

**BOOK REVIEW****ADAPTING CITIES TO SEA LEVEL RISE  
GREEN AND GRAY STRATEGIES**

Author: Stefan Al (2018)

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Witiya Pittungnapoo<sup>1,\*</sup>

Climate change is a global challenge that faces cities around the world. Many coastal cities have experienced first-hand the destructive effects of rising sea levels, and these cities have learned some ways to adapt themselves to mitigate these effects. This book aims to introduce design response through different approaches in adapting cities to rising sea levels. The focus of this book is on urban planning and design for coping with flooding caused by rising sea levels. Author Stefan Al, who is an Associate Professor of Urban Design at the University of Pennsylvania, presents both the advantages and disadvantages of green and grey strategies with real-world examples. This book is well structured and divided into 10 chapters.

**Chapter 1** begins with an introduction to the challenges posed by climate change and the impact of rising sea levels on cities. Scenarios in 10 coastal cities are featured, followed by definitions of grey and green solutions. The author also introduces four main flood management strategies: 1) the hard-protect approach, which has been the most traditional and most used approach in flood management, 2) the soft-protect or natural-based approach, 3) upland water storage, and 4) retreat as a basic approach for moving away from the risk. An illustrated tool box of sea level rise interventions is also in this chapter. Four coastal cities from three continents are discussed as case studies: Rotterdam, Netherlands; New York City and New Orleans, USA; and Ho Chi Minh City, Vietnam.

Each of the four case studies is briefly introduced, and the future of city design in each location is discussed at the end of the first chapter. After Chapter 1, the book is divided into two parts. The first part presents strategies at the city level, from Chapter 2 to Chapter 5. The second part focuses on local strategies, from Chapter 6 to Chapter 10.

**Part 1: City Strategies**

**Chapter 2** presents the city strategies of Rotterdam, Netherlands. Ninety percent of Rotterdam is located below sea level. The flood map of Rotterdam and its illustrated resilience plan divides the city into districts for smart water management. Rotterdam's use of its resilience plan, which includes components such as integrated improvement, dikes, water squares, multipurpose dikes, building codes, polders, and dunes, has made the city a global leader in climate change adaptation and best practices for flood resilience.

**Chapter 3** discusses New York City, USA, and its multiple resilience plans since 2007. New York integrated urban resiliency into the city's plan in 2013. The author explains New York's four coastal protection strategies, which are: increase coastal edge elevations, minimize the upland wave zones, protect against storm surge, and improve coastal design and governance.

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<sup>1,\*</sup> Witiya Pittungnapoo, PhD, Associate Professor, Faculty of Architecture, Art and Design, Naresuan University, Thailand Email: pwitiya@googlemail.com

**Chapter 4** focuses on the city of New Orleans, Louisiana, USA. The majority of the New Orleans is below sea level and one-third of the area is wetlands. Resilient New Orleans, a plan which has been guided by the Rockefeller Foundation's 100 Resilient Cities program, is divided into three sections: 1) adapt to thrive: the vision of New Orleans defence approach includes hard and soft infrastructure solutions, regulations, planning, and investments, 2) connect to opportunity: this vision acknowledges the importance of economic and social equity including environmental resilience, and 3) transform city systems: the final vision of the plan to improve the city's infrastructure to promote economic development and resilience through capacity-building programs.

**Chapter 5** presents Ho Chi Minh City (Largest city in Vietnam with 8 million residents). The city flood map features a large port crisscrossed by the riverine systems. Flood protection and management are integrated into the city development goals building an urban network of green infrastructure and green building codes. The author also illustrates the climate-proof plan for District 4 where the port of Saigon is located. Protective ring dykes and dyke development, adapting buildings outside of the dyke ring and landscape infrastructure are presented.

## **Part 2: Local Strategies include;**

**Chapter 6** presents the hard-protect strategies which mean engineering approaches or grey solutions. Protect and reoccupy is a strategy of defence to deal with rising sea levels on a longer-term basis. Examples and design goals of hard-engineered protect strategies include seawalls, revetments, breakwaters, floodwalls, dykes, multipurpose dykes, and surge barriers are well presented in pros and cons detailed for real-world cases of coastal cities.

**Chapter 7** concentrates on soft-project strategies known as nature-based systems which has a major advantage in terms of friendly biodiversity and low maintenance compared to the hard-protect infrastructure. Living shorelines, dunes, and floating islands are featured as illustrations in line with design goals including pros and cons and performances from various cases. This soft strategy is often mixed with grey infrastructure making hybrid solutions.

**Chapter 8** presents store strategies to control and avoid flooding issues and its backflow. Examples featured of this strategic approach are floodable plains, polders, floodable squares, and storm water infiltrations which can be integrated into parks, plazas, streets, and other forms of urban landscapes. Similarly, to previous chapters the author simply describes design goals, performance along with pros and cons details of each approach from certain cases.

**Chapter 9** discusses about retreat strategies which can be seen in two aspects: 1) planned accommodation to live with water (amphibious houses, raising ground plains, flood-proofing buildings, and make more spaces for water), and 2) unplanned response in terms of relocations of housings and residents away from the flood risk. Raised grounds, flood-proofing, and strategic retreat are illustrations with design goals, pros and cons of each performance details through real implementation across different cases. The former two chapters are defensive strategies (hard-protect and soft-protect solutions); while the latter two chapters are accommodation strategies (store and retreat approaches).

This book ends with a short conclusion in **Chapter 10** which calls for further action to achieve more resilient cities. The implemented projects mentioned in this book not only offer new design adaptations; but the author also highlights these good practices which provide opportunities for us to integrate green and grey solutions in more collaborative approaches to reduce risk and to achieve a better environment, a better society for our sustainable future - all at once.

This book is highly recommended for its timely and substantial contribution to the field as city planners, urban designers, architects, engineers, landscape architects, policy makers, developers, investors, communities, and other stakeholders strive to adapt their own cities to address rising sea levels worldwide. The author well presents the salient four flood management strategies which takes the reader to explore pros and cons of each practical technique in details based on various real-world cases.

Good practice in green and grey infrastructure illustrated in this book will provide various useful solutions for dealing with climate change at local, city, and regional levels. The book also addresses traditional grey-protect infrastructure by compromising them with green strategies or soft ecological solutions when possible. I agree with the author that the design solutions for twenty-first century should be integrated water and hydraulic environmental, economic, social, and aesthetic natural aspects into urban development for achieving resilient future. Without interdisciplinary and interdepartmental collaboration, more holistic and integrated planning and practice cannot be achieved to deal with uncertain future and risk.