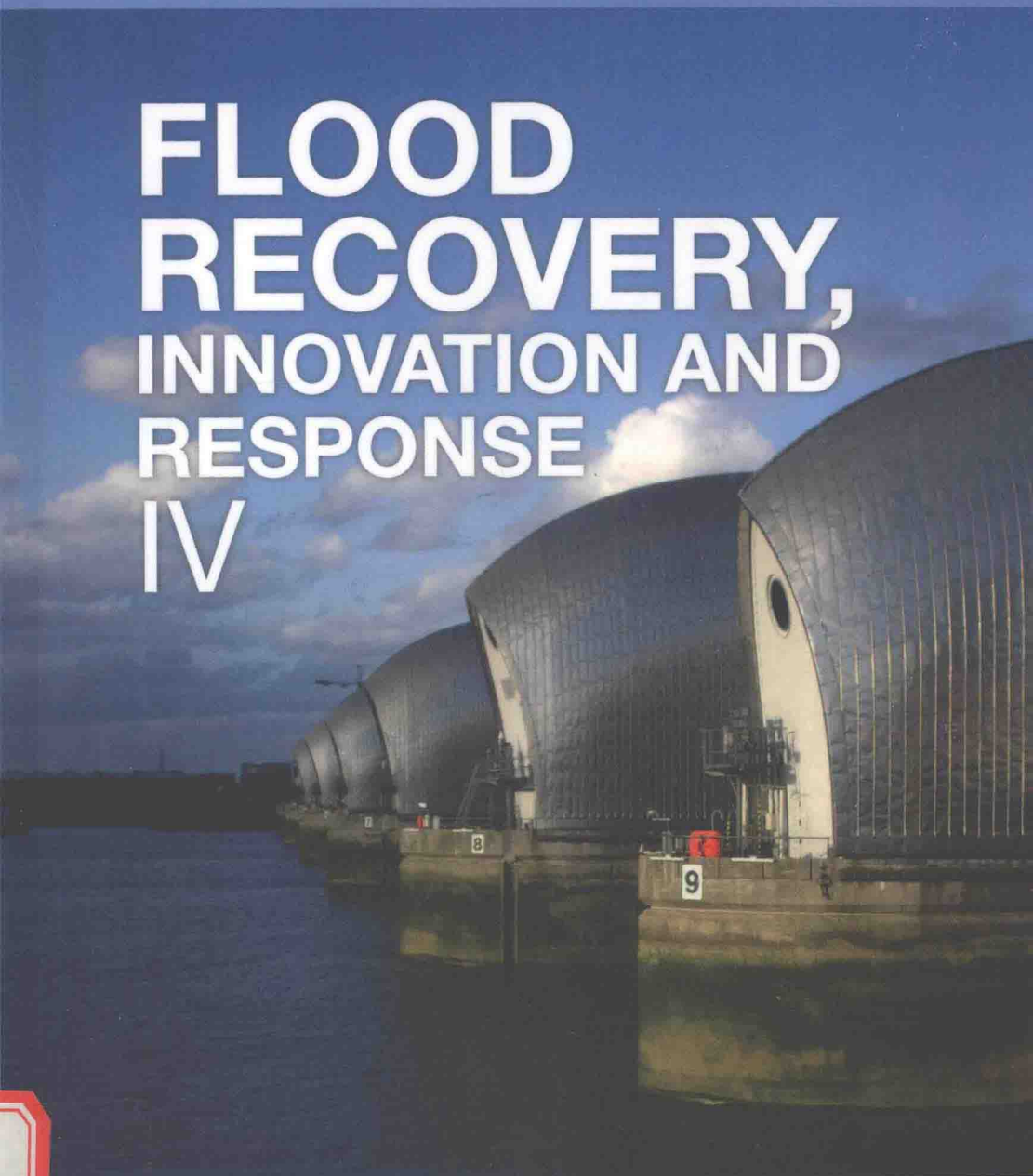
FLOOD RECOVERY, INNOVATION AND RESPONSE IV



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Flood Recovery, Innovation and Response IV

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WIT PRESS Southampton, Boston

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Published by

WIT Press
Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK
Tel: 44 (0) 238 029 3223; Fax: 44 (0) 238 029 2853
E-Mail: witpress@witpress.com
http://www.witpress.com

For USA, Canada and Mexico

Computational Mechanics Inc
25 Bridge Street, Billerica, MA 01821, USA
Tel: 978 667 5841; Fax: 978 667 7582
E-Mail: infousa@witpress.com
http://www.witpress.com

British Library Cataloguing-in-Publication Data

A Catalogue record for this book is available
from the British Library

ISBN: 978-1-84564-784-1
eISBN: 978-1-84564-785-8
ISSN: 1746-448X (print)
ISSN: 1743-3541 (on-line)

The texts of the papers in this volume were set individually by the authors or under their supervision. Only minor corrections to the text may have been carried out by the publisher.

Printed in Great Britain by Lightning Source, UK.

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Preface

The present volume contains papers presented at the Fourth International Conference on Flood Recovery Innovation and Response (FRIAR) held in Poznan, Poland. The conference is jointly organised by the Wessex Institute of Technology, UK, and the University of the West of England, Bristol, UK; sponsored by WIT Transactions on Ecology and the Environment, and the International Journal of Safety and Security Engineering.

FRIAR 2014 is the fourth Conference of this successful series. The conference started at the Institute of Civil Engineers in London 2008 and was reconvened at the Lombardy Region Headquarters in Milano in 2010 and in Dubrovnik in 2012.

Flooding is a global phenomenon that claims numerous lives worldwide each year. This winter many parts of Europe have been affected by serious flooding including several Italian cities such as Pisa, Florence and Rome and others in Southern France. The UK has been very severely affected by an exceptional run of winter storms, culminating in serious coastal damage and widespread, persistent flooding. This record-breaking weather and flooding, has been exceptional in its duration, and led to the wettest December to January period in the UK since records began. Heavy rains combined with strong winds and high waves led to widespread flooding and coastal damage, causing significant disruption to individuals, businesses and infrastructure.

The damage caused by the flooding over the winter period is estimated to be £1.1bn in the UK alone; but of course this does not reflect the longer term impacts to lives and communities and businesses, who will be affected for many months beyond the flooding itself. For some home owners and businesses, insurers will assist in the recovery process by providing the necessary funding and services to restore properties back to a habitable state. For others including those without insurance, the recovery process will be very challenging indeed and it is likely that many businesses will simply collapse as a consequence.

Research has shown that in the aftermath of the summer 2007 floods in the UK,

the vast majority of flood affected properties were reinstated to their previous condition, leaving them equally vulnerable to future flood events. This goes against the principles of climate change adaptation and represents a missed opportunity to build back better and improve the resilience of homes and businesses that were affected. Hopefully, the financial support now being made available to businesses and homes in the UK will help to ensure resilient measures are installed during the recovery process.

We know that it is impossible to entirely eliminate the risk from flooding and that there is considerable uncertainty about future extreme weather patterns . Clearly, further research is needed to improve our understanding of the challenges associated with making our rural and urban environments and the communities that exist within them, more resilient to the effects of flooding. This includes the development of new innovative solutions as part of an integrated approach to flood risk management at the community level. The complexity of these challenges means that we need to work across disciplines and draw on a range of expertise, recognising the use of both structural and non-structural measures towards arriving at novel solutions to suit local circumstances.

The conference provided a forum for researchers, academics and practitioners actively involved in improving our understanding of flood events and new approaches to response, recovery and resilience. The meeting brought together social scientists, surveyors, engineers, scientists, and other professionals from many countries involved in research and development activities in a wide range of technical and managerial topics related to flooding and its impacts on communities, property and people. The conference drew together a wide range of experts from across a range of disciplines and provided a very fertile platform for the development of new ideas and solutions.

WIT Press, the publishing arm of the Wessex Institute has produced this volume which is distributed around the world by its own offices in Europe and the USA and an extensive distribution network. The book is produced in hard copy and digital format to reach as many colleagues as possible. Furthermore, all conference papers have been archived online in the Institute eLibrary (http://library.witpress.com) where they are immediately and permanently available to the international community.

The Editors are grateful to the authors for the quality of the papers published in this book and particularly indebted to the members of the International Scientific Advisory Committee and other colleagues who helped to select them, in this manner ensuring their names the quality of this volume.

The Editors
Poznan
2014

Contents

Section 1
Flood modelling

A new approach for flood forecasting of river flows

M. Mohssen
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Abstract

Flood warning mainly depends on reliable flood forecast models. Literature is rich in flood modelling techniques, but failures of these models, especially on the very short scale such as hourly flows, do often cause devastating impacts on the communities affected by these floods, and on many occasions result in loss of lives. This paper presents a new approach for flood forecasting of river flows based on the projection theorem in Hilbert space.

The new modelling process obtains the projection of hourly flow rates on hourly rainfalls over the catchment at previous hours to the projected flow rate. A total of 25 flow events observed for the Leith River in Dunedin, New Zealand, along with their corresponding observed rainfalls at two sites in the catchment have been identified and applied to calibrate and validate the derived model. The proposed modelling technique was capable of simulating the flow process for the Leith River, and is a promising tool for flood forecast when other models fail. The proposed model is easy to apply, doesn't imply a lot of assumptions or parameters, as other models usually require, and can be used for long term forecast based on forecasted hourly rain one day or more before the event, or real time forecast during the event itself based on rainfall which has been already gauged. However, for real time (short term) forecast, the forecast time can be a few hours based on the catchment area and its topography which can lead to a fast flow to the outlet.

Keywords: flood forecast, flood modelling, rainfall-runoff, projection in Hilbert Space.

WIT Transactions on Ecology and The Environment, Vol 184, © 2014 WIT Press
www.witpress.com, ISSN 1743-3541 (on-line)
doi:10.2495/ERIAR140011