

1. Record Nr.	UNINA9910476950803321
Titolo	Water-Wise Cities and Sustainable Water Systems : : Concepts, Technologies, and Applications / / Guangtao Fu, Xiaochang C. Wang
Pubbl/distr/stampa	IWA Publishing, 2021 [s.l.] : , : IWA Publishing, , 2021
Edizione	[1st ed.]
Descrizione fisica	1 online resource (474 p.)
Disciplina	628.1
Soggetti	Technology & Engineering / Environmental / Water Supply Technology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Cover -- Contents -- Preface -- About the Editors -- Part I: Water Management Concepts and Principles -- Chapter 1: Pathways towards sustainable and resilient urban water systems -- 1.1 INTRODUCTION -- 1.2 THE EVOLUTION OF URBAN WATER SYSTEMS -- 1.3 PATHWAYS TOWARDS SUSTAINABLE WATER SYSTEMS -- 1.3.1 Decentralisation -- 1.3.2 Greening -- 1.3.3 Circular economy -- 1.3.3.1 The linear model -- 1.3.3.2 The circular economy model -- 1.3.4 Digitalisation -- 1.4 A NEW PARADIGM TOWARDS SUSTAINABLE WATER MANAGEMENT -- 1.4.1 Performance measures -- 1.4.2 Intervention framework -- 1.4.2.1 Four types of intervention -- 1.4.2.2 Analysis approaches -- 1.5 CONCLUSIONS -- ACKNOWLEDGEMENTS -- REFERENCES -- Chapter 2: Water-wise cities and sustainable water systems: Current problems and challenges -- 2.1 INTRODUCTION -- 2.2 FACTS OF OUR LIVING CONDITIONS ON THE EARTH -- 2.2.1 Population and cities -- 2.2.2 Available water resources -- 2.2.3 Imbalanced resource provision and consumption - biocapacity and ecological footprint as indicators -- 2.3 URBAN WATER SYSTEMS: HISTORY AND DEVELOPMENT -- 2.3.1 Water and human settlements -- 2.3.2 Pre-modern urban water systems -- 2.3.3 Modern urban water systems -- 2.3.3.1 Needs for drinking water purification -- 2.3.3.2 Needs for wastewater treatment -- 2.3.3.3 Needs for urban watershed management and aquatic system conservation -- 2.4 INTERNATIONAL

ACTIONS FOR BUILDING WATER WISE CITIES -- 2.4.1 Cities of the future program implemented by the International Water Association -- 2.4.2 The IWA principles for water-wise cities -- 2.4.2.1 The five building blocks -- 2.4.2.1.1 Vision -- 2.4.2.1.2 Governance -- 2.4.2.1.3 Knowledge and capacities -- 2.4.2.1.4 Planning tools -- 2.4.2.1.5 Implementation tools -- 2.4.2.2 The four levels of actions -- 2.4.2.2.1 Level 1 - Regenerative water services. 2.4.2.2.2 Level 2 - Water sensitive urban design -- 2.4.2.2.3 Level 3 - Basin connected cities -- 2.4.2.2.4 Level 4 - Water-wise communities -- 2.4.3 Envisaged solutions -- 2.4.3.1 Systematic solutions -- 2.4.3.2 Water shortage and flood control countermeasures -- 2.4.3.3 Pollution control countermeasures -- 2.4.3.4 Countermeasures to enhance liveability -- 2.4.3.5 Human resources and capacity guarantee -- REFERENCES -- Chapter 3: Chinese version of water-wise cities: Sponge City initiative -- 3.1 INTRODUCTION -- 3.2 PROBLEMS TO SOLVE -- 3.3 CONVENTIONAL SOLUTIONS: GRAY ENGINEERING MEASURES -- 3.3.1 Urban water system 1.0 -- 3.3.2 Urban water system 2.0 -- 3.4 TOWARDS A MULTI-PURPOSE WATER-WISE SYSTEM: SPONGE CITY -- 3.4.1 Urban water system 3.0 as a new approach -- 3.4.1.1 Sustainable water services -- 3.4.1.2 Improvement of overall environmental quality, resilience, and liveability in urban areas -- 3.4.1.3 Water-wise communities -- 3.4.1.4 Reviving water culture -- 3.4.2 Main functional elements of the water system 3.0 -- 3.4.2.1 Sponge infrastructure -- 3.4.2.2 Decentralized sewage system -- 3.4.2.3 Fit-for-purpose water supply system -- 3.4.2.4 Near-natural ecological zones -- 3.4.2.5 Intelligent water management system -- 3.5 FUTURE PERSPECTIVES -- 3.5.1 Enhancing system monitoring and evaluation and promoting multi-channel cooperation management -- 3.5.2 Developing decision support tools for sustainable implementation of sponge city -- 3.5.3 Valuing Sponge City ecosystem services -- 3.5.4 Developing local guidelines and standards for Sponge City implementation -- 3.5.5 Promoting Sponge City construction in watershed-scales based on data and information sharing -- REFERENCES -- Chapter 4: US version of water-wise cities: Low impact development -- 4.1 INTRODUCTION TO REGULATORY HISTORY -- 4.2 A SHIFT IN STORMWATER MANAGEMENT IN THE UNITED STATES. 4.2.1 Pollution prevention, source control, and public education -- 4.2.2 Volume reduction -- 4.2.3 Pollution retention by soil and potential for soil and groundwater contamination -- 4.2.3.1 Nutrients -- 4.2.3.2 Metals -- 4.2.3.3 Suspended solids -- 4.2.3.4 Organic compounds -- 4.2.3.5 Pathogens -- 4.2.3.6 Chloride -- 4.2.4 Summary of groundwater contamination due to stormwater infiltration -- 4.3 LID APPLICATIONS -- 4.3.1 Combined sewer overflows -- 4.3.2 Eutrophication in fresh surface water bodies -- 4.3.3 Hypoxia in coastal waters -- 4.3.4 Climate change adaptation -- 4.3.5 Selection of an LID practice -- 4.4 TECHNOLOGICAL ASPECTS OF LOW IMPACT DEVELOPMENT PRACTICES -- 4.4.1 Common practices -- 4.4.1.1 Infiltration basins, trenches, and chambers -- 4.4.1.2 Permeable pavements -- 4.4.1.3 Bioretention -- 4.4.1.4 Swales and roadside ditches -- 4.4.1.5 Green roofs -- 4.4.1.6 Rainwater harvesting -- 4.4.1.7 Maintenance and pre-treatment -- 4.4.1.7.1 Maintenance -- 4.4.1.7.2 Why pre-treatment -- 4.4.1.7.3 Commercial products -- 4.4.2 Emerging LID practices -- 4.4.2.1 Enhanced media -- 4.4.2.1.1 Iron -- 4.4.2.1.2 Aluminum oxide -- 4.4.2.1.3 Water treatment residuals -- 4.4.2.1.4 Activated carbon and biochar -- 4.4.2.2 Floating islands -- 4.4.2.3 Rain gardens for nitrogen removal -- 4.4.3 Future perspectives -- 4.4.3.1 Climate change -- 4.4.3.2 Combined sewer overflows -- 4.4.3.3 Dynamic design -- 4.4.3.4 Advances in enhanced

media -- 4.4.3.5 Source reduction -- REFERENCES -- Chapter 5: Australian case of water sensitive city and its adaptation in China -- 5.1 INTRODUCTION -- 5.2 CASE STUDY 1: MONASH CARPARK STORMWATER TREATMENT SYSTEMS -- 5.2.1 A treatment train that provides both pollution management and landscape value -- 5.2.2 Key components of the treatment train -- 5.2.2.1 Rainwater tank -- 5.2.2.2 Sedimentation tank. 5.2.2.3 Stormwater biofilters -- 5.2.2.3.1 A popular WSUD technology for stormwater treatment -- 5.2.2.3.2 A base of scientific research -- 5.2.2.3.3 Recreational stormwater ponds -- 5.3 CASE STUDY 2: HOW THIS WAS APPLIED OUTSIDE OF AUSTRALIA -- 5.3.1 Introduction of EastHigh stormwater treatment systems -- 5.3.2 Landscaping -- 5.3.3 Local tailoring research -- 5.3.4 The main parts of the biofilter -- 5.3.4.1 Inflow pit -- 5.3.4.2 Media -- 5.3.4.3 Plants -- 5.3.4.4 Outflow -- 5.3.4.5 Monitoring -- 5.3.4.6 Outflow pollutant concentration -- 5.4 SUMMARY -- ACKNOWLEDGEMENT -- REFERENCES -- Part II: New Paradigm of Systems Thinking and Technology Advances -- Chapter 6: Water cycle management for building water-wise cities -- 6.1 INTRODUCTION -- 6.2 THINGS TO LEARN FROM THE NATURAL HYDROLOGICAL CYCLE -- 6.2.1 Natural hydrological cycle -- 6.2.1.1 Global hydrological cycle -- 6.2.1.2 Hydrological cycle of a watershed -- 6.2.2 Functions of the hydrological cycle -- 6.2.2.1 Water quantity secured by the hydrological cycle -- 6.2.2.2 Water quality secured by the hydrological cycle -- 6.2.3 Thermodynamic characteristics of the hydrological cycle -- 6.2.4 Human disturbance of the hydrological cycle -- 6.3 URBAN WATER CYCLE -- 6.3.1 Characteristics of the urban water cycle -- 6.3.2 Conventional modern urban water system -- 6.3.3 Urban water system toward a new paradigm -- 6.4 CONCEPTUAL SCHEME OF WATER CYCLE MANAGEMENT -- 6.4.1 Resource management -- 6.4.2 Quality management -- 6.4.3 Water use management -- 6.4.4 Discharge management -- 6.4.5 Overall management -- 6.5 WCM CONCEPT APPLICATION FOR WATER SOURCE ENLARGEMENT TO RESTORE A WATER CITY -- 6.5.1 Background -- 6.5.2 Water source enlargement plan -- 6.5.2.1 Requirement of source enlargement -- 6.5.2.2 Source enlargement measures -- 6.5.2.2.1 Alternative water resource development. 6.5.2.2.2 Increasing water use efficiency -- 6.5.2.3 Formulation of a quasi-natural water cycle for water source enlargement -- 6.5.2.4 Implementation plan -- 6.5.2.4.1 Water supply network -- 6.5.2.4.2 Source water distribution -- 6.5.2.4.3 Realization of cascading water use -- 6.5.2.4.4 Water quality protection -- 6.5.3 Effects of water source enlargement -- REFERENCES -- Chapter 7: Resilient infrastructures for reducing urban flooding risks -- 7.1 INTRODUCTION -- 7.1.1 Definition of main terms -- 7.2 REVIEW OF THE CONTEXT -- 7.2.1 Flooding hazard -- 7.2.2 Infrastructure resilience from a system perspective -- 7.2.2.1 Infrastructure risk and resilience -- 7.2.3 Adaptation strategies and adaptation benefits -- 7.2.3.1 Monetary and non-monetary benefits from adaptation -- 7.3 FLOOD-WISE USE OF URBAN INFRASTRUCTURE -- 7.3.1 Flood risk management in Jingdezhen -- 7.3.2 Costs and benefits from adaptation measures -- 7.4 DISCUSSION -- 7.4.1 Next frontier of research -- 7.5 CONCLUSION -- ACKNOWLEDGEMENTS -- REFERENCES -- Chapter 8: Building resilience in water supply infrastructure in the face of future uncertainties: Insight from Cape Town -- 8.1 INTRODUCTION -- 8.2 THE DROUGHT IN CAPE TOWN -- 8.2.1 Water resources -- 8.2.2 Water system vulnerabilities -- 8.2.2.1 Climate variability -- 8.2.2.2 Population growth and urbanisation -- 8.2.2.3 Water supply and demand management -- 8.2.2.4 Water pricing and social inequality --

8.2.2.5 Invasive alien plants species -- 8.2.3 Demand management --
8.2.4 Long-term solutions - supply augmentation -- 8.3 OPTION
CHARACTERISATION ANALYSIS -- 8.3.1 Criteria 1 (C1): yield (m3/day)
-- 8.3.1.1 Option 1: desalination plant -- 8.3.1.2 Option 2:
groundwater augmentation scheme -- 8.3.1.3 Option 3: wastewater
reuse treatment plant -- 8.3.1.4 Option 4: surface water transfer
scheme.
8.3.2 Criteria 2 (C2): cost per unit of water.

Sommario/riassunto

Building water-wise cities is a pressing need nowadays in both developed and developing countries. This is mainly due to the limitation of the available water resources and aging infrastructure to meet the needs of adapting to social and environmental changes and for urban liveability. This is the first book to provide comprehensive insights into theoretical, systematic, and engineering aspects of water-wise cities with a broad coverage of global issues. The book aims to (1) provide a theoretical framework of water-wise cities and associated sustainable water systems including key concepts and principles, (2) provide a brand-new thinking on the design and management of sustainable urban water systems of various scales towards a paradigm shift under the resource and environmental constraints, and (3) provide a technological perspective with successful case studies of technology selection, integration, and optimization on the "fit-for-purpose" basis.
