Water Resources and Environmental Engineering I

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Editors

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Surface and Groundwater

Springer

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ISBN 978-981-13-2043-9 ISBN 978-981-13-2044-6 (eBook)
https://doi.org/10.1007/978-981-13-2044-6

Library of Congress Control Number: 2018951405

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Foreword

Judicious management of water resources is fundamental for achieving sustainable management of natural resources and ensuring environmental integrity. Technologies, such as remote sensing, navigation, space communication, geospatial tools, Internet of things, are extremely useful in developing newer applications and tools for scientific data management and decision making.

The international conference organized by the Department of Civil Engineering, MVGR College of Engineering (A), Vizianagaram, from 30 March to 01 April 2018 provided a much-needed platform to discuss the emerging technologies and opportunities in water, environment and climate change facets.

The effort of the organizers in bringing out a scientific book on conference deliberations and a compendium of papers needs a special compliment.

I strongly believe that the technical insights presented in this book will enrich the scientific community and provide inspiration to readers and lead to newer technological applications that would support human society in coping up with the challenges posed by impending climate change.

I wish the organizing committee of the conference a grand success.

Hyderabad, India

Y. V. Krishna Murthy
Director
National Remote Sensing Centre

Preface

With the ever-increasing demand for development, the stress on water resources and environment is increasing day by day. The changing climate further amplifies the effect resulting in severe drought, flood and pollution problems. In order to provide a platform for eminent scientists, researchers and students to discuss the emerging technologies in mitigating the problems related to water and environment, the International Conference on Emerging Trends in Water Resources and Environmental Engineering (ETWREE 17) was conducted by MVGR College of Engineering, Vizianagaram, Andhra Pradesh, India, during Mar–Apr 2017. About 100 participants from three different countries attended ETWREE 17. ETWREE 17 was organized by the Department of Civil Engineering, MVGR College of Engineering, and was sponsored by Science and Engineering Research Board (SERB) and National Remote Sensing Centre (NRSC).

The proceedings of this conference contain 60 papers which are included as two volumes. The response to ETWREE 17 was overwhelming. It attracted quality work from different areas relating to water resources, environmental engineering and climate. From a total of 120 abstracts, we selected around 80 papers through a rigorous peer review process with the help of our programme committee members and external reviewers for the presentation.

Dr. Y. V. N. K. Murthy, Director, NRSC Hyderabad, conducted a special session on "Application of Remote Sensing in Water Resources". A special session on "Enigma of Climate" was conducted by Prof. Rakesh Khosa, IIT Delhi. Professor D. Nagesh Kumar from IISC Bangalore delivered a lecture on "Remote Sensing, GIS and DEM for Water Resources Assessment of a River Basin". Professor Uma Mahesh, NIT Warangal, gave a lecture on "Non-Stationarity in Rainfall Intensity". Dr. Brijesh Kumar Yadav, IIT Roorkee, conducted a session on "Engineered BioRemediation". Dr. K. B. V. N. Phanindra, IIT Hyderabad, delivered a keynote on "Modeling Soil Water Disease Interactions of Flood Irrigated Mandarin Orange Trees".

Dr. Shishir Gaur, IIT BHU, conducted a special session on "Application of Simulation Optimization Model for Management of Groundwater Resources". Dr. L. Suri Naidu, NUS Singapore, delivered a lecture on "Food, Water and Energy

Nexus". Professor G. V. R. Srinivas Rao, Andhra University, conducted a session on "Multivariate Statistical Analysis of River Water Quality". Professor T. V. Praveen, Andhra University, delivered a lecture on "Salinity Intrusion Modelling". Dr. Y. R. S. Rao, NIH Kakinada, provided a lecture on "River Bank Filtration".

These sessions were very informative and beneficial to the authors and delegates of the conference. We thank all the keynote speakers and the session chairs for their excellent support to make ETWREE 17 a grand success. The quality of a contributed volume is solely due to the reviewers' efforts and dedication. We thank all the members of the advisory board of the conference for their support and encouragement.

We are indebted to the programme committee members, Mr. A. V. S. Kalyan, Mr. Varaprasad and Mr. Sridhara Naidu, for extending their help in preparing the manuscript.

We express our heartfelt thanks to the Chief Patron, Sri Ashok Gajapathi Raju, Chairman, MANSAS, and Patron, Prof. K. V. L. Raju, Principal, MVGR College of Engineering, for their continuous support and encouragement during the course of the convention. We also thank all the faculty and administrative staff for their efforts.

We would also like to thank the authors and participants of this conference, who have made it for the conference. Finally, we would like to thank all the student volunteers who spent their assiduous efforts in meeting the deadlines and arranging every detail to make sure the smooth running of the conference. All the efforts are worth if the readers of this contributed volume find them inspiring and useful. We also sincerely thank the press, print and electronic media for their excellent coverage of this convention.

Vizianagaram, India — Dr. Maheswaran Rathinasamy
Vizianagaram, India — Dr. S. Chandramouli
Hyderabad, India — Dr. K. B. V. N. Phanindra
Warangal, India — Prof. Uma Mahesh
December 2017

About This Book

The book covers a variety of topics related to water, climate and environment. The topics mainly focus but not limited to hydrological modelling, water resources management, water conservation practices, applications of recent techniques for solving water-related issues, land use impact on water resources, climate change impacts, wastewater treatment and recovery, advances in hydraulics in rivers and ocean. The book is a collection of best papers submitted in the First International Conference on Emerging Trends in Water Resources and Environmental Engineering held from 28 March 2017 to 1 April 2017 at MVGR College of Engineering, Vizianagaram, Andhra Pradesh, India. It was hosted by the Department of Civil Engineering, MVGR College of Engineering, with the support of Science and Engineering Research Board, India.

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About the Editors

Dr. Maheswaran Rathinasamy is currently Associate Professor, Department of Civil Engineering, MVGR College of Engineering, Vizianagaram. He received his bachelor's and master's degree from Anna University, Chennai, and BIT Mesra, respectively. He obtained his Ph.D. from IIT Delhi. He is a recipient of INSPIRE Fellowship from the Department of Science and Technology, India, and Humboldt Fellowship from Alexander Von Humboldt Foundation, Germany. He has postdoctoral experience in the University of Minnesota, USA, and Potsdam Institute of Climate Impact Research, Germany. He is principal investigator of funded research projects on the order of 1.5 crore rupees. He has around 30 international journal publications and 25 international conference publications. His research interests include stochastic hydrology, hydrological modelling and hydro-meteorological forecasting.

Dr. S. Chandramouli currently serves as Professor and HOD, Department of Civil Engineering, MVGR College of Engineering, Vizianagaram. He received his M.Tech. with water resources engineering as specialization from NIT Warangal in 2002. He obtained his Ph.D. in civil engineering from Andhra University, Visakhapatnam, in 2013. He has worked in several organizations such as CES(I) Pvt. Ltd., Hyderabad; GVP College of Engineering, Visakhapatnam; and GMRIT, Rajam, for a period of 10 years. He is working with MVGR College of Engineering since 2011. He has published more than 50 technical papers in various reputed journals and conferences. He has attended more than 60 professional training programmes organized by prestigious institutions in India. He is the life member of ISTE and IEI. He has completed one DST project as a co-principal investigator. He has reviewed many journal papers published by prestigious journals and conferences. He has organized many faculty development programmes and student training programmes.

Dr. K. B. V. N. Phanindra currently serves as Assistant Professor of Civil Engineering at IIT Hyderabad, India. He received his master's degree in hydraulics and water resources engineering from IIT Kanpur and Ph.D. in water resources engineering from New Mexico State University (NMSU). He also holds a graduate

minor degree in GIS from NMSU. To his credit, he has nine journal publications of international repute, three technical reports, one monograph and one chapter. He has completed three research projects funded by various ministries from the Government of India to the tune of about 1.6 crore rupees. His research interests include hydrogeologic characterization, groundwater flow and transport modelling, soil–water–crop interactions, remote sensing and GIS applications in groundwater.

Prof. Uma Mahesh is currently serving as Professor in the Department of Civil Engineering at National Institute of Technology, Warangal, Telangana, India. He has earlier served as Head of the Department from July 2008 to June 2010, as Dean, Students' Welfare from July 2012 to March 2013 and as Dean, Planning & Development from April 2013 to June 2014. His area of specialization is water resources with a focus on water resources systems, hydrologic modelling, irrigation management, water quality modelling and management, applications of soft computing techniques and modelling impacts of climate change. He is a recipient of the Jalamitra Award by the Government of Andhra Pradesh in 2003 for successful implementation of Watershed Development Project in Warangal District, G. M. Nawathe Award for the paper presented at Hydro 2004 (annual conference of the Indian Society for Hydraulics) and Central Board of Irrigation and Power (CBIP) Award. Eight Ph.D. students have graduated with Prof. Uma Mahesh as their advisor. He is currently advising six Ph.D. students at NIT Warangal. He has published more than 60 papers in various reputed journals and conferences.