all over the world. The resulting problems have given rise to many activities which reflect the growing concern about them and the importance of effective management. As water increasingly becomes a precious resource on which the well-being of future generations depends, it is essential to discuss issues concerning quality, quantity, planning and other related topics. Containing papers presented at the Fourth International Conference on Water Resources Management, this book examines the recent technological and scientific developments associated with the management of surface and sub-surface water resources. The wide variety of subjects covered are as follows: Water Resource Management and Planning; Waste Water Treatment and Management; Water Markets and Policies; Urban Water Management; Water Quality; Storm Water Management; Water Security Systems; Pollution Control; Irrigation Problems; Reservoirs and Lakes; River Basin Management; Hydrological Modelling; Flood Risk; Decision Support Systems; Groundwater Flow Problems and Remediation Technologies; Coastal and Estuarial Problems; Soil and Water Conservation and Risk Analysis.

This thesis presents analysis of the status of IWRM implementation along with the challenges with regards to policy and institutional measures as well as the required basin information and management instruments. The research entailed a detailed analysis of water resources systems based on a case study from the Awash River Basin in Ethiopia, covering the historical and present state of the challenges and gaps in policies, institutional arrangements and management instruments. The status quo of practical water management, implications of plausible management alternatives in terms of their impact to future water availability, demand fulfilment, patterns of use, and sustainability of the environment were examined. Moreover, the interlinkages and dynamics between key water dependent resources sectors, broadly categorized into water, energy, food, and ecosystems (WEFE) was explored to identify key tradeoffs and synergies. This was deliberated as to improving the synchronization of sectoral plans and resources management programs, thereby fast-tracking the coordination process in IWRM. Overall, the research provides a clearer understanding of the system-wide problems, structural challenges and possible future consequences regarding the management and sustainability of the entire water resource system. Ultimately the purpose is to set in motion new strategies and mechanisms to improve the implementation of the currently applied IWRM framework in the context of the SDGs. The comprehensive and compact presentation in this book is the perfect format for a resource/textbook for undergraduate students in the areas of Agricultural Engineering, Biological Systems Engineering, Bio-Science Engineering, Water Resource Engineering, and Civil & Environmental Engineering. This book will also serve as a reference manual for researchers and extension workers in such diverse fields as agricultural engineering, agronomy, ecology, hydrology, and meteorology. Managing land and water is a complex affair. Decisions must be made constantly to allocate and use natural resources. Decision and action in any use of resources often have strong interactions and side-effects on others, therefore it is extremely important to monitor and forecast the impacts of the decisions very carefully. Reliable information and clear data manipulation procedures are compulsory for monitoring and forecasting. Remote Sensing has considerable potential to provide reliable information. A Geographic Information System is an easy tool for manipulating and analysing the data in a clear and fast way. This book describes in seven practical examples how GIS and Remote Sensing techniques are successfully applied in land and water management. This book provides a comprehensive and systematic overview of the recent developments in cotton production and processing, including a number of genetic approaches, such as GM cotton for pest resistance, which have been hotly debated in recent decades. In the era of climate change, cotton is facing diverse abiotic stresses such as salinity, drought, toxic metals and environmental pollutants. As such, scientists are developing stress-tolerant cultivars using agronomic, genetic and molecular approaches. Gathering papers on these developments, this timely book is a valuable resource for a wide audience, including plant scientists, agronomists, soil scientists, botanists, environmental scientists and extension workers. Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs.

Starving people in poor nations, obesity in rich nations, increasing food prices, ongoing climate changes, increasing fuel and transportation costs, flaws of the global market, worldwide pesticide pollution, pest adaptation and resistance, loss of soil fertility and organic carbon, soil erosion, decreasing biodiversity, desertification, and so on. Despite unprecedented advances in sciences allowing to visit planets and disclose subatomic particles, serious terrestrial issues about food show clearly that conventional agriculture is not suited any longer to feed humans and to preserve ecosystems. Sustainable agriculture is an alternative for solving fundamental and applied issues related to food production in an ecological way. While conventional agriculture is driven almost solely by productivity and profit, sustainable agriculture integrates biological, chemical, physical, ecological, economic and social sciences in a comprehensive way to develop new farming practices that are safe and do not degrade our environment. In that respect, sustainable agriculture is not a classical and narrow science. Instead of solving problems using the classical painkiller approach that treats only negative impacts, sustainable agriculture treats problem sources. As most actual society issues are now intertwined, global, and fast-developing, sustainable agriculture will bring solutions to build a safer world. This book gathers review articles that analyze current agricultural issues and knowledge, then propose alternative solutions. It will therefore help all scientists, decision-makers, professors, farmers and politicians who wish to build a safe agriculture, energy and food system for future generations.

Simply stated, geography studies the locations of things and the explanations that underlie spatial distributions. Profound forces at work throughout the world have made geographical knowledge increasingly important for understanding numerous human dilemmas and our capacities to address them. With more than 1,200 entries, the Encyclopedia of Geography reflects how the growth of geography has propelled a demand for intermediaries between the abstract language of academia and the ordinary language of everyday life. The six volumes of this encyclopedia encapsulate a diverse array of topics to offer a comprehensive and useful summary of the state of the discipline in the early 21st century. Key Features Gives a concise historical sketch of geography's long, rich, and fascinating history, including human geography, physical geography, and GIS Provides succinct summaries of trends such as globalization, environmental destruction, new geospatial technologies, and cyberspace Decomposes geography into the six broad subject areas: physical geography; human geography; nature and society; methods, models, and GIS; history of geography; and geographer biographies, geographic organizations, and important social movements Provides hundreds of color illustrations and images that lend depth and realism to the text Includes a special map section Key Themes Physical Geography Human Geography Nature and Society Methods, Models, and GIS People, Organizations, and Movements History of Geography This encyclopedia strategically reflects the enormous diversity of the discipline, the multiple

meanings of space itself, and the diverse views of geographers. It brings together the diversity of geographical knowledge, making it an invaluable resource for any academic library.

As metropolises continue to see a growth in population, planners are continually searching for trending methods for utilizing space and seeking the best geographical arrangements for these cities. Professionals have continually used geographic information systems (GIS) to solve these issues; however, limitations in this technology remain prevalent. Integrating multiple-criteria decision analysis and evolutionary computing tools with GIS has created an array of robust solutions for spatial optimization problems in densely populated areas.

Interdisciplinary Approaches to Spatial Optimization Issues is a pivotal reference source that provides vital research on advancements within the field of GIS and evolutionary solutions for spatial optimization issues. While highlighting topics such as computing machinery, vehicular routing, and operational research, this publication is ideally designed for practitioners, technicians, developers, academicians, students, government officials, planners, and researchers seeking current research on applications and improvements within spatial optimization and GIS.

Completely devoted to application of models to optimize the use of limited water and nutrients in various climates, this collection will inspire confidence in the capacity of modeling to tackle the biggest threats to secure agriculture. To obtain the most production from available water while maintaining natural resources, we need whole system-based quantitative knowledge and tools to help select appropriate crops and manage water and associated inputs on a site-specific basis under changing climate. Site-specific experimental results are available for limited locations, limited periods of time, and limited management options. Well-tested process models of cropping systems can extend field research results to long-term weather conditions, as well as other climates and soils, allowing us to explore new management options. The case studies in this volume are promising examples of these kinds of solutions.

State-of-the-art GIS spatial data management and analysis tools are revolutionizing the field of water resource engineering. Familiarity with these technologies is now a prerequisite for success in engineers' and planners' efforts to create a reliable infrastructure. *GIS in Water Resource Engineering* presents a review of the concepts and application

In today's world, as we see the rapid population growth, irrigation agriculture becomes more important to meet the human needs. It allows double cropping and enables stabilization of supply and production of vegetables and fruits. Land and water resource suitability analysis plays an important role in maintaining and developing land and water use on a spatial basis of agriculture. This book identified the evaluation of land suitability for irrigation intensification. The aim of this study was to analyze the water and land resources potential and irrigation water management in river catchments of Andasa watershed for irrigation

suitability by using Geographic Information System (GIS) and remote sensing. Identification of potential irrigable land, and socioeconomic factors that influence the use of surface irrigation water management were followed to analyze this irrigation potential. Analytic Hierarchy Process (AHP) evaluation method was used to evaluate the physical land characteristics of the study area for surface irrigation. The factors that were considered for evaluations of the land for surface irrigation include: slope, land use land cover, river distance, soil.

In recent years the topic of environmental management has become very common. In sustainable development conditions, central and local governments much more often notice the need of acting in ways that diminish negative impact on environment. Environmental management may take place on many different levels - starting from global level, e.g. climate changes, through national and regional level (environmental policy) and ending on micro level. This publication shows many examples of environmental management. The diversity of presented aspects within environmental management and approaching the subject from the perspective of various countries contributes greatly to the development of environmental management field of research.

ABSTRACT: A decision support system, GIS-based Water Resources and Agricultural Permitting and Planning System (GWRAPPS), was developed for modeling crop water demand in Florida. GWRAPPS tightly couples ArcGIS with the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) model. Discrepancies often exist between water quantities predicted by various planning and permitting models due to different modeling approaches. The variability in crop, climate, and soil made the planning models use simplified representations of the agricultural water use processes. GWRAPPS provides a uniform method for modeling consumptive use water requirements in both permitting and planning applications in humid regions. The system demonstrates the effects of climate distribution and soil variability on crop water demand. It also functions as a tool for studying the sensitivity of the AFSIRS model to the environmental, crop and soil factors in the model. This manuscript presents an overview of the GWRAPPS. Case studies to investigate the influence of climate and soil variability on regional scale crop water use requirements are conducted and the results are discussed. A sensitivity analysis was performed to assess the sensitivity of the AFSIRS model to the crop evapotranspiration, soil water holding capacity and crop root zone depth. The model was most sensitive to evapotranspiration and least sensitive to crop root zone depth.

Changes in land use and land cover can have many drivers, including population growth, urbanization, agriculture, demand for food, evolution of socio-economic structure, policy regulations, and climate variability. The impacts of these changes on water resources range from changes in water availability (due to changes in losses of water to evapotranspiration and recharge) to degradation of water quality (increased erosion, salinity, chemical loadings, and pathogens). The impacts are manifested through complex hydro-bio-geo-climate characteristics,

which underscore the need for integrated scientific approaches to understand the impacts of landscape change on water resources. Several techniques, such as field studies, long-term monitoring, remote sensing technologies, and advanced modeling studies, have contributed to better understanding the modes and mechanisms by which landscape changes impact water resources. Such research studies can help unlock the complex interconnected influences of landscape on water resources in terms of quantity and quality at multiple spatial and temporal scales. In this Special Issue, we published a set of eight peer-reviewed articles elaborating on some of the specific topics of landscape changes and associated impacts on water resources.

Irrigation programs / Water use / Reservoirs / Lakes / River basins / Water potential / Water resources

This book is dedicated toward space technology application in Earth studies based on the use of a variety of methods for satellite information classification and interpretation. Advantages of geospatial data use in a large-scale area of observation and monitoring as a source of decision-making stage have been demonstrated. The book describes navigation systems providing data estimation method and review of existing data in the literature relevant to remote sensing sensors delivering main information electromagnetic spectrum and a variety of sensor applications. This aspect is important when combining/integrating satellite data processing into the field measurements. Satellites and satellite data application for the study of Earth features have been demonstrated as the next step of geospatial data application. The use of different purposeful processing technology applications of satellite data is one of the vital aspects of space technology advances. The use of GNSS GPS technology in industry and MODIS images and data interpretation for agriculture purposes has been presented. It was the aim of the book to create an attractive environment by presenting space technology application in the wide areas of Earth study. For this purpose, some of the book chapters are dedicated toward space technology advances in climate monitoring, natural disaster factor detection, satellite data processing optimization, and GIS technology for meteorology information with the aim of agriculture developments.

Irrigated agriculture and the use of water resources in agriculture face the challenges of sustainable development. Research has advanced our knowledge of water use by crops, soil-water-solutes interactions, and the engineering and managerial tools needed to mobilize, convey, distribute, control and apply water for agricultural production. However, the achievements booked in user practice have revealed the need for new developments in the areas of resource conservation, control of environmental and health impacts, modernisation of technologies and management, economic viability and the social acceptance of changes. The contributions to Sustainability of Irrigated Agriculture cover most of the relevant disciplines. Besides its multidisciplinary, the different origins, experience, backgrounds and practices of the authors provide a wide, in-depth

analysis of the various aspects of water resource utilization in agriculture. The papers review scientific, technical and managerial aspects, highlighting the main problems, issues and future developments. The book covers the different aspects of sustainability, including environmental, technical, economic, institutional and social ones. Advances in irrigation science and engineering are dealt with, both on- and off-farm. Special attention is paid to the different components of water quality management, to the transfer of technology, and to capacity building.

This study provides a hydrology based assessment of (surface) water resources and its continuum of variability and change at different spatio-temporal scales in the semi-arid Karkheh Basin, Iran, where water is scarce, competition among users is high and massive water resources development is under way. The study reveals that the ongoing allocation planning is not sustainable and essentially requires reformulation, with consideration of spatio-temporal variability and observed trends in the streamflows regarding flood intensification and decline in low flows. The development of innovative methods for quantification of the hydrological fluxes (i.e., regionalization of model parameters based on similarity of the flow duration curve and the use of areal precipitation input in the hydrological modeling) helped better understanding and modeling the basin hydrology. The investigation of scenarios for upgrading rain-fed areas to irrigated agriculture, using SWAT, recommends the promotion of in-situ soil and water conservation techniques. Conversion of rain-fed areas to irrigation causes significant reduction in the downstream flows, and requires additional considerations such as less development in the upper catchments, practicing supplementary irrigation and developing water storage. The knowledge generated is instructive for hydrological assessment and its use in water resources planning and management in the river basin context.

Remote Sensing Applications in Environmental Research is the basis for advanced Earth Observation (EO) datasets used in environmental monitoring and research. Now that there are a number of satellites in orbit, EO has become imperative in today's sciences, weather and natural disaster prediction. This highly interdisciplinary reference work brings together diverse studies on remote sensing and GIS, from a theoretical background to its applications, represented through various case studies and the findings of new models. The book offers a comprehensive range of contributions by well-known scientists from around the world and opens a new window for students in presenting interdisciplinary and methodological resources on the latest research. It explores various key aspects and offers state-of-the-art research in a simplified form, describing remote sensing and GIS studies for those who are new to the field, as well as for established researchers.

The Issues, Conclusions, and Recommendations of the NATO Advanced Research Workshop - Budapest, Hungary July 27 -31, 1997 TIIOMAS NAFF University of Pennsylvania 847 Williams Hall Philadelphia, PA 19104-6305 USA tna. /J" @sas. upenn. edu 1. The Issues Sharing data and information enables

people to think together in solving problems, in building trust essential for cooperative efforts toward sustaining shared vital natural resources, and in avoiding conflict. It is axiomatic that all planning and policy making, not least for environmental and resource sustainability, depend for success on accurate data and information dispensed freely to all who need it, from farmers to heads of state. These maxims are particularly apt when applied to water resources that are international and transboundary. In those circumstances, the need for cooperation and sharing are acute if the water source is to be managed, distributed, and used equitably and efficiently. In many parts of the world, the collection, management, reporting, and quality of water and environmental data are often so poor and incomplete as to render them useless, or they are treated as security issues and are therefore classified. Either way, wherever those conditions exist, essential planning and policy data and information of good quality are relatively hard to come by. The consequences are high, particularly for effective basin-wide river management and resource sustainability.

There is an estimated 1.4 billion km³ of water in the world but only approximately three percent (39 million km³) of it is available as fresh water. Moreover, most of this fresh water is found as ice in the arctic regions, deep groundwater or atmospheric water. Since water is the source of life and essential for all life on the planet, the use of this resource is a highly important issue. "Water management" is the general term used to describe all the activities that manage the optimum use of the world's water resources. However, only a few percent of the fresh water available can be subjected to water management. It is still an enormous amount, but what's unique about water is that unlike other resources, it is irreplaceable. This book provides a general overview of various topics within water management from all over the world. The topics range from politics, current models for water resource management of rivers and reservoirs to issues related to agriculture. Water quality problems, the development of water demand and water pricing are also addressed. The collection of contributions from outstanding scientists and experts provides detailed information about different topics and gives a general overview of the current issues in water management. The book covers a wide range of current issues, reflecting on current problems and demonstrating the complexity of water management.

This book provides a detailed insight into how space and its applications are embedded, and can be further embedded, into African society in support of the SDGs, while taking into account the specific features, needs, and diversity of that society. Contributions drawn from across the continent and further afield provide analyses of the particular social situations in a variety of different African countries and regions, and highlight areas where space applications support the SDGs, and where they can further do so. The chapters cover a wide array of relevant and timely topics including basic needs like water quality, education, and capacity building, as well as financial, security, and legal aspects, together with facets of space technologies and infrastructure in Africa. Embedding Space in African Society will be of great interest to students and professionals in sustainable development, governance, and space studies.

Recent researches on resource conserving techniques have provided exciting opportunities for improving input-use-efficiency, productivity and sustainability. These techniques include: zero tillage, minimum tillage, rotary tillage, bed planting, surface seeding, laser land leveling, pressurized irrigation systems, system of rice intensification, aerobic rice, soil solarization, residue management, site-specific nutrient management, crop diversification, precision farming employing use of modern tools and procedures etc. Adoption of these techniques is the need of the hour as a method of 'low-input agriculture' to reduce costs and achieve sustainability in

Indian agriculture. This book provides the most updated and comprehensive information on resource conserving techniques for improving crop productivity. The text is divided into 9 sections: (i) Concept and approaches, (ii) Cropping systems and diversification, (iii) Soil use and management, (iv) Improving nutrient use efficiency, (v) Water-saving techniques, (vi) Weed dynamics and herbicide use, (vii) Energy conservation and farm machinery, (viii) Modern tools and approaches, (ix) On-farm testing and evaluation. In each section, there are chapters on specific topics, contributed by eminent scientists, who made notable research contributions in their field of specialization. The chapters have been thoroughly edited and presented in an easily understandable manner.

Water a key natural resource, fundamental to life, livelihood, food security and sustainable development is rapidly becoming scarce and limited. Agriculture is the major water user in our country utilizing nearly 70-80 per cent of all the utilizable water resources of the country. Therefore, Agricultural Water Management (AWM) interventions aim at enhancing per capita benefits, while preventing the degradation of natural resource bases of land, water and ecosystem services. Evidence shows that AWM interventions have increased yields, which has helped areas with low productivity. In recent past a large number of new techniques and advanced tools have been invented in recent past which can enhance the water productivity in agriculture to a very high level. Knowledge adoption and extensive use of these tools and techniques needs proper dissemination. There is a dearth of ample number of technically trained manpower to undertake the work of On-farm AWM. Therefore, the present book has been organized with following specific objectives: i) to impart the advanced knowledge of On-farm water management using modern concepts, tools and techniques for assessing, planning and designing the AWM (irrigation and drainage) systems and to disseminate these techniques for enhancing crop water use efficiencies; ii) to train the readers in designing, installation operation and automated operation, controls and management of high-tech irrigation water management systems; and iii). to provide the participants an opportunity to discuss and exchange the new ideas/knowledge with experts/resource persons who have contributed substantially in Agricultural Water Management (AWM). The book has a very wide spectrum covering almost all topics pertaining to advanced concepts and methods of modern Agricultural Water Management. The present book will provide to the readers an in-depth understanding of various related topics pertaining to highly efficient irrigation water management for crop production and enhancing agricultural water productivity such as scientific design and layout of farm irrigation and drainage, soil water content measurement using TDR/Neutron Moisture meters/Soil moisture probe, geophysical techniques of groundwater exploration etc. It will elaborate the concepts and methodology of using modern instruments and systems of irrigation such as drip, sprinkler, rain gun, level basin system etc. that would be an added benefit. Applications of modern techniques such as GIS and remote sensing applications for enhancing water resources use efficiencies in irrigation project, sensor based weather data collection and automated irrigation management and control systems under open field and covered cultivation have been explained in depth. The book shall impart the comprehensive knowledge on advanced concepts in Soil-Plant-Climate interactions, scientific estimation of crop water demand, various irrigation scheduling criteria and application of modern tools and techniques such as; application of computer softwares (such as EQUITA/DRIPD/CROPWAT/AQACROP/IMPASSE/USAR etc.) for irrigation planning and management; under different water supply scenarios in a lucid manner.

[Copyright: 061e7c013b02035373355959fa92eea3](#)