
Innovation by Design

INNOVATION BY DESIGN

IMPROVING
LEARNING NETWORKS
IN COASTAL MANAGEMENT

THE
HEINZ
CENTER

THE H. JOHN HEINZ III CENTER FOR
SCIENCE, ECONOMICS AND THE ENVIRONMENT

The H. John Heinz III Center for Science, Economics and the Environment

Established in December 1995 in honor of Senator John Heinz, The Heinz Center is a nonprofit institution dedicated to improving the scientific and economic foundation for environmental policy through multisectoral collaboration. Focusing on issues that are likely to confront policymakers within two to five years, the Center creates and fosters collaboration among industry, environmental organizations, academia, and government in each of its program areas and projects. The membership of the Center's Board of Trustees, its steering committees, and all its committees and working groups reflects its guiding philosophy: that all relevant parties must be involved if the complex issues surrounding environmental policymaking are to be resolved. The Center's mission is to identify emerging environmental issues, conduct related scientific research and economic analyses, and create and disseminate nonpartisan policy options for solving environmental problems.

About the Sharing Coastal Zone Management Innovations Study

The Heinz Center's Sharing Coastal Zone Management Innovations study was conducted under the terms of a joint project agreement between The Heinz Center and the National Oceanic and Atmospheric Administration's Office of Coastal Resource Management. This report does not necessarily reflect the policies or views of the organizations or agencies that employ the panel members and study sponsors.

Library of Congress Control Number: 200410419 4

International Standard Book Number: 0-9717592-5 1

Copyright © 2004 by The H. John Heinz III Center for Science, Economics and the Environment. All rights reserved.

08 07 06 05 04

5 4 3 2 1

Printed in the United States of America

Additional single copies of this report may be obtained free of charge from

The Heinz Center

1001 Pennsylvania Avenue, N.W., Suite 735 South, Washington, D.C. 20004

Telephone (202) 737-6307 Fax (202) 737-6410 e-mail info@heinzctr.org

This report is also available in full at www.heinzctr.org

Cover illustration: "Salt Water Branches," batik on silk. Copyright © 1991 by Mary Edna Fraser.

The H. John Heinz III Center for Science, Economics and the Environment

Established in December 1995 in honor of Senator John Heinz, The Heinz Center is a nonprofit institution dedicated to improving the scientific and economic foundation for environmental policy through multisectoral collaboration. Focusing on issues that are likely to confront policymakers within two to five years, the Center creates and fosters collaboration among industry, environmental organizations, academia, and government in each of its program areas and projects. The membership of the Center's Board of Trustees, its steering committees, and all its committees and working groups reflects its guiding philosophy: that all relevant parties must be involved if the complex issues surrounding environmental policymaking are to be resolved. The Center's mission is to identify emerging environmental issues, conduct related scientific research and economic analyses, and create and disseminate nonpartisan policy options for solving environmental problems.

About the Sharing Coastal Zone Management Innovations Study

The Heinz Center's Sharing Coastal Zone Management Innovations study was conducted under the terms of a joint project agreement between The Heinz Center and the National Oceanic and Atmospheric Administration's Office of Coastal Resource Management. This report does not necessarily reflect the policies or views of the organizations or agencies that employ the panel members and study sponsors.

Library of Congress Control Number: 200410419 4

International Standard Book Number: 0-9717592-5 1

Copyright © 2004 by The H. John Heinz III Center for Science, Economics and the Environment. All rights reserved.

08 07 06 05 04

5 4 3 2 1

Printed in the United States of America

Additional single copies of this report may be obtained free of charge from

The Heinz Center

1001 Pennsylvania Avenue, N.W., Suite 735 South, Washington, D.C. 20004

Telephone (202) 737-6307 Fax (202) 737-6410 e-mail info@heinzctr.org

This report is also available in full at www.heinzctr.org

Cover illustration: "Salt Water Branches," batik on silk. Copyright © 1991 by Mary Edna Fraser.

THE H. JOHN HEINZ III CENTER FOR SCIENCE, ECONOMICS AND THE ENVIRONMENT

BOARD OF TRUSTEES

G. William Miller (*Chair*), Chairman, G. William Miller and Company, Inc.

Teresa Heinz (*Vice Chair*),* Chairman, Heinz Family Philanthropies

Cabell Brand, Chairman, Cabell Brand Center for International Poverty and
Resource Studies

Jared Cohon, President, Carnegie Mellon University

R. Philip Hanes, Jr., Owner, River Ridge Land and Cattle Co., LLC

Fred Krupp, President, Environmental Defense

Jonathan Lash, President, World Resources Institute

Thomas E. Lovejoy, President, The Heinz Center

Shirley M. Malcom, Head, Directorate for Education and Human Resources
Programs of the American Association for the Advancement of Science

William McDonough, Principal, William McDonough + Partners

Jerry M. Melillo, Co-Director, The Ecosystems Center, Marine Biological
Laboratory

Edward L. Miles, Virginia and Prentice Bloedel Professor,
University of Washington

David J. Refkin, Director, Sustainable Development, Time Inc.

Howard Ris, Former President, The Union of Concerned Scientists

Phyllis Wyeth, Environmentalist

SUSTAINABLE OCEANS, COASTS, AND WATERWAYS ADVISORY COMMITTEE

Stephen Leatherman (*Chair*), International Hurricane Research Center and
Laboratory for Coastal Research, Florida International University, Miami

Michael Bahleda, Electric Power Research Institute, Charlotte, North Carolina

Cabell Brand, Cabell Brand Center for International Poverty and Resource
Studies, Salem, Virginia

Virginia Burkett, U.S. Geological Survey, Lafayette, Louisiana

Michael Campana, University of New Mexico, Albuquerque

* *On a leave of absence beginning January 30, 2004.*

Rita R. Colwell, Canon U.S. Life Sciences, Inc., Washington, D.C.
Michael Connor, San Francisco Estuary Institute, San Francisco, California
M. Rupert Cutler, Roanoke, Virginia
Susan Cutter, University of South Carolina, Columbia
Margaret A. Davidson, NOAA Coastal Services Center, Charleston, South Carolina
Timothy Dillingham, American Littoral Society, Sandy Hook, New Jersey
Peter Douglas, California Coastal Commission, San Francisco
Leo M. Eisel, Brown and Caldwell, Golden, Colorado
David Hart, Patrick Center for Environmental Research, Academy of Natural Sciences, Philadelphia, Pennsylvania
John Huff, Oceaneering International, Inc., Houston, Texas
Ann L. Riley, Waterways Restoration Institute, Berkeley, California
David Rockefeller, Jr., Businessman and Philanthropist, Cambridge, Massachusetts
Henry Vaux, University of California, Berkeley
Phyllis Wyeth, Environmentalist, Wilmington, Delaware

HEINZ CENTER STAFF

Thomas E. Lovejoy, President
Anthony Janetos, Vice President
Anne Hummer, Corporate Secretary and Development Director
Kent Cavender-Bares, Fellow
Caroline Cremer, Project Assistant
Sheila D. David, Consultant/Project Director
Judy Goss, Research Assistant
Carolyn Harris, Research Associate
Laura Meyerson, Fellow and Research Associate
Robin O'Malley, Senior Fellow and Project Manager
Sharon Phenneger, Treasurer and Chief Financial Officer
Bobbie Jo Simmons, Staff Assistant
Carmen R. Thorndike, Executive Assistant

COMMITTEE ON SHARING COASTAL ZONE MANAGEMENT INNOVATIONS

James Good (*Chair*), Oregon State University, Corvallis

Ralph Cantral, National Oceanic and Atmospheric Administration, Office of
Ocean and Coastal Resource Management, Silver Springs, Maryland

Charles Colgan, University of Southern Maine, Portland

Sarah W. Cooksey, Delaware Coastal Programs, Dover

Michael Deluca, Rutgers University, New Brunswick, New Jersey

Jon Fisher, Texas Chemical Council, Austin

Madilyn Fletcher, Baruch Institute, University of South Carolina, Columbia

Kem Lowry, Jr., University of Hawaii, Honolulu

Andrew Manus, Ducks Unlimited, Stevensville, Maryland

Maya K. van Rossum, Delaware Riverkeeper Network, Washington Crossing,
Pennsylvania

Robert Wayland, Consultant, Alexandria, Virginia

PROJECT STAFF

Sheila D. David, Project Director

Judy Goss, Research Assistant

CONTENTS

PREFACE	xi
SUMMARY	1
How Coastal Managers Learn Today, 3	
Learning Networks and Coastal Management, 6	
Technological Change and Coastal Management, 7	
Recommendations, 8	
1. INTRODUCTION	17
Impetus for and Scope of the Study, 19	
Study Methods, 21	
<i>Interviews with Coastal Managers, 22; Workshop</i>	
<i>on Coastal Management Information</i>	
<i>Sharing, 23</i>	
2. INNOVATION AND INFORMATION SHARING TODAY	25
Coastal Environmental Activism, 27	
The Private Sector and Coastal Management, 28	
What Drives Change in Coastal Management Practice? 31	
<i>Social and Economic Changes, 33; Scientific Understanding</i>	
<i>and Tools, 33; Technological Advances, 35; Policy Initiatives</i>	
<i>and Incentives, 36; Planning and Management Process, 37;</i>	
<i>Outreach and Technical Assistance, 39</i>	
Where Do Coastal Managers Go for Ideas and	
Information? 43	
How Do Innovations Spread? 45	
Future Information Sharing—Overcoming Barriers and	
Constraints, 48	
Conclusions and Recommendations, 50	

3. LEARNING FROM LEARNING NETWORKS	52
Shaping Coastal Management Networks, 52	
<i>Issue Networks, 53; Professional Networks, 56; Sectoral Networks, 56; Political Networks, 58; Participation in Networks, 58</i>	
Learning in Networks, 59	
<i>Types and Characteristics of Learning Networks, 61</i>	
Implications for Coastal Management, 69	
<i>Linking Organizations to the Networks, 70; Recognizing and Transferring Useful Innovations, 73</i>	
Conclusions and Recommendations, 75	
4. THE PROMISE AND LIMITS OF TECHNOLOGY	77
The Internet and the World Wide Web, 77	
Geographic Information Systems, 79	
New Sensor Technologies, 80	
Technology's Influence on Coastal Management Practice, 87	
<i>Moving from Data to Useful Information, 90; Future Technologies and Coastal Management, 91; Incorporating Technologies into Organizational Practices, 93; Centralized Standards, Distributed Knowledge, 97</i>	
Conclusions and Recommendations, 99	
APPENDIXES	101
A The Survey and Interview Process	103
B Survey Participants	107
C Workshop Participants	109
D About the Contributors and the Project Staff	111
REFERENCES	117

PREFACE

THE CONCEPT and practice of coastal zone management emerged a scant four decades ago from serious soul-searching about how to tackle an array of interconnected problems associated with unprecedented growth and development of our coasts, and with that growth, a host of environmental problems. Numerous studies and popular books in the 1950s and 1960s documented the decline of coasts and the environment generally. One study—the landmark 1969 Stratton Commission report—pointed the way forward, recommending the establishment of a comprehensive national program to manage our coasts. Although the states led the way with coastal management legislation in the 1960s, it was the passage of the U.S. Coastal Zone Management Act (CZMA) in 1972 that provided the fundamental structure and laid out the challenges at the coast.

This study, more than three decades later, is an acknowledgment that we still have a long way to go in meeting this challenge. Further, development within the sciences, generally, and the rapid emergence of a whole new field of information sciences over the last two decades, present coastal managers with many new challenges associated with using new knowledge and application methods to advance their practice in new and creative ways.

It was in this spirit that, in 2002, the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resources Management—the federal agency responsible for supporting the network of U.S. state coastal management programs developed under the CZMA—asked The Heinz Center to conduct a study of how information sharing in coastal zone management might be improved. The

Heinz Center organized a committee drawn from academia, government, industry, and environmental groups to explore how innovative ideas and practices for coastal problem solving are shared with others who have similar needs, and what improvements are needed.

The committee received a great deal of assistance in conducting this study. We would like to take this opportunity to thank our principal sponsor, the NOAA Office of Ocean and Coastal Resource Management, and the director of its National Policy and Evaluation Division, Ralph Cantral, who also served as a committee member. Thanks are due as well to Margaret Davidson, who helped conceive the study when she was serving as acting administrator of NOAA's National Ocean Service. We also greatly appreciate the assistance of the staff of The Heinz Center, particularly Sheila David, project director for the study, and Judy Goss, research assistant. Sheila refined the committee's scope of work and demonstrated an uncanny knack for drawing the best effort from a group, helping us to be productive and focused throughout the study. Judy provided excellent logistic and substantive support and communication throughout the project. Thanks to you both.

The committee expresses appreciation to those coastal managers who educated us about how they get, use, and share information with their colleagues—especially our interviewees and workshop participants. We really value your time and contributions to the project. Among the workshop participants, we especially appreciate the stimulating presentations of keynoters Robert Kay, coastalmanagement.com Web guru and the brains behind the new United Nations sanctioned OneCoast project, who joined us from Perth, Australia; and Stephen Olsen, director of the University of Rhode Island Coastal Resources Center. Workshop panelists also deserve special thanks for their discussion-stimulating presentations, including Doug Brown, Jeanne Christie, Tracey Crago, Dawn Hamilton, Kalle Matso, Donna McCaskill, Arleen O'Donnell, Miki Schmidt, Suzanne Schwartz, and Carolyn Stem.

All committee members contributed directly to this report and reviewed several drafts. We want to especially acknowledge the heavy lifters who pulled the pieces together, chapter leaders Bob Wayland (Chapter 2), Kem Lowry (Chapter 3), and Madilyn Fletcher (Chapter 4). Finally, we greatly appreciate the fresh perspective our peer reviewers provided near the conclusion of the project: special thanks to Tom Ballou, Jr., Sherwin Alumina Company (retired); Dana Beach, South Carolina Coastal Conservation League; Robert Goodwin, University of Washington Sea Grant;

Nick Shufro, PricewaterhouseCoopers; and Peter Douglas, California Coastal Commission.

This report is aimed at coastal managers in the public, private, and nonprofit sectors at all levels—local, state, regional, and national. However, opportunities for improvements in the networks that facilitate innovation, information sharing, and learning in coastal management require the special attention of its leaders. It is the leaders who can do the most to create a culture and climate that fosters innovation, creative problem solving, and risk taking. The problems and opportunities we face at the coast—thoroughly described in recent reports from the Pew Oceans Commission and the U.S. Commission on Ocean Policy—are looking for that leadership.

JAMES GOOD
Chair

