

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter

[More information](#)

HURRICANE KATRINA AND THE FORGOTTEN COAST OF MISSISSIPPI

The study of natural disasters is particularly challenging, as they are enormously complex and demand mastery of a number of disciplines ordinarily beyond the reach of any individual researcher working alone. The full sociological, geographical, historical, economic, cultural, political, and physical impacts of – and recovery from – a natural disaster are so vast, the contours so manifold and complicated, that only a genuinely and thoroughly interdisciplinary approach can begin to master the scope, scale, and meaning of the event.

Hurricane Katrina slammed into the Gulf Coast of the United States in August 2005 with devastating consequences. Almost all analyses of the disaster have been dedicated to the way the hurricane affected New Orleans. This volume's highly interdisciplinary approach examines the full impact of the disaster on southern Mississippi. While communities along Mississippi's Gulf Coast shared the impact of the hurricane, their socio-economic and demographic compositions varied widely, leading to different types and rates of recovery. This volume combines baseline geographic data on the social and built environment and the hazard vulnerability of the region with a historical narrative on past conditions that influenced the pre-Katrina settlement history. It further includes a statistical analysis of historical rates of settlement and demographic change in the region and forecasts the future trajectory of settlement and demographic change post Katrina. This volume not only furthers our understanding of the pace of recovery and its geographic extent, but also explores the role of inequalities in the recovery process and those antecedent conditions that could give rise to a "recovery divide." It will be especially appealing to researchers and advanced students of natural disasters and policy makers dealing with disaster consequences and recovery.

SUSAN L. CUTTER is Carolina Distinguished Professor of Geography at the University of South Carolina and Director of the Hazards and Vulnerability Research Institute.

CHRISTOPHER T. EMRICH is a Research Assistant Professor in the Hazards and Vulnerability Research Institute at the University of South Carolina.

JERRY T. MITCHELL is the Director of the Center of Excellence for Geographic Education and a Research Associate Professor in the Hazards and Vulnerability Research Institute, both at the University of South Carolina.

WALTER W. PIEGORSCH is the Director of Statistical Research and Education at the University of Arizona's BIO5 Institute.

MARK M. SMITH is Carolina Distinguished Professor of History at the University of South Carolina.

LYNN WEBER is a Professor of Psychology and Women's and Gender Studies at the University of South Carolina.

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter

[More information](#)

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter

[More information](#)

HURRICANE KATRINA AND THE FORGOTTEN COAST OF MISSISSIPPI

SUSAN L. CUTTER

University of South Carolina

CHRISTOPHER T. EMRICH

University of South Carolina

JERRY T. MITCHELL

University of South Carolina

WALTER W. PIEGORSCH

University of Arizona

MARK M. SMITH

University of South Carolina

LYNN WEBER

University of South Carolina



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter

[More information](#)

CAMBRIDGE
UNIVERSITY PRESS

32 Avenue of the Americas, New York NY 10013-2473, USA

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781107023949

© Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch,
Mark M. Smith, and Lynn Weber 2014

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2014

Printed in the United States of America

A catalog record for this publication is available from the British Library.

Library of Congress Cataloging in Publication data

Cutter, Susan L.

Hurricane Katrina and the forgotten coast of Mississippi / Susan Cutter, University of South Carolina; Christopher T. Emrich, University of South Carolina; Jerry T. Mitchell, University of South Carolina; Walter W. Piegorsch, University of Arizona; Mark M. Smith, University of South Carolina; Lynn Weber, University of South Carolina.

pages cm

Includes bibliographical references and index.

ISBN 978-1-107-02394-9 (hardback)

1. Hurricane Katrina, 2005 – Social aspects – Mississippi – Gulf Coast.
 2. Hurricane Katrina, 2005 – Environmental aspects – Mississippi – Gulf Coast.
 3. Hurricane Katrina, 2005 – Economic aspects – Mississippi – Gulf Coast.
- I. Title.

HV636 2005 .M7 C87 2014

363.34'922097621090511–dc23 2013049914

ISBN 978-1-107-02394-9 Hardback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party Internet Web sites referred to in this publication and does not guarantee that any content on such Web sites is, or will remain, accurate or appropriate.

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

Contents

<i>List of Figures</i>	<i>page</i> vii
<i>List of Tables</i>	ix
<i>List of Boxes</i>	x
<i>About the Authors</i>	xi
<i>Acknowledgments</i>	xiii
1 The Forgotten Coast	1
The Nature of Recovery	5
Is the Past a Prologue to the Future?	6
Setting the Geographic Stage	9
Setting the Social Stage	11
The Unfolding Story	13
2 Remembering the Coast: The Road to Camille	15
Introducing Camille	15
Prelude to Camille	16
Continuity, Change, and Hurricane Camille	25
History, Redux	30
The Political Economy of Recovery	33
3 The Second Big One	39
Before the Storm	40
Hurricane Katrina and Its Immediate Aftermath	51
Different Places, Different Impacts	59
4 Uneven Recovery	64
Recovery: For Whom and by What Measure?	66
Population Ebb and Flow	68
Restarting the Economic Engine	71
Changes within the Landscape	77
The Phoenix Rises: Rebuilding the Homes	79
Recovery by the Numbers	86
A Real Recovery?	89
5 Powering an Unequal Recovery	90
Power Over: Making the Rules	91

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

vi

Contents

Power Over: Winning the Contest	100
Power Over: Spinning the Outcome	102
The Power of the Spin	104
Power With: Organizing and Advocating for the Vulnerable	107
Processes Producing an Unequal Recovery	110
6 Slow Going for Neighborhoods	114
Six Stories	114
Damaged Landscapes and Lives	120
A Tale of Three Damaged Communities	127
Sticker Shock: Hazard Insurance and Differential Recovery	129
Into the Details, One Neighborhood at a Time	135
Forgetfulness	140
7 Waiting for the Next Katrina	141
Increasing Risk and Exposure	142
The Recovery Calendar	144
Altering Preexisting Trajectories	146
Contested Views and Constrained Recovery	157
What Does the Future Hold?	162
8 Recovery Divides in a Changing World	164
Generalizing Recovery: The Theory	164
Lessons from Mississippi's Experience	169
Scaling Up	171
Where in the World? Comparing Recovery Experiences	173
Postscript	186
9 Epilogue	187
<i>Index</i>	191

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

Figures

1.1	Continuous change in community development patterns over time	<i>page</i> 8
1.2	A punctuated trajectory of community development	8
1.3	Study area map	10
2.1	Early time line of significant events on the Mississippi coast	17
2.2	Hurricane of 1947, Coleman Avenue, Waveland, Mississippi	26
2.3	Military personnel unloading relief supplies	27
2.4	Long Beach, Mississippi (before and after), Shopping Center, Jefferson Davis Avenue and U.S. Highway 90	31
3.1	The Social Vulnerability Index	49
3.2	GOES-12 satellite image of Hurricane Katrina	53
3.3	Raised house in Waveland, Mississippi, inundated by storm surge	55
3.4	Forest damage in Carriere, Mississippi	57
3.5	Damage impact area	60
3.6	Amount of residential damage estimates for selected communities and the three Mississippi counties	62
4.1	Casinos moved landward	65
4.2	Shrimp boat on Edgewater Drive in Pass Christian	67
4.3	Population changes 2000–2012 in (a) Hancock County, (b) Harrison County, (c) Jackson County, and (d) overall percentage change in population	69
4.4	The damage survey grid for fieldwork	79
4.5	Estimating disaster recovery from photographic evidence	80
4.6	The geographic pattern of recovery 2006–2010	81
4.7	Before and after transect along Beach Boulevard (Highway 90)	82
4.8	Clusters of building permits 2005–2008	84
5.1	Port of Gulfport	98
5.2	Y'all Mart	108
5.3	Housing reconstruction	110
5.4	Volunteers in Waveland, Mississippi, September 11, 2005	113
6.1	Waveland, Mississippi, June 2013	115
6.2	Diamondhead, Mississippi, June 2013	116

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

viii	<i>Figures</i>	
6.3	St. Louis Bay bridge	117
6.4	Casino row, Biloxi, Mississippi	118
6.5	Moss Point, Mississippi, schooner loading at L. N. Dantzer Lumber Co.'s mill	119
6.6	Moss Point, Mississippi, today	120
6.7	Progression of recovery over time in the six study communities	122
6.8	Beau Rivage Casino in Biloxi, Mississippi	125
6.9	Spatial clusters of residential building permits in the hardest hit communities after Katrina	128
6.10	Neighborhood analysis for Waveland, Mississippi	137
6.11	Humor is one of the mainstays of recovery	139
7.1	Changes in the development footprint along the Mississippi coast	143
7.2	Mississippi recovery calendar	146
7.3	Coastal Mississippi's slab landscape	147
7.4	Population growth 1820–2010	148
7.5	Projected population growth	149
7.6	Employment trends 1967–2010	150
7.7	White to black ratios, 1850–2010	152
7.8	Age trends 1930–2020	154
7.9	Social vulnerability 2000–2010	155
7.10	Dwelling unit density 1850–2010	156
7.11	Elevated housing, part two	161
7.12	The historical time line 1960 and beyond	162
8.1	Maule, Chile, 2010 earthquake	174
8.2	Tohoku, Japan, 2011 earthquake	175
8.3	Flooding in Bangkok, Thailand, November 2011	179
8.4	Flood inundation from Hurricane Sandy in the New York metropolitan area	183
8.5	Seaside Heights, New Jersey, on April 30, 2013	185

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

Tables

3.1	Hurricanes making landfall in Mississippi 1960–2004	<i>page</i> 42
3.2	Hazard losses 1960–2004 (in 2012 dollars)	43
3.3	Presidential Disaster Declarations and Emergency Declarations 1960–2004	44
3.4	Exposure of the built environment assets before Hurricane Katrina	45
3.5	Selected demographic comparisons prior to Hurricane Katrina	48
3.6	Houses damaged or destroyed by storm surge and flooding	61
4.1	Change in the population composition 2000–2010	70
4.2	Major regional employers	72
4.3	Building permits by cluster	85
4.4	Recovery by the numbers	88
5.1	Distribution of CDBG funds in millions 2006–2008	96
5.2	Total CDBG funds expended by program type 2012	97
6.1	Building permits and level of damage	123
6.2	Flood insurance profiles of six communities	133
7.1	Long-term employment trends	151
8.1	Understanding recovery and its obstacles	169
8.2	Key findings from Hurricane Katrina recovery along Mississippi's coast	173

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

Boxes

1.1 Biloxi's Little Saigon	<i>page 3</i>
1.2 Racial segregation and Jim Crow laws	12
3.1 The Social Vulnerability Index, SoVI®	47
3.2 Planning for Katrina's arrival	52
3.3 FEMA's Residential Substantial Damage Estimation (RSDE) Tool	60
4.1 The Port of Gulfport: A tale of one post-Katrina contest	76
4.2 Repeat photography and disaster recovery	78
4.3 Building permits as a proxy indicator of recovery	83
5.1 Unheard voices	95
5.2 Local obstacles	99
5.3 Voices from grass roots	109
6.1 Wind or water? It makes a difference	134
7.1 Flood insurance reform	158
7.2 Elevating homes: Voices from the field	160
8.1 The U.S. National Disaster Recovery Framework (NDRF)	167
8.2 Cascading impacts at home and abroad: Tohoku and Fukushima Dai'ichi	178

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber

Frontmatter

[More information](#)

About the Authors

SUSAN L. CUTTER is Carolina Distinguished Professor of Geography at the University of South Carolina and Director of the Hazards and Vulnerability Research Institute. Her primary research interests are in the area of hazard vulnerability/resilience science. She has authored or edited twelve books and more than 150 peer-reviewed articles and book chapters. Dr. Cutter serves on many national and international advisory boards and committees, including the U.S. National Research Council, U.S. National Science Foundation, Intergovernmental Panel on Climate Change, and Science Committee of the Integrated Research on Disaster Risk Program. She is an Executive Editor of *Environment* and Associate Editor for *Weather, Climate, and Society*. In 2010, Dr. Cutter received the Lifetime Achievement Award from the Association of American Geographers, and in 2013 she was a recipient of the prestigious Southeastern Conference Faculty Achievement Award. Her most recent book is *Hazards, Vulnerability, and Environmental Justice* (2006).

CHRISTOPHER T. EMRICH is a Research Assistant Professor in the Hazards and Vulnerability Research Institute at the University of South Carolina. His primary research interests are in the development and application of geospatial technologies in emergency management. He has taught at the University of South Florida and worked for FEMA as a Mitigation GIS Specialist at the Florida Disaster Field Office (2004–2005); GIS Unit Leader for the Jackson, Mississippi, Joint Field Office (2006); GIS Unit Leader for the Florida Long-Term Recovery Office (2006–2007); and Geospatial Liaison to FEMA headquarters for the New Orleans Gulf Coast Recovery Office during the run-up to the three-year anniversary of Hurricane Katrina.

JERRY T. MITCHELL is the Director of the Center of Excellence for Geographic Education and a Research Associate Professor in the Hazards and Vulnerability Research Institute, both at the University of South Carolina. He is also editor of the *Journal of Geography*. His primary research interests lie in cultural responses to disaster, the use of geospatial technologies for vulnerability assessments, and hazards education.

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter

[More information](#)

xii

About the Authors

Prior to joining the USC faculty in 2004, he was an Associate Professor of Geography at Bloomsburg University. He was awarded a Distinguished Teaching Achievement award from the National Council for Geographic Education in 2012.

WALTER W. PIEGORSCH is the Director of Statistical Research and Education at the University of Arizona's BIO5 Institute. He is also a Professor of Mathematics, Professor of Public Health, and former Chair of the University's Graduate Interdisciplinary Program in Statistics, and he holds accreditation as a Professional Statistician from the American Statistical Association. His research focuses on environmental data analytics, with emphasis on environmental hazards and risk assessment. He is the Editor in Chief of the journal *Environmetrics* and former Joint Editor of the *Journal of the American Statistical Association* (Theory & Methods Section) and has served on numerous other editorial and scientific review boards. His most recent book is *Encyclopedia of Environmetrics, Second Edition* (2012).

MARK M. SMITH is Carolina Distinguished Professor of History at the University of South Carolina. A specialist in southern history, race relations, and sensory history, he has authored or edited a dozen books, including, most recently, *Camille, 1969: Histories of a Hurricane* (2011). His work has been featured in the *New York Times*, *London Times*, *Science*, *Brain*, and the *Chronicle of Higher Education*. A former president of the Historical Society, Professor Smith has lectured in China, Australia, and Europe, as well as throughout the United States. He regularly reviews books for the *Wall Street Journal*.

LYNN WEBER is a Professor of Psychology and Women's and Gender Studies at the University of South Carolina. For more than thirty years, she has led in developing the field of intersectionality – examining the nexus of race, class, gender, sexuality, and other dimensions of inequality. In addition to her work on the Mississippi Gulf Coast and in conjunction with a national research network on persons displaced by Hurricane Katrina, she and Lori Peek edited *Displaced: Life in the Katrina Diaspora* (2012).

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter[More information](#)

Acknowledgments

This book is a collective effort born out of the Hurricane Katrina experience. In the days leading up to landfall we watched with trepidation as the Gulf Coast prepared for yet another major hurricane. It was only afterward that the magnitude of the destruction became evident – homes and businesses were destroyed, universities and colleges lost valuable research equipment and data to floodwaters, and residents and students were displaced to locations all across the country.

Hurricane Katrina provided a natural laboratory to examine all facets of coastal resiliency – from the natural processes of ecosystem restoration to the societal challenges of relocation, repopulation, and reconstruction. The University of South Carolina saw the opportunity to facilitate the collection of perishable data. Under its Coastal Resiliency Information Systems Initiative for the Southeast (CRISIS), eighteen funded research projects surveyed ecological damage, law enforcement response, beach conditions, the perceptions of affected residents, community damages, and infrastructure breaches, among other topics. The competitive research program was supported by the Vice President for Research and Health Sciences Office, enabling research teams to get into the field three to four weeks after the storm. This was an unprecedented effort by the university, and many thanks are due to Harris Pastides (who was vice president for research at the time and is now university president), who had the vision and wisdom to see how this would help researchers, but more significantly how it would help the region and the nation better understand coastal vulnerability. As recipients of this initial funding, we were able to conduct our first coastal Mississippi investigation in October 2005 – with a team of two faculty (Susan Cutter and Jerry Mitchell) and six graduate students (the CRISIS field cohort). With later support from the National Science Foundation (Grant CMMI-0623991), we have been able to monitor recovery in the region since 2006.

More than thirty-five graduate students at the University of South Carolina have been involved in this work. Many are no longer students, but are now professors and disaster professionals. They spent countless hours on this project and not only left blood, sweat, and tears on the coast, but also took with them lessons, memories, and

Cambridge University Press

978-1-107-02394-9 - Hurricane Katrina and the Forgotten Coast of Mississippi

Susan L. Cutter, Christopher T. Emrich, Jerry T. Mitchell, Walter W. Piegorsch, Mark M. Smith and Lynn Weber
Frontmatter[More information](#)

inspiration. We are grateful to each for their contributions: Dara Angelo, Kevin Ash, David Asiamah, Lindsey Barnes, Melissa Berry Potter, Kevin Borden, Bryan Boruff, Gregg Bowser, Christopher Burton, Jennifer Castellow, Andy Edmonds, Elijah Evans, Christina Finch, Ehren Foley, Christina Griffin Garrard, Jenn Webb Haney, Steve Hardin, Beatriz Hummell, Caglar Koylu, Julie Lam, Elizabeth Dunn Luke, Reggie McCarn, Ginni Melton, Dan Morath, Nancy Pazmino, Mathew Schmidlein, Anna Smith, Joanne Rinaldi Stevenson, Eric Tate, Brittney Townsend, Trevor Townsend, Nathaniel Warner, and Brooks Willett.

We would thank Dan Allan (FEMA Biloxi GIS Unit Leader) for providing data and analysis for coastal Mississippi, Paul (PJ) Weschler (FEMA GIS Specialist) for assistance with geospatial data procurement, and the many Mississippi Gulf Coast building officials who provided building permit and parcel information used to track recovery progress. We are especially indebted to the people of Hancock, Harrison, and Jackson counties. In the midst of their own recovery, they provided their time in interviews and in casual conversations shared their personal experiences with us so that we could gain a deeper understanding of the recovery process.

As is the case with any large and complex project, we benefited from conversations with and critical feedback from colleagues about our work: Dr. DeAnne H. K. Messias, Dr. Melanie Gall, and Dr. Dennis Wenger. Ronald Schumann III deserves a large thank you for his time, effort, and expertise in the development of publication-worthy figures and graphics. The majority of photographs used in the book were taken by Hazards and Vulnerability Research Institute (HVRI) field teams and are part of our digital documentation of the progression of recovery along Mississippi's coast.

Last, and certainly not least, we thank our families, who also experienced Hurricane Katrina, but in more indirect ways. They kept things running smoothly on the home front while we were dispatched to the field and provided solace and encouragement as we worked through the analysis and writing. It has been a rewarding eight years for us personally and professionally. While we have captured parts of the story of disaster recovery in coastal Mississippi, there is much more to learn.