



Makoto Taniguchi *Editor*

# Groundwater and Subsurface Environments

Human Impacts  
in Asian Coastal Cities

 Springer

# Groundwater And Subsurface Environments Human Impacts In Asian Coastal Cities

**Keitaro Ito**



## **Groundwater And Subsurface Environments Human Impacts In Asian Coastal Cities:**

*Groundwater and Subsurface Environments* Makoto Taniguchi, 2011-02-24 Excessive groundwater pumping groundwater contamination and subsurface thermal anomalies have occurred frequently in Asian coastal cities greatly disturbing the urban aquifer and the subsurface environment In this volume the relationship between the stage of a city's development and subsurface environment issues have been explored Intensive field surveys were done in Tokyo Osaka Seoul Taipei Bangkok Jakarta and Manila New advanced methods including satellite tracer techniques and the social economy model were developed to evaluate subsurface conditions Groundwater storage and groundwater recharge rates as well as the accumulation and transport of pollutants have been compiled as integrated indices of natural capacities under climate and social changes and used to evaluate the vulnerability risk for all cities The indices have been made on a yearly basis for seven cities for a century 1900 2000 Using these indicators it is now possible to manage groundwater resources in a sustainable fashion This volume is indispensable to researchers in hydrology coastal oceanography civil engineering urban geography social economy climatology geothermics and urban management

**Groundwater and Subsurface Environments** Makoto Taniguchi, 2011-03-03 Excessive groundwater pumping groundwater contamination and subsurface thermal anomalies have occurred frequently in Asian coastal cities greatly disturbing the urban aquifer and the subsurface environment In this volume the relationship between the stage of a city's development and subsurface environment issues have been explored Intensive field surveys were done in Tokyo Osaka Seoul Taipei Bangkok Jakarta and Manila New advanced methods including satellite tracer techniques and the social economy model were developed to evaluate subsurface conditions Groundwater storage and groundwater recharge rates as well as the accumulation and transport of pollutants have been compiled as integrated indices of natural capacities under climate and social changes and used to evaluate the vulnerability risk for all cities The indices have been made on a yearly basis for seven cities for a century 1900 2000 Using these indicators it is now possible to manage groundwater resources in a sustainable fashion This volume is indispensable to researchers in hydrology coastal oceanography civil engineering urban geography social economy climatology geothermics and urban management

**Groundwater Environment in Asian Cities** Sangam Shrestha, Vishnu Prasad Pandey, Shashidhar Thatikonda, Binaya Raj Shivakoti, 2016-02-11 Groundwater contributes to the sustainable development of many Asian cities by providing water for domestic industrial and agricultural uses and regulating ecosystem flows However groundwater has not always been properly managed which often has resulted in depletion and degradation of the resource Groundwater Environment in Asian Cities presents the up to date scientific knowledge on groundwater environment in fourteen Asian cities using Driver Pressure State Impact Response DPSIR framework In detail the book presents the facts and figures of groundwater dependency problems related to groundwater over exploitation implementation of various policy instruments and management practices and their results in selected fourteen Asian cities namely Bandung Indonesia Bangkok Thailand

Beijing China Bishkek Kyrgyzstan Chitwan Nepal Delhi India Dili East Timor Ho Chi Minh Vietnam Hyderabad India Khulna Bangladesh Lahore Pakistan Seoul South Korea Tokyo Japan and Yangon Myanmar The book provides the one step platform to get sufficient details about groundwater aquifers hydrogeology groundwater status impacts on groundwater environment and responses technology policy institutional etc deployed in the case studies cities and therefore provides a snap shot of Asian groundwater environments The theoretical background of the topics discussed along with the case studies help the readers understand the similarities and differences about the status of groundwater development and use in each city In addition the information in the book will serve as a baseline for other research such as mitigation of groundwater related problems e g land subsidence impact of climate change on groundwater and importance of groundwater for implementing sustainable development goals in future Presents a framework for evaluating groundwater environment in urban environments Includes case studies and local examples from a broad geographical range of urban environments from virtually every region in Asia including Bandung Bangkok Delhi Bishkek Beijing and Tokyo The book will be a valuable resource for groundwater adversaries in the scientific decision making and end user communities particularly for understanding and assessing state of groundwater resources in the region as well as learning from the responses practiced so far Dr Linda Anne Stevenson APN The contents in this book are very much useful for informed decision making for protecting groundwater environment and therefore contributes in making invisible visible Dr Neno Kukuric IGRAC With concrete examples and lessons for readers this book responds to the call for comprehensive research and studies the implementation of new science based methodologies and endorsement of principles for groundwater resources management and cities Dr Aureli Alice UNESCO IHP As a Regional Hub for Groundwater Management in the Asia Pacific Region IGES finds this book as a very much useful reference for knowledge hub partners groundwater managers academic institutions research scholars and international organizations working in the areas of groundwater in Asia and beyond Dr Hideyuki Mori IGES Climate Change Effects on Groundwater Resources Holger Treidel, Jose Luis Martin-Bordes, Jason J.

Gurdak, 2011-12-02 Climate change is expected to modify the hydrological cycle and affect freshwater resources Groundwater is a critical source of fresh drinking water for almost half of the world's population and it also supplies irrigated agriculture Groundwater is also important in sustaining streams lakes wetlands and associated ecosystems But despite this knowledge about the impact of climate change on groundwater quantity and quality is limited Direct impacts of climate change on natural processes groundwater recharge discharge storage saltwater intrusion biogeochemical reactions chemical fate and transport may be exacerbated by human activities indirect impacts Increased groundwater abstraction for example may be needed in areas with unsustainable or contaminated surface water resources caused by droughts and floods Climate change effects on groundwater resources are therefore closely linked to other global change drivers including population growth urbanization and land use change coupled with other socio economic and political trends Groundwater response to

global changes is a complex function that depends on climate change and variability topography aquifer characteristics vegetation dynamics and human activities This volume contains case studies from diverse aquifer systems scientific methods and climatic settings that have been conducted globally under the framework of the UNESCO IHP project Groundwater Resources Assessment under the Pressures of Humanity and Climate Change GRAPHIC This book presents a current and global synthesis of scientific findings and policy recommendations for scientists water managers and policy makers towards adaptive management of groundwater sustainability under future climate change and variability

**Global Change and Future Earth** Tom Beer,Jianping Li,Keith Alverson,2018-10-18 Authoritative reviews on the wide ranging ramifications of climate change from an international team of eminent researchers

Cities and Nature Lisa Benton-Short,John Rennie Short,2013-05-29 Cities and Nature connects environmental processes with social and political actions The book reconnects science and social science to demonstrate how the city is part of the environment and how it is subject to environmental constraints and opportunities This second edition has been extensively revised and updated with in depth examination of theory and critical themes Greater discussion is given to urbanization trends and megacities the post industrial city and global economic changes developing cities and slums urban political ecology the role of the city in climate change and sustainability The book explores the historical relationship between cities and nature contemporary challenges to this relationship and attempts taken to create more sustainable cities The historical context situates urban development and its impact on the environment and in turn the environmental impact on people in cities This provides a foundation from which to understand contemporary issues such as urban political ecology hazards and disasters water quality and supply air pollution and climate change The book then considers sustainability and how it has been informed by different theoretical approaches Issues of environmental justice and the role of gender and race are explored The final chapter examines the ways in which cities are practicing sustainability from light greening efforts such as planting trees to more comprehensive sustainability plans that integrate the multiple dimensions of sustainability The text contains case studies from around the globe with many drawn from cities in the developing world as well as reviews of recent research updated and expanded further reading to highlight relevant films websites and journal articles This book is an asset to students and researchers in geography environmental studies urban studies and planning and sustainability

*Megacities and the Coast* Mark Pelling,Sophie Blackburn,2014-01-03 Based on a major international study this volume provides a synthesis of scientific knowledge on megacity urbanization on the coast environmental impacts risks and management choices including a focus on adaptation mitigation and disaster risk management It is the primary output of a major international scientific project sponsored by the International Geosphere Biosphere Programme the Land Ocean Interactions at the Coastal Zone programme of IHDP IGBP and others It brings together the work of over 60 contributing authors and an international review board It presents the international policy and academic community with an unbiased and high quality assessment of the state of the art in areas of

social ecological systems interaction One of its main messages is that while we know a great deal about megacities of more than ten million people and about urban processes and about coasts and their physical and ecological processes aquatic physical and atmospheric there is relatively little work that focusses primarily at points of intersection between large scale urbanization and the coast The book responds to this gap by providing the first global synthesis of megacity and large urban region urbanization on the coast Its focus is on environmental and development challenges climate change and disaster It is interdisciplinary and brings together world recognised scientists including many IPCC lead authors on urban climate and atmosphere disaster risk management demography and coastal environments *Urban Development in Asia and Africa* Yuji Murayama, Courage Kamusoko, Akio Yamashita, Ronald C. Estoque, 2017-03-29 This book examines the urban growth trends and patterns of various rapidly growing metropolitan regions in developing Asian and African nations from the perspective of geography State of the art geospatial tools and techniques including geographic information system science and remote sensing were used to facilitate the analysis In addition to the empirical results the methodological approaches employed and discussed in this book showcase the potential of geospatial analysis e g land change modeling for improving our understanding of the trends and patterns of urban growth in Asia and Africa Furthermore given the complexity of the urban growth process across the world issues raised in this book will contribute to the improvement of future geospatial analysis of urban growth in the developing regions This book is written for researchers academicians practitioners and graduate students The inclusion of the origin and brief history of each of the selected metropolitan regions including the analysis of their urban primacy spatiotemporal patterns of urban land use changes driving forces of urban development and implications for future sustainable development makes the book an important reference for various related studies *Our Warming Planet: Climate Change Impacts And Adaptation* Martin Parry, Cynthia Rosenzweig, Manishka De Mel, 2021-10-22 This volume the second in the Lectures in Climate Change series covers the full array of climate impacts and adaptation measures It has been brought together by friends and colleagues of Dr Martin Parry Co Chair of the Intergovernmental Panel on Climate Change IPCC 2007 assessment on impacts and adaptation The writers are experts in this field and have been lead authors in many of the IPCC assessments and other major publications Lectures in Climate Change is a unique combination of written text plus electronic slides that together comprise an informative and up to date set of presentations This second volume entitled *Our Warming Planet Climate Change Impacts and Adaptation* covers areas of climate impacts related to climate science methods and approaches sectors regional and national studies and policy and practice The volume comprises topics such as current and future challenges of climate change global assessments downscaling community based adaptation impacts on biodiversity food systems water resources and cities Research from across the world is presented on making science actionable through assessments early warning and early action communicating climate risk documenting the uptake of adaptation on the global front and transformation towards systemic resilience Included with this publication are

downloadable electronic slides and accompanying notes of each lecture for students teachers and public speakers around the world to be better able to understand and present climate change impacts and adaptation Related Link s

**Sustainable Water Management** Daniel H. Chen,2016-10-14 While the world s population continues to grow the availability of water remains constant Facing the looming water crisis society needs to tackle strategic management issues as an integrated part of the solution toward water sustainability The first volume in the two volume set Sustainable Water Management and Technologies offers readers a practical and comprehensive look at such key water management topics as water resource planning and governance water infrastructure planning and adaption proper regulations and water scarcity and inequality It discusses best management practices for water resource allocation ground water protection and water quality assurance especially for rural arid and underdeveloped regions of the world Timely topics such as drought ecosystem sustainability climate change and water management for shale oil and gas development are presented Discusses best practices for water resource allocation ground water protection and water quality assurance Offers chapters on urban rural arid and underdeveloped regions of the world Describes timely topics such as drought ecosystem sustainability climate change and water management for shale oil and gas development Covers water resource planning and governance water infrastructure planning and adaptation proper regulations and water scarcity and inequality Discusses water resource monitoring efficiency and quality management

**Thriving** Megha Mukim,Mark Roberts,2023-05-18 Between 1970 and 2021 the number of people living in cities increased from 1 19 billion to 4 46 billion while the Earth s surface temperature climbed by 1 19 degrees Celsius above its preindustrial levels Because of the prosperity they helped generate cities have been a major cause of this climate change However it is also in cities that many of the solutions to the climate crisis in terms of both adaptation and mitigation will be found not least because by 2050 almost 70 percent of the world s population will call cities home As such cities are the key to arguably the greatest public policy challenge of our times To take stock of how green how resilient and how inclusive cities globally are today Thriving Making Cities Green Resilient and Inclusive in a Changing Climate defines a global typology of more than 10 000 cities It finds that there is wide variation in how green resilient and inclusive cities are around the world It asks how climate change impacts cities and conversely how cities affect climate Vicious cycles in development could occur as cities become more vulnerable to extreme events and the challenges compound and cascade Finally this report provides a compass for policy makers on policies that can help cities not only survive but also thrive in the face of the perils of climate change Policy makers can and must act now to chart a more sustainable trajectory

**The Global Casino** Nick Middleton,2013-07-18 The Global Casino is an introduction to environmental issues which deals both with the workings of the physical environment and the political economic and social frameworks in which the issues occur Using examples from all over the world the book highlights the underlying causes behind environmental problems the human actions which have made them issues and the hopes for solutions It is a book about the human impact on the environment

and the ways in which the natural environment impacts human society The fifth edition has been fully revised and updated throughout with new case studies figures and online resources such as downloadable figures and tables from the text and multiple choice questions for students accessible at [www.routledge.com/cw/middleton](http://www.routledge.com/cw/middleton) New topics covered in extended boxed case studies include payment for environmental services ocean acidification biofuels in Brazil waste reduction through industrial symbiosis and the long term impact of natural disasters on vulnerable groups Other approaches and concepts covered for the first time in this new edition include traditional ecological knowledge environmental justice the resource curse and urban biodiversity Eighteen chapters on key issues follow three initial chapters which outline the background contexts of the physical and human environments and the concept of sustainable development Each chapter provides historical context for key issues outlines why they have arisen and highlights areas of controversy and uncertainty to appraise how issues can be resolved both technically and in political and economic frameworks Each chapter also contains an updated critical guide to further reading and websites as well as discussion points and essay questions The text can be read in its entirety or individual chapters adopted as standalone reading The Global Casino is an essential resource for students of the environment geography earth sciences and development studies It provides comprehensive and inspirational coverage of all the major global environmental issues of the day in a style that is clear and critical

**Urban Biodiversity and Ecological Design for Sustainable Cities** Keitaro Ito, 2021-03-23 This book highlights various designs for urban green spaces and their functions It provides an interesting meeting point between Asian European and North America specialists researchers planners landscape architects studying urban biodiversity urban biodiversity and green space relations between people and biodiversity The most important feature of this book is the unique point of view from each contributor towards the relationship between nature and people in urban areas in the context of the ecosystem and biodiversity in urban areas and how to manage them All chapters explore and consider the relationship between humans and nature in cities a subject which is taking on increasing importance as new cities are conceptualized and planned These discussion and examples would be useful for urban ecology researchers biologists city planners government staff working in city planning architects landscape architects and university instructors This book can also be used as a textbook for undergraduate and postgraduate city planning architecture or landscape architecture courses

**Beyond the Gap** Julie Rozenberg, Marianne Fay, 2019-01-30 Beyond the Gap How Countries Can Afford the Infrastructure They Need while Protecting the Planet aims to shift the debate regarding investment needs away from a simple focus on spending more and toward a focus on spending better on the right objectives using relevant metrics It does so by offering a careful and systematic approach to estimating the funding needs to close the service gaps in water and sanitation transportation electricity irrigation and flood protection Exploring thousands of scenarios this report finds that funding needs depend on the service goals and policy choices of low and middle income countries and could range anywhere from 2 percent to 8 percent of GDP per year by 2030 Beyond the Gap also identifies a



policy mix that will enable countries to achieve key international goals universal access to water sanitation and electricity greater mobility improved food security better protection from floods and eventual full decarbonization while limiting spending on new infrastructure to 4 5 percent of GDP per year Importantly the exploration of thousands of scenarios shows that infrastructure investment paths compatible with full decarbonization in the second half of the century need not cost more than more polluting alternatives Investment needs remain at 2 percent to 8 percent of GDP even when only the decarbonized scenarios are examined The actual amount depends on the quality and quantity of services targeted the timing of investments construction costs and complementary policies Finally investing in infrastructure is not enough maintaining it also matters Improving services requires much more than capital expenditure Ensuring a steady flow of resources for operations and maintenance is a necessary condition for success Good maintenance also generates substantial savings by reducing the total life cycle cost of transport and water and sanitation infrastructure by more than 50 percent

**Tokyo as a Global City** Toshio Kikuchi,Toshihiko Sugai,2018-03-28 This book examines Tokyo s changes current challenges and future trends through a new kind of regional geography and serves as an important source of comprehensive information about the past present and future perspectives of Tokyo as a global city Regional geography relies on two main approaches The traditional one addresses each geographical element of a region individually and in depth in a descriptive and static manner The other focuses on a region s specific phenomena and realities as a starting point and proceeds to identify the region s constituent elements and their interactions which it records and explains in a systematic and dynamic manner The present volume unlike its predecessors relies on the dynamic approach and endeavors to offer a fresh view of Tokyo s new and diverse geographical realities analyzed in a holistic systematic manner allowing identification of its specific features The book covers a broad range of topics including landform variations and volcanic activity biodiversity concerns transportation management waste management population issues religious functions and urban tourism all of which facilitate understanding of the unique characteristics of Tokyo Extensive views from different fields of studies make the book a valuable reference to comprehend both the development of Tokyo into a global city and its sustainability

Natural Hazards Ramesh Singh,Darius Bartlett,2018-03-22 Over the years the interactions between land ocean biosphere and atmosphere have increased mainly due to population growth and anthropogenic activities which have impacted the climate and weather conditions at local regional and global scales Thus natural hazards related to climate changes have significantly impacted human life and health on different spatio temporal scales and with socioeconomic bearings To monitor and analyze natural hazards satellite data have been widely used in recent years by many developed and developing countries In an effort to better understand and characterize the various underlying processes influencing natural hazards and to carry out related impact assessments Natural Hazards Earthquakes Volcanoes and Landslides presents a synthesis of what leading scientists and other professionals know about the impacts and the challenges when coping with climate change Combining reviews of theories

and methods with analysis of case studies the book gives readers research information and analyses on satellite geophysical data radar imaging and integrated approaches It focuses also on dust storms coastal subsidence and remote sensing mapping Some case studies explore the roles of remote sensing related to landslides and volcanoes Overall improved understanding of the processes leading to these hazardous events will help scientists predict their occurrence Features Provides information on the physics and physical processes of natural hazards their monitoring and the mapping of damages associated with these hazards Explains how natural hazards are strongly associated with coupling between land ocean atmosphere Includes a comprehensive overview of the role of remote sensing in natural hazards worldwide Examines risk assessment in urban areas through numerical modelling and geoinformation technologies Demonstrates how data analysis can be used to aid in prediction and management of natural hazards

*Drought* Ben Cook, 2019-04-30 Water is fundamental to all life From the Dust Bowl of the 1930s to the extreme water shortages that have struck California in recent years modern societies often take its abundance for granted until it unexpectedly becomes scarce Drought is one of the many problems anthropogenic climate change may exacerbate but it is also a complex phenomenon at the intersection of a range of scientific disciplines and public policy issues In this innovative book Benjamin I Cook brings together climate science hydrology and ecology to provide a synthetic overview of drought and its environmental and social consequences Cook introduces readers to the hydroclimate and its components explaining the global water cycle the earth's climate system and the distribution of water resources He discusses drought dynamics and variability over time the climatological context and ecological effects and environmental issues such as desertification land degradation and groundwater depletion He also considers the socioeconomic impacts of drought and the role of drought risk management policy especially in light of how climate change is expected to affect drought risk and severity Cook gives special attention to paleoclimate and the role of drought in the crises of ancient civilizations A scientifically comprehensive and approachable overview of water issues throughout the world Drought is a critical interdisciplinary text that will be essential reading for a broad range of students in earth science and environmental and sustainability studies

**Groundwater as a Key for Adaptation to Changing Climate and Society** Makoto Taniguchi, Tetsuya Hiyama, 2014-06-24 The book presents an overview of recent advances in knowledge related to the assessment and management of groundwater resources giving special attention to the uncertainties related to climate change and variability While proposing strategies of groundwater management as adaptation alternative and resilience under the changing environments this book also discusses new directions and initiatives of hydrological study in particular on the groundwater Groundwater is a major source of water across much of the world and acts as a component of the global water cycle on the Earth Groundwater has the capacity to balance large swings in precipitation and has the potential to supplement surface water resources when they are close to the limits of sustainability such as during drought Although groundwater is pivotal to sustain water supplies these important resources are vulnerable to increased human activities and

the uncertain consequences of climate change This book presents that groundwater with longer resident time of water circulation can be an alternative water resources and environment in changing climate Assessments of groundwater services and benefit as well as risk are important for sustainable groundwater uses under the climate change Groundwater which is one of the leys of adaptation to climate change should be treated as common resources and environment beyond the tragedy of the commons and dilemma of the boundaries While providing a comprehensive description of hydrogeological characteristics of groundwater systems the present volume also covers important aspects of legal and institutional contexts required for groundwater resources management as well as social and economic considerations This publication may contribute to an improved understanding of the impacts of climate change and human activity on groundwater resources provides useful guidance for policy makers and planners to include groundwater into climate change adaptation schemes and strategies

**Emerging Issues in Groundwater Resources** Ali Fares,2016-08-11 This book discusses how emerging groundwater risks under current and potential climate change conductions reduce available groundwater resources for domestic use and agriculture and energy production The topics discussed throughout this book are grouped into five sections i Sea Level Rise Climate Change and Food Security ii Emerging Contaminants iii Technologies and Decision Support Systems iv Surface Water Groundwater Interactions and v Economics and Energy Production and Development This book is unique and different from other groundwater hydrology books in that it uses a holistic approach in investigating the risks related to groundwater resources This book will be of interest to a wide audience in academia governmental and non governmental organizations and environmental entities This book will greatly contribute to a better understanding of the emerging risks to groundwater resources and should help responsible stakeholders make informed decisions in this regard

**The Dilemma of Boundaries** Makoto Taniguchi,Takayuki Shiraiwa,2012-05-19 Water circulates continuously and seamlessly on Earth with little regard for the boundaries we draw There are natural boundaries as between land and ocean and surface and subsurface environments as well as human or demographic boundaries between nations cultures and religions Although considered necessary by societies these human created boundaries disrupt natural water circulation leading to serious water related environmental problems The dilemma of how to manage water beyond our boundaries remains and nations have different ways and means of controlling each form of water whether as vapor surface water groundwater or seawater Recent findings on the interaction of water from land oceans and the atmosphere encourage researchers to undertake collaborative work that goes beyond the boundaries of each discipline be it oceanography surface and subsurface hydrology climatology or glaciology Drawing on all these fields the book focuses on two major boundaries that between surface water and ground water and that between terrestrial water and ocean water This comprehensive work is of great value to experts in academia international organizations consulting firms water resources fisheries and urban development planning agencies

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