

FLOOD HAZARDS

Impacts and Responses
for the Built Environment

FLOOD HAZARDS

Impacts and Responses
for the Built Environment

Edited by

Jessica Lamond Colin Booth
Felix Hammond David Proverbs



CRC Press

Taylor & Francis Group

Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

© 2012 by Taylor & Francis Group, LLC
CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works
Version Date: 20110615

International Standard Book Number-13: 978-1-4398-2626-3 (eBook - PDF)

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access www.copyright.com (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

Trademark Notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Visit the Taylor & Francis Web site at
<http://www.taylorandfrancis.com>

and the CRC Press Web site at
<http://www.crcpress.com>

Contents

Preface.....	ix
About the Editors	xi
List of Contributors.....	xiii

Chapter 1	Flooding in the Built Environment: Changing Risk and an Overview of Impacts	1
	<i>Jessica E. Lamond, David G. Proverbs, Colin A. Booth, and Felix N. Hammond</i>	

SECTION I Impacts, Preparedness, and Emergency Response

Chapter 2	State of the Art of Flood Forecasting: From Deterministic to Probabilistic Approaches	9
	<i>Jutta Thielen, Florian Pappenberger, Peter Salamon, Konrad Bogner, Peter Burek, and Ad de Roo</i>	
Chapter 3	Flood Warning and Incident Management.....	25
	<i>Katharine Evans</i>	
Chapter 4	Impacts of Flooding in the Built Environment	37
	<i>Derek Bell</i>	
Chapter 5	Health Impacts of Flooding.....	53
	<i>Harriet Caldin and Virginia Murray</i>	
Chapter 6	The UK Sewer Network: Perceptions of Its Condition and Role in Flood Risk.....	75
	<i>Lee French, Victor Samwinga, and David G. Proverbs</i>	

SECTION II Recovery, Repair, and Reconstruction

Chapter 7 Flood Insurance in the United Kingdom: The Association
 of British Insurers’ View 89
 Swenja Surminski

Chapter 8 A Practical Guide to Drying a Water-Damaged Dwelling..... 99
 Bill Lakin and David G. Proverbs

Chapter 9 The Art of Reinstatement..... 111
 Roger Woodhead

Chapter 10 The Development of Standards in Flood Damage Repairs:
 Lessons to Be Learned from the United Kingdom Example 125
 Tony Boobier

Chapter 11 Resilient Repair Strategy..... 141
 Richard Ayton-Robinson

SECTION III Mitigation and Adaptation to Flood Risk

Chapter 12 International Historical, Political, Economic, Social, and
 Engineering Responses to Flood Risk 155
 David Crichton

Chapter 13 Risk Management, Adaptation, and Monetary Aspects 177
 Annegret H. Thieken, Holger Cammerer, and Clemens Pfurtscheller

Chapter 14 Blue Space Thinking..... 191
 Robert Barker

Chapter 15 Adapting to and Mitigating Floods Using Sustainable Urban
 Drainage Systems.....207
 Susanne M. Charlesworth and Frank Warwick

Downloaded by [168.105.61.89] at 17:13 05 April 2017

Chapter 16	Land Use Planning Issues	235
	<i>Bill Finlinson</i>	
Chapter 17	Flood Resilience for Critical Infrastructure and Services	245
	<i>Ben Kidd</i>	
Chapter 18	Protection and Performance of Flooded Buildings.....	259
	<i>Mike Johnson</i>	
Chapter 19	Impacts of Flood Hazards on Small and Medium-Sized Companies: Strategies for Property-Level Protection and Business Continuity	269
	<i>Bingunath Ingirige and Gayan Wedawatta</i>	

SECTION IV *The Community Perspective*

Chapter 20	Living with Flood: Understanding Residents’ Experiences of Recovery	281
	<i>Rebecca Whittle and Will Medd</i>	
Chapter 21	Property-Level Flood Protection: Case Studies of Successful Schemes.....	291
	<i>Mary Dhonau and Jessica E. Lamond</i>	
Chapter 22	Improving Community Resilience: Education, Empowerment, or Encouragement?.....	305
	<i>Carly B. Rose, David G. Proverbs, Ken I. Manktelow, and Colin A. Booth</i>	
Chapter 23	Financial Implications of Flooding and the Risk of Flooding on Households	317
	<i>Jessica E. Lamond</i>	
Chapter 24	Why Most “At-Risk” Homeowners Do Not Protect Their Homes from Flooding	327
	<i>Tim Harries</i>	

Chapter 25 Exploring the Effect of Perceptions of Social Responsibility
on Community Resilience to Flooding 343
Aaron Mullins and Robby Soetanto

Chapter 26 Lessons for the Future 353
*Felix N. Hammond, Colin A. Booth, Jessica E. Lamond, and
David G. Proverbs*

Index..... 357

Preface

As recent flooding events show worldwide, the impact of flooding on the built environment can cause widespread chaos. These flood events form part of a wider pattern of increasing flood frequency coupled with increased vulnerability of the built environment to flood hazard. Arguably, in the developed world there exists the technology to handle the vast majority of flood events, either through built-in resilience, prevention of small-scale regular flooding, or prediction and evacuation during large-scale disasters. However, events in the United Kingdom (UK) during the summers of 2007 and 2009 have revealed that, while agencies are well prepared and briefed for the majority of circumstances, flood victims remain unconvinced that the best actions have been taken. The debate surrounding the role of government, insurer, property professional, NGO (nongovernmental organization), coastal engineer, and flood victim has been played out in the media.

The idea for this book stemmed from the synergy developed within the EPSRC (Engineering and Physical Sciences Research Council)-funded international network of experts in flood repair (www.floodrepair.net), which is led by the University of Wolverhampton. This unique network of academics, property stakeholders, and restoration specialists, together with the involvement of international experts, provided a forum for exchange of ideas that has proved highly valuable. It emerged that flood management is constantly evolving, and valuable experience has been gained in the emergency management, recovery, and restoration processes in recent years. Some of this experience has yet to be captured in the literature. The aim of this book is to disseminate these discussions to a wider audience. In this book, practitioners, researchers, restorers, insurers, and policy makers discuss their perspectives on the wide issues surrounding flood risk management in one unique volume.

About the Editors

Jessica Lamond, B.Sc. (Honors), M.Sc., Ph.D., is a research fellow in the Construction and Infrastructure Department at the University of Wolverhampton, United Kingdom. Her areas of research specialism are in the field of flood risk management and property valuation studies. She has conducted research projects for research councils, government departments, the Environment Agency, private industry, and the RICS (Royal Institution of Chartered Surveyors), and has published twelve peer-reviewed journal and conference articles in the field. Recent projects include a strategic review of the impact of climate change on the risk of flooding for individual developments, guidance for the drying of buildings following flooding, and availability and cost of property-level flood risk information. She has a particular interest in structural and nonstructural flood resilience, flood insurance, the long-term financial impacts of flooding, information asymmetry in property valuation, the barriers and incentives for adaptation of the built environment to meet the challenges of climate change, and the measurement of environmental impacts within the built environment.

Colin Booth, B.Sc., M.Sc., Ph.D., PGCE, is a senior lecturer in the Environmental Engineering Department at the University of Wolverhampton, United Kingdom, with a background in geology and environmental modeling. Booth has an international research profile and, as such, he has authored or coauthored approximately 80 scientific publications (articles and chapters) in international peer-reviewed journals and books. The themes of these works are reflected in those areas of his research interests, which include environmental magnetism and urban pollution, water engineering and resource management, sustainable development and waste management, soil erosion and conservation management, and coastal and estuarine engineering.

Felix Hammond, B.Sc., PGCE, MBA, LLM, Ph.D., MGIS, FHEA, is a senior lecturer and a member of the Surveying and Property Research Group at the University of Wolverhampton, United Kingdom. He is a real estate economics and finance specialist with considerable experience in real estate policy and development economics-related research and analysis. Hammond has published widely in these specialized areas. He has served on various international development projects that impinge on land and real estate dating back to 1995. An example of such is the Ghana Environmental Resource Management Project (GERMP), which closed in (1995–1998) under the auspices of the World Bank and the Danish International Development Association (DANIDA). Hammond served as a real estate specialist on the 15-year, World Bank-led, \$US55.0 million Ghana Land Administration Project, which is aimed at reorganizing the land sector of that country as a way of facilitating poverty reduction.

David Proverbs, Professor of Construction Management, B.Sc. (Honors), PG.Cert. Ed., Ph.D., FCIQB, FHEA, is presently Head of the Construction and Property Department at the University of the West of England. He is vice-chair of the Council of Heads of the Built Environment (CHOBE) in the United Kingdom. He has undertaken numerous research projects, both for the research councils (EPSRC, NERC) and various public (DEFRA, EA, CLG) and private (Lloyds TSB, RICS) sponsors. Areas of research specialism include a number of construction management themes, including international benchmarking, construction productivity, contractor performance, and client satisfaction issues. More recently his research efforts have focused on urban flood management issues, including damage assessment, flood repair, and flood resilience. The products of his research activities have been disseminated through more than 200 refereed academic journal and conference papers; textbooks, research seminars, and workshops; articles and features in the construction press; and by the publication of numerous reports and working papers. He is Editor of the *International Journal of Sustainable Development and Planning* as well as a member of the editorial board for the *CIQB Construction Annual Review*, *Disaster Prevention and Management*, and *Structural Survey* journals.

List of Contributors

Richard Ayton-Robinson

Cunningham Lindsey
Whiteley, United Kingdom

Robert Barker

Baca Architects Ltd
London, United Kingdom

Derek L. Bell

Barnsley Metropolitan Borough
Council
Barnsley, South Yorkshire, United
Kingdom

Konrad Bogner

Joint Research Centre
Institute for Environment and
Sustainability
European Commission
Ispra, Italy

Anthony Boobier

Maidstone, Kent, United Kingdom

Colin Booth

School of Engineering and the Built
Environment
University of Wolverhampton
Wolverhampton, West Midlands, United
Kingdom

Peter Burek

Joint Research Centre
Institute for Environment and
Sustainability
European Commission
Ispra, Italy

Harriet Caldin

Health Protection Agency
Centre for Radiation, Chemical &
Environmental Hazards
London, United Kingdom

Holger Cammerer

Institute of Geography
University of Innsbruck
Innsbruck, Austria

Susanne Charlesworth

Department of Geography, Environment
and Disaster Management
Coventry University
Coventry, West Midlands, United
Kingdom

David C. Crichton

Crichton Associates
Perth, United Kingdom

Mary Dhonau

The National Flood Forum
Bewdley, Worcestershire, United
Kingdom

Katharine Evans

National Office of Environment Agency
Leeds, United Kingdom

William John Finlinson

AMEC ENTEC
Shrewsbury, United Kingdom

Lee French

Cundall Johnston and Partners LLP
Ashington, Northumberland, United
Kingdom

Felix Hammond

School of Engineering and the Built
Environment
Wolverhampton University
Wolverhampton, West Midlands, United
Kingdom

Timothy Martin Harries

King's College
London, United Kingdom

Bingunath Ingirige

School of the Built Environment
University of Salford
Salford, United Kingdom

Michael Raymond Johnson (retired)

Neant sur Yvel, France

Benjamin Rhys Kidd

CIRIA
London, United Kingdom

William John Lakin

WJL Associates
Stafford, Staffordshire, United
Kingdom

Jessica Lamond

School of Engineering and the Built
Environment
Wolverhampton University
Wolverhampton, West Midlands, United
Kingdom

Kenneth Ian Manktelow

School of Applied Sciences
Wolverhampton University
Wolverhampton, West Midlands, United
Kingdom

William Peter Medd

Lancaster Environment Centre
Lancaster University
Lancaster, United Kingdom

Aaron Mullins

Coventry University
Coventry, United Kingdom

Virginia Murray

Health Protection Agency
Radiation, Chem & Env. Haz.
London, United Kingdom

Florian Pappenberger

European Centre for Medium-Range
Weather Forecasts
Reading, United Kingdom

Clemens Pfurtscheller

Institute of Mountain Research: Man
and Environment
Austrian Academy of Sciences
Innsbruck, Austria

David Proverbs

Department of Humanities, Language
& Social Sciences
University of Wolverhampton
Wolverhampton, West Midlands, United
Kingdom

Ad de Roo

Joint Research Centre
Institute for Environment and
Sustainability
European Commission
Ispra, Italy

Carly Rose

University of Wolverhampton
Wolverhampton, West Midlands, United
Kingdom

Peter Salamon

Joint Research Centre
Institute for Environment and
Sustainability
European Commission
Ispra, Italy

Victor Samwinga

University of Northumbria
School of Built & Natural Environment
Newcastle Upon Tyne, United Kingdom

Robby Soetanto

Department of Built Environment
University of Coventry
Coventry, United Kingdom

Swenja Surminski

Association of British Insurers
London, United Kingdom

Annegret Thieken

Institute of Geography
University of Innsbruck
Innsbruck, Austria

Jutta Thielen-del Pozo

Joint Research Centre
Institute for Environment and
Sustainability
European Commission
Ispra, Italy

Frank Warwick

Department of Geography, Environment
and Disaster Management
Coventry University
Coventry, West Midlands, United
Kingdom

Gayan Wedawatta

School of the Built Environment
University of Salford
Salford, United Kingdom

Rebecca Kate Whittle

Lancaster Environment Centre
Lancaster University
Lancaster, United Kingdom

Roger S. Woodhead

Rameses Associates Ltd
Stone, Staffordshire, United Kingdom