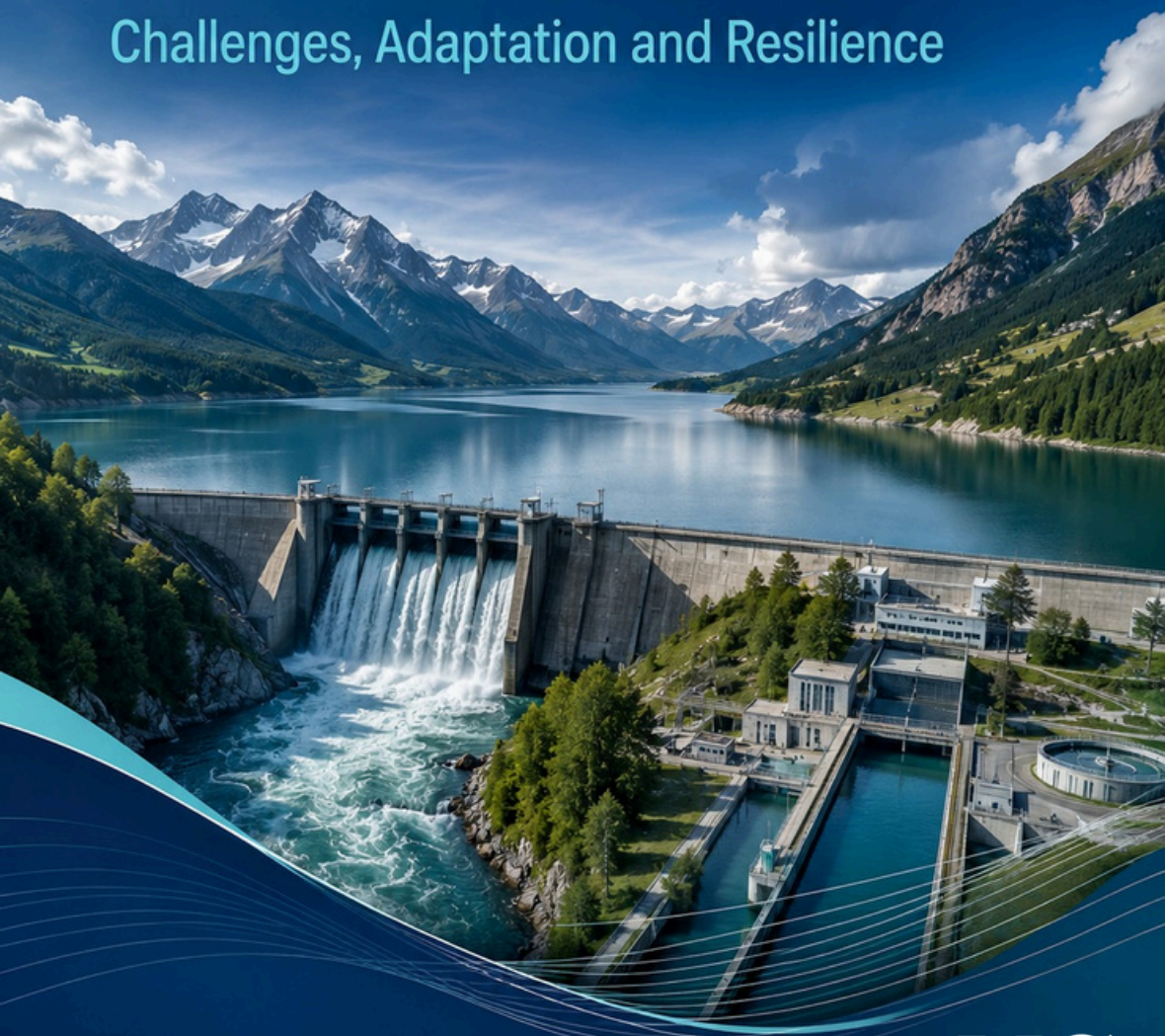
Water Security in a Changing Climate

Challenges, Adaptation and Resilience



Dr. Mani Bhushan

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About the Author

Dr. Mani Bhushan is an Assistant Professor (Senior Scale) cum Principal In-charge at Government Engineering College Khagaria, Bihar. He holds a Ph.D. in Civil Engineering with specialization in Water Resources Engineering from the National Institute of Technology (NIT) Patna. With over eight years of teaching and research experience, including more than six years of post-Ph.D. experience, he has established himself as a dedicated academician, researcher, and academic administrator. Dr. Bhushan has published more than 28 research papers in reputed national and international journals and conference proceedings. He is also the author of 2 books, has contributed 3 book chapters, and holds 7 patents, reflecting his commitment to innovation, knowledge dissemination, and applied research. His research interests encompass water resources engineering, hydrology, environmental sustainability, climate resilience, and infrastructure development. In addition to his scholarly contributions, Dr. Bhushan actively engages in institutional leadership, curriculum development, research mentoring, and capacity-building initiatives. Through his academic endeavors and dedication to excellence, he continues to make significant contributions to engineering education, research, and sustainable development.

Preface

Water security is one of the most pressing challenges of the present century. Climate change is altering rainfall patterns, intensifying floods and droughts, affecting groundwater recharge, degrading water quality, and increasing pressure on freshwater resources. These changes make water security not only a question of water availability, but also of reliability, accessibility, equity, ecosystem health, institutional capacity, and long-term resilience.

This authored book, Water Security in a Changing Climate: Challenges, Adaptation, and Resilience, presents an integrated understanding of water security in the context of climate change. The book begins with the basic concept of water security and the changing global water cycle, and then discusses impacts on surface water, groundwater, extreme events, and water quality. It further examines agricultural water management, urban water security, ecosystem health, wetlands, environmental flows, community-based adaptation, technological innovations, integrated watershed management, water governance, livelihood concerns, and future pathways for resilient water systems.

The author has attempted to present the subject in a clear, systematic, and applied manner so that readers can connect scientific understanding with practical adaptation measures. The book highlights that technical solutions alone cannot ensure water security unless they are supported by effective governance, inclusive policies, community participation, nature-based solutions, climate-resilient infrastructure, and responsible water use. Special attention is also given to the social dimensions of water insecurity, as climate-related water risks often affect vulnerable communities, smallholder farmers, women, and livelihood-dependent populations more severely.

This book is intended for students, researchers, teachers, policymakers, development professionals, extension workers, environmental planners, and water resource managers. The chapters are structured to help readers move from conceptual understanding to sector-specific challenges and finally toward integrated solutions.

The author believes that strengthening water security in a changing climate requires informed planning, interdisciplinary knowledge, participatory governance, and collective responsibility. This book is a modest contribution toward promoting sustainable and resilient water futures.

-Dr. Mani Bhushan

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Water Security in a Changing Climate Challenges, Adaptation, and Resilience

Water Security in a Changing Climate: Challenges, Adaptation, and Resilience provides a comprehensive examination of how climate change is reshaping freshwater availability, quality, reliability, and access. It discusses surface water, groundwater, floods, droughts, agricultural and urban water management, ecosystem health, technological innovation, governance, equity, and community-based adaptation.

Combining scientific understanding with practical strategies, the book highlights integrated water resources management, climate-resilient infrastructure, nature-based solutions, participatory governance, and responsible water use. It is a valuable resource for students, researchers, teachers, engineers, policymakers, environmental professionals and water-resource managers seeking sustainable and resilient pathways for future water security.

About the Author

Dr. Mani Bhushan is an Assistant Professor (Senior Scale) and Principal In-charge at Government Engineering College, Khagaria, Bihar. His academic interests include water resources engineering, hydrology, climate resilience, and environmental sustainability. He has published extensively and contributed to books, research chapters, patents and academic administration.

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