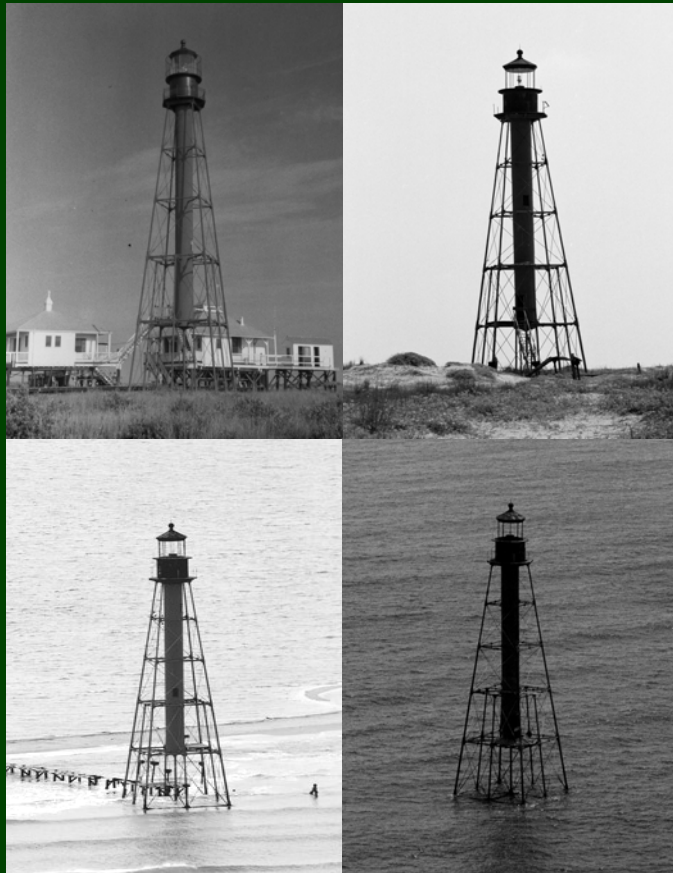


Conference Program/Abstracts

*Challenges of Natural Resource  
Economics & Policy*

2nd National Forum on Socioeconomic  
Research in Coastal Systems

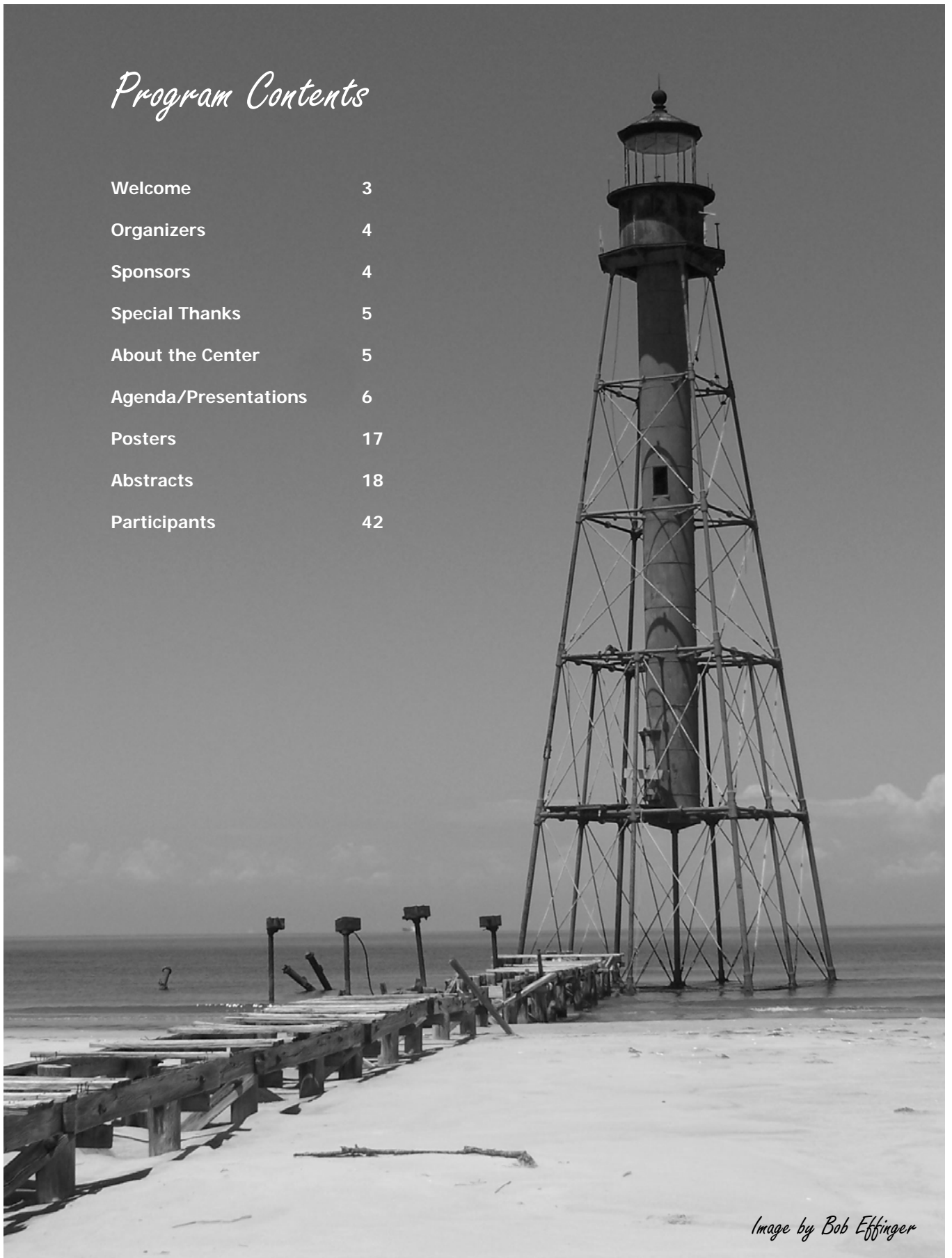


*Chandeleur Light 1895-2005*

May 20-23, 2007  
New Orleans

# *Program Contents*

Welcome	3
Organizers	4
Sponsors	4
Special Thanks	5
About the Center	5
Agenda/Presentations	6
Posters	17
Abstracts	18
Participants	42



*Image by Bob Effinger*

*Welcome!*

Welcome to New Orleans and thank you for joining us for: *Challenges of Natural Resource Economics and Policy: (CNREP 2007), the 2<sup>nd</sup> National Forum on Socioeconomic Research in Coastal Systems.*

Three years ago, our inaugural forum was held on the campus of Louisiana State University in Baton Rouge. That conference emphasized the status and challenges of integrating the social sciences into the restoration and management of coastal systems. Since that time, the catastrophic damage associated with the 2005 hurricane season has focused national attention on a region fraught with environmental challenges and tremendous opportunities for socioeconomic research and extension.

As you'll see from the agenda, CNREP 2007 continues the theme of highlighting the contributions that social scientists make to the management of our coastal resources - be they in Louisiana, the Everglades, Chesapeake Bay, Puget Sound, or any other region of the U.S. and the world.

We have a dynamic program scheduled, with numerous opportunities to interact with colleagues in a relaxed, interdisciplinary setting. This year's conference features more than 80 oral and poster presentations from social scientists, resource managers, and policy professionals from 16 U.S. states and 9 countries.

Once again, we welcome you to New Orleans and extend to you our best wishes for a productive and enjoyable experience.

Sincerely,



Rex H. Caffey  
CNREP 2007 Conference Chair

**Cover** - On August 29, 2005, Hurricane Katrina claimed one of the oldest and most remote lighthouses in the northern Gulf of Mexico, Chandeleur Light. Although Katrina provided the final blow, the structure had become increasingly vulnerable in recent years because of coastal land loss. Cover images depict this loss through archive photos from 1945, 1985, 1995, and 2005. Images provided by the Lighthouse People: [www.thelighthousepeople.com](http://www.thelighthousepeople.com)

## Conference Organizers

### Conference Co-Chairs

**Rex Caffey, Ph.D.**, Associate Professor and Director, Center for Natural Resource Economics & Policy, LSU AgCenter and Louisiana Sea Grant, Department of Agricultural Economics & Agribusiness, LSU  
**Richard F. Kazmierczak, Jr., Ph.D.**, Professor, Resource Economics and Director of Graduate Studies, Center for Natural Resource Economics & Policy, Department of Agricultural Economics and Agribusiness, LSU

### Program Committee

**Hamady Diop, Ph.D.**, Assistant Professor, Fisheries & Coastal Resource Economics, Louisiana Sea Grant College Program, Center for Natural Resource Economics & Policy  
**Michael A. Dunn, Ph.D.**, Associate Professor, Forest Economics, Center for Natural Resource Economics & Policy, Department of Agricultural Economics & Agribusiness, LSU  
**Steven A. Henning, Ph.D.**, Associate Professor, Natural Resource Economics, Center for Natural Resource Economics & Policy, Department of Agricultural Economics & Agribusiness, LSU  
**Walter R. Keithly, Jr., Ph.D.**, Associate Professor, Fisheries and Coastal Resource Economics, Center for Natural Resource Economics & Policy, Department of Agricultural Economics & Agribusiness, LSU  
**Krishna P. Paudel, Ph.D.**, Assistant Professor, Environmental and Natural Resources, Center for Natural Resource Economics & Policy, Department of Agricultural Economics & Agribusiness, LSU  
**Lisa C. Schiavinato, J.D.**, Legal Coordinator, Louisiana Sea Grant Legal Program, Center for Natural Resource Economics & Policy  
**John V. Westra, Ph.D.**, Assistant Professor, Conservation and Resource Economics, Center for Natural Resource Economics & Policy, Department of Agricultural Economics & Agribusiness, LSU  
**James G. Wilkins, J.D.**, Director of Legal Advisory Service, Center for Natural Resource Economics & Policy, Louisiana Sea Grant Legal Program

## Conference Sponsors

The Center for Natural Resource Economics and Policy wishes to thank the following sponsors for their generous support of *Challenges of Natural Resource Economics and Policy, the 2<sup>nd</sup> National Forum on Socioeconomic Research in Coastal Systems*:

**The Shaw Group**  
[www.envirogen.com](http://www.envirogen.com)

**Arcadis**  
[www.arcadis-us.com](http://www.arcadis-us.com)

**C.H. Fenstermaker**  
[www.fenstermaker.com](http://www.fenstermaker.com)

**HNTB**  
[www.hntb.com](http://www.hntb.com)

**Tetra Tech**  
[www.tetrattech.com](http://www.tetrattech.com)

**Farm Foundation**  
[www.farmfoundation.org](http://www.farmfoundation.org)

**Coastal Wetlands Planning, Protection & Restoration Act**  
[www.lacoast.gov](http://www.lacoast.gov)

**Louisiana State University Agricultural Center**  
[www.lsuagcenter.com](http://www.lsuagcenter.com)

**Louisiana Sea Grant College Program**  
[www.laseagrant.org](http://www.laseagrant.org)

**LSU Department of Agricultural Economics & Agribusiness**  
[www.agecon.lsu.edu](http://www.agecon.lsu.edu)

**National Oceanic and Atmospheric Administration**  
[www.noaa.gov](http://www.noaa.gov)

**USDA's SERA-IEG 30 Committee**  
[www.usda.gov](http://www.usda.gov)

**USGS National Wetland Research Center**  
[www.nwrc.usgs.gov](http://www.nwrc.usgs.gov)

## *Special Thanks*

**It is with great appreciation that we recognize the following individuals for their support, guidance, and assistance in preparing for this conference:**

Dr. William L. Jenkins, President, LSU System  
Dr. William B. Richardson, Chancellor, LSU Agricultural Center  
Dr. Gail Cramer, Chair, LSU Department of Agricultural Economics & Agribusiness  
Dr. Chuck Wilson, Executive Director, Louisiana Sea Grant College Program  
Mr. Mike Liffmann, Associate Executive Director, Louisiana Sea Grant College Program  
Dr. Paul Coreil, Extension Director and Associate Vice Chancellor, LSU Agricultural Center  
Dr. David Boethel, Experiment Station Director and Associate Vice Chancellor, LSU Agricultural Center  
Mr. Mark Davis, Director, Institute on Water Resources Law and Policy, Tulane Law School  
Dr. John Ward, Chief Economist, NOAA Fisheries, U.S. Department of Commerce  
Ms. Margaret Davidson, Director, NOAA Coastal Services Center  
Dr. Todd Davison, Director, NOAA Gulf Coast Service Center  
Dr. Fen C. Hunt, National Program Leader, Environmental and Resource Economics, USDA – CSREES  
Ms. Pam Fenn, Executive Assistant, LSU Department of Agricultural Economics & Agribusiness  
Ms. Brenda Smith, Administrative Assistant, LSU Department of Agricultural Economics & Agribusiness  
Mr. Roy Kron, Director of Communications, Louisiana Sea Grant College Program  
Mr. Robert Ray, Art Director, Louisiana Sea Grant College Program  
Mr. Herbert J. Bourque, State Public Affairs Specialist, USDA-Natural Resources Conservation Service  
Ms. Jane Niu, GIS Director, LSU Department of Agricultural Economics & Agribusiness  
Mr. Rick Bogren, Associate Professor of Communications, LSU Agricultural Center  
Graduate Students: Augustus Matekole, Cheikhna Dedah, Heidi Landry, James Henderson, Larry Hall, Nirmala Devkota, Powan Poudel, Ryan Bourriaque, Sachin Chintawar, Surkiti Nepal, Tao Ran, Tina Willson, and Tyler Mark

## *About the Center*

The Center for Natural Resource Economics & Policy (CNREP) was established in January 2004 to coordinate the activities of resource economists and policy professionals at LSU and other institutions in Louisiana and the southeastern US. The center functions as a research and extension cooperative, providing a focal point for social scientists by organizing and marketing their efforts to those agencies seeking the socioeconomic information required to fully evaluate new environmental programs and projects.

To learn more about CNREP go to: [www.cnrep.lsu.edu](http://www.cnrep.lsu.edu)

## Conference Agenda

Sunday, May 20, 2007	
1:00 pm to 5:30 pm Arcade	<b>Registration Desk Open</b>
1:00 pm to 5:30 pm Esplanade	<b>Speaker Resource Room Open</b>
1:00 pm to 5:30 pm Evangeline A & B	<b>Poster/Display Set-Up</b>
3:30 pm to 5:00 pm Iberville	<b>CNREP Advisory Committee Meeting</b>
6:00 pm to 9:00 pm Bourbon Balcony Suite	<p><b>Opening Reception and Conference Social</b>            Be sure to join us on Sunday evening, May 20<sup>th</sup> for the CNREP 2007 Opening Reception and Conference Social. This event will be a wonderful opportunity to socialize with other participants while enjoying a variety of hor'dourves and complimentary beverages. The reception will take place in the Royal Sonesta's premier balcony suite overlooking the corner of Bienville Street and Bourbon Street. This reception is sponsored by the LSU Center for Natural Resource Economics &amp; Policy.</p>
Monday, May 21, 2007	
7:00 am to 5:30 pm Arcade	<b>Registration Desk Open</b>
7:00 am to 5:30 pm Esplanade	<b>Speaker Resource Room Open</b>
7:00 am to 12:00 pm Evangeline A & B	<b>Poster Set-Up</b>
7:00 am to 8:30 am Foyer	<b>Breakfast Buffet</b>
8:30 am to 9:45 am South Ballroom	<p><b>CNREP 2007 Plenary Session: Marshaling the Social Sciences</b></p> <p style="padding-left: 20px;"><b>8:30 Opening announcements</b></p> <p style="padding-left: 40px;"><b>Dr. William L. Jenkins</b>, LSU System President  <b>Dr. William B. Richardson</b>, Chancellor, LSU Agricultural Center  <b>Dr. Walter J. Armbruster</b>, President, Farm Foundation  <b>Dr. Rex H. Caffey</b>, Director, Center for Natural Resource Economics &amp; Policy</p> <p style="padding-left: 20px;"><b>9:00 Keynote Speaker – "After Katrina" - Mr. John Barry</b>            Nationally acclaimed author of <i>Rising Tide</i>, New York Times Best-Selling author, and visiting scholar at Tulane and Xavier Universities, Mr. John Barry will provide his perspective on the post-Katrina management of the lower Mississippi River from an economic and social standpoint.</p>
9:45 am to 10:00 am Foyer	<b>Coffee Break</b>

## Monday, May 21, 2007 (continued)

<p><b>10:00 am to 11:45am</b> South Ballroom</p> <p>Moderator: Jack Isaacs</p> <p>A/V: James Henderson</p>	<p><b>Track 1A</b> <b>Planning for Restoration and Sustainability - I</b> This session will be the first in a five-track series at CNREP 2007 that will focus on the current status and challenges of integrating the social sciences into coastal restoration and protection programs. This session will examine programs from a global perspective, with particular emphasis on the need for socioeconomic modeling and monitoring.</p> <p><b>Coastal Restoration: Monitoring as a Planning-Evaluation Process</b> David K. Loomis, University of Massachusetts Amherst Terry McTigue, National Centers for Coastal Ocean Sciences</p> <p><b>Enhancing the Role of Science in Post-Katrina Comprehensive Flood Damage Reduction and Coastal Restoration</b> Len Bahr, Louisiana Governor's Office of Coastal Activities</p> <p><b>Soft Sciences and the Hard Reality of Coastal Zone Restoration and Management</b> Kent Thornton, FTN Associates</p> <p><b>Assessing Constraints in the Linkages Between Numerical and Environmental Response Modeling: Current Capabilities and Future Needs</b> Ellis "Buddy" Clairain and Jonathan Hird, Moffatt &amp; Nichol</p>
<p><b>10:00 am to 11:45am</b> North Ballroom</p> <p>Moderator: Mike Liffmann</p> <p>A/V: Tyler Mark</p>	<p><b>Track 2A</b> <b>Understanding Human Response to Hurricanes</b> The catastrophic damage associated with the 2005 hurricane season has focused national attention on the way in which local, state, and federal governments prepare for and respond to natural disasters. This session will examine the human response to hurricanes, with particular emphasis on the socioeconomic and risk-related factors affecting the efficacy of evacuation.</p> <p><b>The Socioeconomic Considerations of Evacuation: The Case of Katrina</b> Ivor L. van Heerden, LSU Center for Public Health Impacts of Hurricanes</p> <p><b>To Evacuate or Not To Evacuate, That is the Question: A Review of the Hurricane Evacuation Choices for Residents of Several Urban Communities</b> Michael H. Thomas, Florida A&amp;M University, David Letson, University of Miami/RSMAS Edward Mahoney, Michigan State University, and Terrill R. Hanson, Mississippi State University</p> <p><b>Evolution of Subjective Hurricane Risk Perceptions: A Bayesian Approach</b> David Letson and Daniel Solis, University of Miami Michael Thomas, Florida A&amp;M University</p> <p><b>Evacuation of the Socially Vulnerable</b> Pamela Jenkins, Shirley Laska, and Gretchen Williamson, University of New Orleans</p>

## Monday, May 21, 2007 (continued)

<p><b>10:00 am to 11:45am</b> Evangeline C</p> <p>Moderator: John Westra</p> <p>A/V: Sachin Chintawar</p>	<p><b>Track 3A</b> <b>SERA 30: Valuing Coastal Resource Amenities</b> This session will be the first in a three-track series at CNREP 2007 featuring resource economists from the SERA 30 Southern Natural Resource Economics Committee. This initial session will focus on factors affecting the demand, value, and impacts of coastal recreation amenities.</p> <p><b>The Role of Congestion in Recreational Beach Site Choice</b> Paul Hindsley, Craig Landry, Okmyung Bin, and Has Vogelsong, East Carolina University</p> <p><b>A Determination of the Economic Benefits and Economic Impacts of Recreation Boating on the Atlantic Intracoastal Waterway (AIWW) in North Carolina, USA</b> John Whitehead, Appalachian State University Jim Herstine and Chris Dumas, University of North Carolina Wilmington</p> <p><b>Diving Demand for Large Ship Artificial Reefs</b> Ash Morgan, Bill Huth, and Greg Martin, University of West Florida</p> <p><b>The Value of Wetlands Versus Open Water in Louisiana</b> Walter R. Keithly, Jr. and Baifu Xu, LSU CNREP; John Barras, USGS; and Richard F. Kazmierczak, Jr., LSU CNREP</p>
<p><b>12:00 pm to 1:30 pm</b> Bienville</p>	<p><b>Lunch    It's a Whole New Ballgame</b> Mark Davis, Institute on Water Resources Law and Policy, Tulane Law School</p>
<p><b>1:30 pm to 3:00 pm</b> South Ballroom</p> <p>Moderator: John Pine</p> <p>A/V: Pawan Poudel</p>	<p><b>Track 1B</b> <b>Planning for Restoration and Sustainability - II</b> This session is the second of a five-track series at CNREP 2007 that will focus on the current status and challenges of integrating the social sciences into coastal restoration and protection programs. This session examines the issue of long-term community sustainability in the face of mounting natural hazards.</p> <p><b>Critical Social Infrastructure for Building Sustainable, Hazard-Resilient Communities</b> Bruce C. Glavovic, Massey University</p> <p><b>Assessing Economic Vulnerability to Climate Change: A Conceptual Framework for Developing Countries</b> Robert B. Richardson, Michigan State University</p> <p><b>Impacts of Sea-Level Rise and Climate Change on the Coastal Zone of Southeastern New Brunswick</b> Lisa DeBaie and Kelly Murphy, Environment Canada Gilles Martin, Omer Chouinard, Université de Moncton</p> <p><b>Coastal Community Resiliency to Hazards</b> John C. Pine, Louisiana State University</p>



## Monday, May 21, 2007 (continued)

<p><b>1:30 pm to 3:00 pm</b> North Ballroom</p> <p>Moderator: John Ward</p> <p>A/V: Ryan Bourriaque</p>	<p><b>Track 2B</b> <b>Impact of Hurricanes on Coastal Fisheries</b> This session will provide state-based economic assessments of damages to coastal fisheries infrastructure resulting from Hurricanes Katrina and Rita in 2005. Additional emphasis will be placed on alternative management strategies for fisheries of the northern Gulf.</p> <p><b>Economic Damages of Hurricane Katrina to Commercial and Recreational Fishing Industries in Alabama</b> See-Moon Chang, University of South Alabama (invited)</p> <p><b>Economic Damages of Hurricane Katrina to Commercial and Recreational Fishing Industries in Mississippi</b> Benedict C. Posadas and Ruth A. Posadas, Mississippi State University William S. Perret, Mississippi Department of Marine Resources</p> <p><b>Economic Damages of Hurricane Katrina and Rita to Commercial and Recreational Fishing Industries in Louisiana</b> Donald Ator and Doug MacNair, ARCADIS U.S., Inc.</p> <p><b>Fisheries in Transition: Reconciling Economic Recovery and Ecosystem Restoration</b> Rex H. Caffey, Richard F. Kazmierczak, Jr., Hamady Diop, and Walter R. Keithly, Jr., Center for Natural Resource Economics &amp; Policy, Louisiana State University</p>
<p><b>1:30 pm to 3:00 pm</b> Evangeline C</p> <p>Moderator: John Westra</p> <p>A/V: Tyler Mark</p>	<p><b>Track 3B</b> <b>SERA 30: Economics of Natural Resource Management</b> This session is the second in a three-track series at CNREP 2007 featuring resource economists from the SERA 30 Southern Natural Resource Economics Committee. This session will focus on natural resources, with a particular emphasis on demand, allocation, and management of surface and ground water.</p> <p><b>Role of Forecasting Water Demand and Crop Value in Agriculture</b> Swagata "Ban" Banerjee and Steven W. Martin, Mississippi State University</p> <p><b>Influence of Risk Aversion on Optimal Irrigation Management Strategies</b> Shanshan Lin, Jeffrey D. Mullen, and Gerrit Hoogenboom, University of Georgia</p> <p><b>Financial Markets for Environmental Assurance Bonds: Could They Work?</b> Nick Stratis, Florida Department of Environmental Protection Michael H. Thomas, Florida A&amp;M University</p> <p><b>Optimal Allocation of Shared Ground Water: A Case of Sparta Aquifer in Louisiana</b> Krishna Paudel and Michael Dunn, LSU CNREP</p>
<p><b>3:00 pm to 3:15 pm</b> Foyer</p>	<p><b>Coffee Break</b></p>

## Monday, May 21, 2007 (continued)

<p><b>3:15 pm to 5:00 pm</b> South Ballroom</p> <p>Moderator: Todd Davison</p> <p>A/V: Pawan Poudel</p>	<p><b>Track 1C</b> <b>Planning for Restoration and Sustainability - III</b></p> <p>This session is the third of a five-track series at CNREP 2007 that will focus on the current status and challenges of integrating the social sciences into coastal restoration and protection programs. This session will feature a series of case studies focusing on the importance and methods of considering community survival, resilience, and/or relocation.</p> <p><b>Relocation from the Community Perspective</b> Shirley Laska and Kristine Peterson, University of New Orleans</p> <p><b>Coastal Communities and the CPRA Planning Process</b> Michele Deshotels, Louisiana Department of Natural Resources</p> <p><b>Learning from the Past: Avoiding Restoration Catastrophes</b> Bob Gramling, University of Louisiana at Lafayette</p> <p><b>Zoning, Insurance, and Land-use Planning Considerations Post-Katrina</b> Rod Emmer, Louisiana Sea Grant College Program</p>
<p><b>3:15 pm to 5:00 pm</b> North Ballroom</p> <p>Moderator: Matt Fannin</p> <p>A/V: Ryan Bourriaque</p>	<p><b>Track 2C:</b> <b>Development and the Coast</b></p> <p>This session focuses on the economic implications of coastal zone development. Particular emphasis is placed on how property markets respond to industrial and residential development, the presence of natural amenities, and the risks associated with natural hazards.</p> <p><b>Impacts of Development on the Gulf Intracoastal Waterway: A Case Study in Alabama</b> Dean Goodin, Eric Dohner, and Kristin Sutherlin, Tetra Tech, Inc.</p> <p><b>Deepwater Energy Impacts on Economic Growth and Public Service Provision in a Louisiana Parish</b> J. Matthew Fannin and Walter R. Keithly, Jr., LSU CNREP David W. Hughes, Clemson University Williams O. Olatubi, American Express Jiemin Guo, Bureau of Economic Analysis, Washington DC</p> <p><b>Viewscapes and Flood Hazard: Coastal Housing Market Response to Amenities and Risk</b> Okmyung Bin, Thomas W. Crawford, Jaime B. Kruse, and Craig E. Landry, East Carolina University</p> <p><b>Amenity Valuation in Simultaneous Hedonic Property Markets</b> Craig E. Landry and Okmyung Bin, East Carolina University</p>

## Monday, May 21, 2007 (continued)

<p><b>3:15 pm to 5:00 pm</b> Evangeline C</p> <p>Moderator: John Westra</p> <p>A/V: Tyler Mark</p>	<p><b>Track 3C</b> <b>SERA 30: Environmental Impacts of Human Activities</b> This is the last session of a three-track series at CNREP 2007 featuring resource economists from the SERA 30 Southern Natural Resource Economics Committee. This session will focus of the environmental impacts of human activities on agricultural and urban landscapes.</p> <p><b>Economic Impact of Tropical Soda Apple on Cattle Production in Florida</b> Tajudeen Tayo Salaudeen and Michael H. Thomas, Florida A&amp;M University David Harding, Florida Fish and Wildlife Conservation Commission</p> <p><b>Growing the U.S. Livestock Economy: The Environmental (Phosphorus Assimilation) Challenge</b> Tyler Mark, Louisiana State University; Allan Gray, Brad Joern, and Michael Boehlje, Purdue University</p> <p><b>A Spatial Model of Formosan Subterranean Termite Spread and Infestation in Louisiana</b> Junpyo Hong, Krishna Paudel, and Michael Dunn, LSU CNREP</p> <p><b>Agricultural Policy, Land Management, and Water Quality in the Mississippi River Basin: An Economic Temporal and Spatial Analysis</b>, Whitney Broussard, LSU School of Coast and Environment, and John V. Westra, LSU CNREP</p> <p><b>A GIS-based Economic Model for Optimal Use of Broiler Litter as Crop Nutrients in Louisiana</b> Krishna Paudel, LSU CNREP and Keshav Bhattarai, University of Central Missouri</p>
<p><b>5:00 pm to 6:30 pm</b> Evangeline A &amp; B</p>	<p><b>Poster Viewing</b> Enjoy a complimentary beverage while viewing the CNREP 2007 posters during the manned poster session.</p>
<p><b>6:30 pm to 8:30 pm</b> Begue's Restaurant</p>	<p><b>CNREP 2007 Dinner-Social</b> Begue's Restaurant in the Royal Sonesta Hotel has been reserved for the CNREP 2007 Dinner Social to be held on Monday night, May 21<sup>st</sup> from 6:30 to 8:30 pm. The banquet will feature an expansive buffet modeled after Begue's famous Sunday brunch, a local favorite amongst New Orleans natives. Tickets for the banquet are \$25 per person and are payable upon registering for the conference. We encourage you to purchase your tickets early, as seating capacity is limited. The menu for the Dinner-Social can be found at the following link: <a href="http://www.cnrep.lsu.edu/2007/Dinner.htm">www.cnrep.lsu.edu/2007/Dinner.htm</a></p> <p><b>Sponsored by:</b>  <b>Arcadis</b> <a href="http://www.arcadis-us.com">www.arcadis-us.com</a>  <b>C.H. Fenstermaker</b> <a href="http://www.fenstermaker.com">www.fenstermaker.com</a>  <b>HNTB</b> <a href="http://www.hntb.com">www.hntb.com</a>  <b>Tetra Tech</b> <a href="http://www.tetrattech.com">www.tetrattech.com</a></p>

## Tuesday, May 22, 2007

7:00 am to 3:00 pm Arcade	<b>Registration Desk Open</b>
7:00 am to 3:00 pm Esplanade	<b>Speaker Resource Room Open</b>
7:00 am to 8:30 am Foyer	<b>Continental Breakfast</b>
<p>8:30 am to 9:45am South Ballroom</p> <p>Moderator: Jim Wilkins</p> <p>A/V: Larry Hall</p>	<p><b>Track 1A</b>  <b>Planning for Restoration and Sustainability - IV</b>  This session will be the fourth in a five-track series at CNREP 2007 that will focus on the current status and challenges of integrating the social sciences into coastal restoration and protection programs. This session will focus on a property-rights perspective, with particular emphasis on sustainable use and acquisition of coastal land.</p> <p><b>Exploring Parish Coastal Zone Management Capacity Within the Context of Local Coastal Programs</b>, Carla Norris-Raynbird, Bemidji State University</p> <p><b>Elements of Landrights Acquisitions</b>, Helen Hoffpauir, Louisiana Department of Natural Resources</p> <p><b>A Survey of Collaborative Practices by Natural Resource Managers on Military Lands</b>, Scott Thomas, Stetson Engineers, Inc.</p> <p><b>Delivering Sustainable Development on the United Kingdom Coast</b> Adam Hosking, Halcrow Inc.</p>
<p>8:30 am to 9:45am North Ballroom</p> <p>Moderator: Mike Dunn</p> <p>A/V: James Henderson</p>	<p><b>Track 2A:</b>  <b>Evaluating the Benefits and Costs – I</b>  This session will be the first of two tracks to focus on the benefits and costs of wetland restoration. Specific emphasis will be placed on the need for standardization of restoration benefits within and between programs and the need to account for market and non-market benefits and costs within specific time frames.</p> <p><b>Trade-Off Analysis for Valuing Socio-economic and Ecosystem Impacts</b> Doug MacNair and Poh Boon Ung, Triangle Economic Research, ARCADIS Inc.</p> <p><b>Biological and Economic Perspectives of Coastal Wetland Forest Loss in Louisiana</b>, Michael A. Dunn, LSU CNREP and Jim L. Chambers, School of Renewable Natural Resources, Louisiana State University</p> <p><b>Accounting for Ecosystem Goods and Services in Coastal Estuaries</b> Matthew A. Wilson, University of Vermont and Poh Boon Ung, Triangle Economic Research, ARCADIS Inc.</p> <p><b>Subsistence Use and Value: The Use and Exchange of Wetland Resources Among Households in Coastal Communities</b>, Robert Gramling, JoAnne Darlington, George Wooddell, and Ray Brassieur, University of La at Lafayette</p>
8:30 am to 9:45am Evangeline C	<b>Track 3A: SERA 30 Business Meeting</b>

## Tuesday, May 22, 2007 (continued)

<p><b>9:45 am to 10:00 am</b> Foyer</p>	<p><b>Coffee Break</b></p>
<p><b>10:00 am to 11:45am</b> South Ballroom</p> <p>Moderator: Craig A. Miller</p> <p>A/V: Larry Hall</p>	<p><b>Track 1B</b> <b>Public Participation in Restoration</b></p> <p>This session examines the role of the restoration planning and implementation. Specific examples and case studies will be used to illustrate how public awareness, support, and participation are solicited or ignored in the policy process.</p> <p><b>Public Willingness to Finance Wetland Preservation and Conservation</b> Frank Lupi, Michael D. Kaplowitz, Oscar Arreola, and John P. Hoehn, Michigan State University</p> <p><b>Public Awareness and Support for Coastal Restoration</b> Craig A. Miller, University of Georgia</p> <p><b>The Role of Socioeconomic Analysis at Thunder Bay National Marine Sanctuary and as a Part of Michigan Sea Grant's Northeast Michigan Integrated Assessment</b> Jordan Parrillo and Rod Ehler, National Marine Sanctuary Program, NOAA</p> <p><b>The Deschutes Estuary: A Case Study of Stakeholder Participation in Socioeconomic Analysis of Coastal Restoration</b> Zac Hart, I.M. Systems Group Inc., NOAA Coastal Services Center Thomas Safford, Department of Sociology, University of New Hampshire</p>
<p><b>10:00 am to 11:45am</b> North Ballroom</p> <p>Moderator: Lisa Schiavinato</p> <p>A/V: James Henderson</p>	<p><b>Track 2B:</b> <b>Evaluating the Benefits and Costs – II</b></p> <p>This session will be the second of two tracks to focus on the benefits and costs of wetland restoration. Specific emphasis will be placed on the need for standardization of restoration benefits within and between programs and the need to account for market and non-market benefits and costs within specific time frames.</p> <p><b>What Benefits Are We Really After? Examining Cost Efficacy and Project Selection in CWPPRA</b>, Rex H. Caffey and Christiane Aust, LSU CNREP</p> <p><b>Beyond Subjective Wetland Evaluations: Assessing the Cost-Effectiveness of Wetland Projects Using Energy Analysis</b> Eldon C. Blancher, II, and Amy E. Hunter, Toxicological &amp; Environmental Associates</p> <p><b>Economic Assessment of Rapid Land-Building Technologies for Coastal Restoration</b>, Daniel R. Petrolia, Mississippi State University and Rex H. Caffey, LSU CNREP</p> <p><b>Non-market Evaluation of Louisiana Coastal Restoration: A Contingent Valuation Survey of the Maurepas Swamp</b>, Jay Johnson, Loyola University New Orleans and David Bowes, Southeastern Louisiana University</p>

## Tuesday, May 22, 2007 (continued)

<p><b>12:00 pm to 1:30 pm</b> Bienville</p>	<p><b>Lunch</b> (Sponsored by The Shaw Group)</p>
<p><b>1:30 pm to 3:00 pm</b> South Ballroom</p> <p>Moderator: Rex H. Caffey</p> <p>A/V: Ryan Bourriaque</p>	<p><b>Track 1C</b> <b>Planning for Restoration and Sustainability - V</b></p> <p>This session will be the culmination of a five-track series at CNREP 2007 that will focus on the current status and challenges of integrating the social sciences into coastal restoration and protection programs. This session will feature a panel discussion of the socioeconomic implications of coastal restoration at the ecosystem scale in Louisiana, with particular emphasis on the State Master Plan of the Coastal Protection Restoration Authority, the Coastal Impact Assistance Program Draft Plan, and the integration of these efforts with ongoing restoration programs (Sponsored by The Shaw Group).</p> <p><b>Panelists</b>            Dave Loomis, University of Massachusetts Amherst            Craig Landry, East Carolina University            Shirley Laska, University of New Orleans            John Whitehead, Appalachian State University            Richard Kazmierczak, LSU Center for Natural Resource Economics &amp; Policy</p> <p><b>Evolution of Project Selection: From CWPPRA to CIAP</b>            Gregory M. Grandy, La Department of Natural Resources </p> <p><b>Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast</b>            Larry Ardoin, Andrew Beall, Michele Deshotels, Norwyn Johnson, Jean Cowan, Jonathan Porthouse, and Juanita Russell, CPRA Integrated Planning Team, Louisiana Dept. of Natural Resources</p>
<p><b>1:30 pm to 3:00 pm</b> North Ballroom</p> <p>Moderator: Walter Keithly</p> <p>A/V: Cheikhna Dedah</p>	<p><b>Track 2C:</b> <b>Research on the Oyster Industry</b></p> <p>This session will feature economic research focusing on the oyster industry in the Northern Gulf of Mexico. Specific emphasis will be placed on the history of oyster lease tenure, lease revenue sources, and oyster market dynamics. (Moderator – TBA)</p> <p><b>History of Coastal Restoration and Oyster Leasing</b>            Jim Wilkins, Louisiana Sea Grant Legal Program and Walter R. Keithly, Jr. LSU CNREP</p> <p><b>Oyster Demand Adjustments to Alternative Consumer Education Processes in Response to <i>Vibrio vulnificus</i></b>            Ash Morgan, Bill Huth, and Greg Martin, University of West Florida</p> <p><b>Economic Analysis of Oyster Lease Dynamics in Louisiana</b>            Walter R. Keithly, Jr. and Richard F. Kazmierczak, Jr., LSU CNREP</p> <p><b>Demand Analysis for Oysters</b>            Cheikhna Dedah and Walter R Keithly, Jr., LSU CNREP</p>
<p><b>3:00 pm to 3:15 pm</b> Foyer</p>	<p><b>Coffee Break</b></p>

<p><b>3:00 pm to 5:00 pm</b> Evangeline A &amp; B</p>	<p><b>Poster/Display Removal</b></p>
<p><b>Tuesday, May 22, 2007 (continued)</b></p>	
<p><b>3:15 pm to 5:00 pm</b> South Ballroom</p> <p>Moderator: Steve Henning</p> <p>A/V: Heidi Landry</p>	<p><b>Track 1D:</b> <b>Evaluating Restoration Technology</b> This session will focus on the evaluation of innovative technologies for resource restoration with a particular emphasis on constructed wetlands as an economical alternative for treatment of tertiary water.</p> <p><b>A Regional Initiative of the Sewerage and Water Board of New Orleans and St. Bernard Parish Government to Use Municipal Wastewater Effluent for Wetland Restoration and Storm Protection</b> Sarah K. Mack and G.C. Austin, Sewerage and Water Board of New Orleans; A.J. Englande, Jr., and R.S. Reimers, Tulane School of Public Health and Tropical Medicine; J. Day, Louisiana State University</p> <p><b>The Economics of a Large-Scale Estuarine Restoration Project</b> John H. Balletto, ARCADIS U.S., Inc., and Kenneth A. Strait, PSEG Services Corporation</p> <p><b>Wetland Assimilation of Treated Municipal Effluent: Improved Water Quality and Wetland Restoration in Louisiana</b> Robert R. Lane, John W. Day, Joel Lindsey, and Jason N. Day, Comite Resources, Inc. and Louisiana State University</p>
<p><b>3:15 pm to 5:00 pm</b> North Ballroom</p> <p>Moderator: Krishna Paudel</p> <p>A/V: Nirmala Devkota</p>	<p><b>Track 2D:</b> <b>International Case Studies</b> This session will include a series of papers focusing on coastal resource management in an international setting.</p> <p><b>Economic Valuation of Mangrove Forest and Coastal Line in the Northern Persian Gulf</b> Abdoulkarim Esmaeili and Maryam Moshavash, College of Agriculture, Shiraz University</p> <p><b>The Effectiveness of Policy and Economic Instruments in Restoring Coastal Areas, Lake Shores, and River Banks in the East African Lake Victoria Basin: The Role of Public Awareness Campaigns</b> Wilson Okaka, Department of Development Studies, Kyambogo University</p> <p><b>Identification of the Conditions for the Appropriation by the Population of An Integrated Management of Ecosystems: The Case of the Toliara's Large Reef</b> Lala Ranaivomanana, ENSAR/IHSM, Ando RABEARISOA, Researcher, Economiste, CÉDM, University of Antananarivo</p> <p><b>Oil Spillage and Farm Productivity in the Coastal Communities of Nigeria: A Nexus Analysis</b> Akanni K. Adekunle, Olabisi Onabanjo University</p>

**Tuesday, May 22, 2007 (continued)**

**6:00 pm to 10:00 pm**  
Bourbon Balcony Suite

**CNREP 2007 Closing Session**

**Wednesday, May 23, 2007**

**8:00 am to 10:00 am**  
Esplanade

**CNREP Business Meeting**

**10:00 am**

**Adjourn**



## Posters

### **Developing Relationships With the Private Landowner in the Coastal Restoration Process**

Helen Hoffpauir, Louisiana Department of Natural Resources

**An Energy Cost Estimation of Sugar-Ethanol: A Comparative Analysis with Corn Ethanol Production in the United States**, Sachin Chintawar and John Westra, Center for Natural Resource Economics & Policy, Louisiana State University

### **A Community Characterization of the Mission-Aransas National Estuarine Research Reserve Watershed**

Sally Morehead, Tami G. Beyer, and Ken Dunton

Mission-Aransas National Estuarine Research Reserve, University of Texas Marine Science Institute

### **Assessing Angler's Boating Behaviors in, and Perceptions of, Shallow Water Seagrass Habitat.**

Jeremy Leitz and Faye Grubbs, Texas Parks and Wildlife Department

### **Developing a Foundation for Analysis of Natural and Human-Induced Disturbances to Coastal Economics**

Terrill R. Hanson, Garen Evans, Al Myles, Dan Petrolia, Keith Coble, Benedict Posadas, and Sharon Hodge  
Mississippi State University; Steve Sempier, University of Southern Mississippi

### **Estimating the Cost of Securing Landrights for Louisiana's Coastal Restoration Projects**

Richard F. Kazmierczak, Jr. and Walter R. Keithly, Jr., Center for Natural Resource Economics & Policy, Louisiana State University

### **Liability, Institutions, and Determinants of Landowner Access Policies for Fee-Based Recreation on Private Lands**

James E. Henderson and Michael A. Dunn, Center for Natural Resource Economics & Policy, Louisiana State University

### **Profiling the Gulf of Mexico Grouper Fisheries,**

Hamady Diop, Walter Keithly Jr., and Richard R. Kazmierczak, Jr. Center for Natural Resource Economics & Policy, Louisiana State University

### **Raising Cane: The Use of BMPs to Manage Agricultural Nonpoint Source Water Pollution in South Louisiana**

Heidi Landry and Steven A. Henning, Center for Natural Resource Economics & Policy, Louisiana State University

### **Sediment as a Solution**

Beverly Ethridge and Brad Miller, EPA Region 6 and La Dept. Natural Resources

### **Tired of Searching Endlessly for Coastal Wetlands Resources? The U.S. Geological Survey's National Biological Information Infrastructure Can Help**

Judith Haydel and Cassie Thibodeaux, IAP World Services, Inc., USGS National Wetlands Research Center

### **Value of Sediment Resources, Transport Technology, Location of Sources in Addressing Louisiana Wetland Losses**

Beverly Ethridge and Brad Miller, EPA Region 6 and Louisiana Dept. Natural Resources

### **Estimating Fisheries Infrastructure Damages with Hurricane Surge Data**

Richard F. Kazmierczak, Jr., Jane Niu, Rex H. Caffey, Hamady Diop, and Walter R. Keithly, Jr., Center for Natural Resource Economics & Policy, Louisiana State University

# ABSTRACTS

(listed alphabetically by lead author)

**Ardoin, Larry**  
**Beall, Andrew**  
**Deshotels, Michele**  
**Johnson, Norwyn**  
**Cowan, Jean**  
**Porthouse, Jonathan**  
**Russell, Juanita**  
CPRA Integrated Planning  
Team, Louisiana Dept. of  
Natural Resources

## **INTEGRATED ECOSYSTEM RESTORATION AND HURRICANE PROTECTION: LOUISIANA'S COMPREHENSIVE MASTER PLAN FOR A SUSTAINABLE COAST**

Coastal Louisiana is a complex ecosystem composed of bottomland hardwood forests, swamps, marshes, cheniers (forested coastal ridges), prairies, bayous, bays, and barrier islands. European settlement in eastern Louisiana focused primarily on the series of ridges along former distributaries of the Mississippi River. The prairie and cheniers were the focus of settlement in the west. Coastal Louisiana contains 30 percent of coastal marsh in the contiguous United States, yet it suffers 90 percent of coastal marsh loss. In addition to this trend, the U.S. Geological Survey (USGS) reported that Hurricanes Katrina and Rita in 2005 converted approximately 138,880 acres of marsh to water (Barras 2006). The storms of 2005 called out another extreme vulnerability to the long-term viability of coastal Louisiana – that of the inadequacy of hurricane protection measures in this fragile region. The storms caused severe damage to over 200,000 homes, and one year after the storm approximately 440,000 Louisiana citizens were still displaced from their homes. The Congressional Budget Office estimated physical capital losses between \$70 and \$130 billion. Approximately 45% of these losses involved business structures or equipment, including resources owned by national concerns. Louisiana and the Nation are now challenged with protecting our communities and nationally significant infrastructure while also providing for the long-term sustainability of the ecosystem. Louisiana's Integrated Ecosystem Restoration and Hurricane Protection Master Plan is comprised of recommended hurricane protection and ecosystem restoration measures, as well as policy, legislative, and institutional issues intended to sustain both human and natural coastal communities. The Master Plan was compiled by an Integrated Planning Team comprised of senior staff from the Louisiana Department of Transportation and Development and Louisiana Department of Natural Resources. The team, working in consultation with stakeholders, the public, and external scientific and technical experts identified four objectives of the plan: 1) Reduce risk to economic assets; 2) Restore sustainability to the coastal ecosystem; 3) Maintain a diverse array of habitats for fish and wildlife; and 4) Sustain Louisiana's unique heritage and culture. Taken together, the Master Plan presents a conceptual vision of a sustainable coast based on the best available science and engineering. It is intended to be implemented using an adaptive management framework that allows for modification as needed based on evolving community and natural conditions, and advances in science and engineering to maintain the plan's relevance into the future. Each of these objectives implies the need to understand not only the ecological, but also the societal and economic implications of this plan on local, regional, and national scales.

**Ator, Donald W.**  
**MacNair, Doug**  
ARCADIS U.S., Inc.

## **ECONOMIC IMPACT FROM THE DECIMATION OF THE RECREATIONAL AND COMMERCIAL FISHERIES INDUSTRIES BY HURRICANES KATRINA AND RITA**

Physical impacts from hurricanes Katrina and Rita decimated the recreational and commercial fisheries industries. Recovery will take many years. The magnitude of the impacts extends beyond the direct impacts to these industries to the economic areas that support them. The impacts are difficult to measure, but it is important to gain as much quantitative insight as possible. The field of economics has done a good job of developing models to estimate the positive impacts of additional stimulus to an economy, such as additional capital investment provided by a new employer or the expansion of existing employer. However, models have not been adequately used to assess the negative economic impact from a reduction, or in this case, the near elimination of an entire industry. Other than the anecdotal reversal of the positive impacts from the expansion of an existing industry or the addition of a new industry there has been little work along these lines. This paper documents the results of efforts to identify the economic impacts resulting from the decimation of the recreational and commercial fisheries by hurricanes Katrina and Rita. We will review the available economic tools and data and attempt to provide preliminary estimates of the economic impacts of the losses suffered by these industries and the amount of time it may take them to recover. We will discuss the strengths and weaknesses of the various tools for measuring large-scale changes to industries within the economy and suggest future research strategies to help improve these tools.

**Bahr, Len**  
Program for Applied Science  
in the Coastal Area,  
Louisiana Governor's Office  
of Coastal Activities

## **ENHANCING THE ROLE OF SCIENCE IN POST-KATRINA COMPREHENSIVE FLOOD DAMAGE REDUCTION AND COASTAL RESTORATION**

The deltaic complex of the lower Mississippi River became catastrophically dysfunctional during the past century, largely the inadvertent result of faulty river management policy. Since 1990 restoring the estuarine function of this Louisiana Coastal Area (LCA) ecosystem has become a federal/state objective. Hurricanes Katrina and Rita triggered a dramatic expansion of the restoration goals (and costs) to include flood risk reduction from storm surge. Application of state-of-the-art science and engineering is widely agreed to be crucial to the success of perhaps the most ambitious coastal rehabilitation program ever mounted - but how to recruit, incorporate, manage and fund world-class restoration science and engineering remains unresolved. After fifteen years under a somewhat "ad hoc" system of restoration science (managed largely by non-scientists) critical technical issues/uncertainties remain: 1) The current restoration "footprint" is only a subset of the entire estuarine ecosystem and doesn't include the Atchafalaya Basin or the Old River Control Structure; 2) Inadequate knowledge of Mississippi River sediment conveyance; 3) Uncertainty over subsidence rates and causes; 4) Inadequate high resolution geometry; 5) Concerns over effects on nutrient dynamics from changes in river hydrology; 6) Thorny

socioeconomic, political and legal issues re public acceptance of dramatic landscape changes; 7) Uncertainty re climate change effects on sea level rise, river flow volume; etc. The presenter will discuss these problems and propose measures by which objective, independent science can be incorporated to resolve science/engineering questions, prioritize implementation strategies, reduce political resistance and achieve credibility and national support. Presenter qualifications: Len Bahr is a coastal ecologist with extensive experience in the Chesapeake Bay, coastal Georgia and coastal Louisiana. He performed research and taught estuarine ecology and other courses at Louisiana State University between 1973 and 1984. Since 1991 he has worked in the area of science/public policy in the Louisiana Governor's Office of Coastal Activities. He has been intimately involved in Louisiana's evolving coastal restoration program, as an advisor to four governors.

**Balletto, John H.**  
ARCADIS U.S., Inc.  
**Strait, Kenneth A.**  
PSEG Services Corporation

#### **THE ECONOMICS OF A LARGE-SCALE ESTUARINE RESTORATION PROJECT**

As a response to a regulatory requirement, Public Service Enterprise Group (PSEG) proposed an innovative alternative to a technological fix. Based upon the available scientific literature, PSEG and the New Jersey Department of Environmental Protection agreed on a large-scale restoration program that would benefit the Delaware River estuary (Estuary Enhancement Program, EEP). The EEP consists of the restoration, enhancement and/or preservation of more than 8700 hectares of degraded salt marsh and adjacent uplands, installation of 12 fish ladders, financial support for state artificial reef programs and an extensive biological monitoring program for assessing fish abundance in the estuary and program success. This presentation will focus on the restoration of the formerly diked salt hay farms (1779 hectares of wetland restoration). The principles of Ecological Engineering were employed in the restoration of these sites (proper elevations and restored hydroperiod resulted in natural revegetation) and adaptive management was used to assure that the success criteria were met. The primary focus of the program was fish production from the restored marshes and fish ladder installations. In addition, other benefits were derived from the increased wildlife habitat, commercial and recreational fishing opportunities, preserved greenway along the coast of Delaware Bay and River, public access and environmental education. Increased public access resulted from the dikes being breached, installation of boardwalks and bird observation platforms and small boat launches and simply removing the properties from private ownership and providing a conservation deed restriction naming New Jersey as the grantee. The economics of the estimated fish production which greatly exceed the cost of either the technology or the cost of the restoration will be discussed. The economics of increased public access will also be discussed.

**Bin, Okmyung**  
**Crawford, Thomas W.**  
**Landry, Craig E.**  
Department of Economics,  
East Carolina University

#### **VIEWSCAPES AND FLOOD HAZARD: COASTAL HOUSING MARKET RESPONSE TO AMENITIES AND RISK**

Coastal amenities and risk are so highly correlated that separate identification within the hedonic framework is potentially challenging. In this study, we construct a three-dimensional measure of ocean view, viewscope, accounting for natural topography and built obstructions, that varies independent of risk to disentangle these spatially integrated housing characteristics. A spatial autoregressive hedonic model is developed to provide consistent estimates of the willingness to pay for coastal amenities and risk. Our findings suggest that incorporating the GIS-based view measures can be successful in isolating risk factors from spatial amenities.

**Blancher, Eldon C. II**  
**Hunter, Amy E.**  
Toxicological &  
Environmental Associates

#### **BEYOND SUBJECTIVE WETLAND EVALUATIONS: ASSESSING THE COST-EFFECTIVENESS OF WETLAND PROJECTS USING EMERGY ANALYSIS.**

Wetland value is appropriately assessed by estimating the cost of replacing the actual wetland landscape (structure) and by estimating the value of ecosystem services (function) provided annually by wetland habitat. Thus, evaluating the cost-effectiveness of wetlands restoration must take both factors (structure and function) into account, but often one or both are ignored. For example, The Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) as it is currently administered, evaluates cost-effectiveness of restoration projects by comparing net acreage evaluations derived from Wetlands Valuation Assessments (WVA), a nominal measure of net wetlands services, and comparing different net services to estimated project construction costs using a subjective and relatively static criteria. A different approach is used for swamps because data are not available for swamp losses. This method may be useful for deciding which project is selected for implementation; however, this approach uses inconsistent methods and does not evaluate the true value of structures and services for individual projects. It is inadequate for defining true cost effectiveness of a project. This lack of demonstration of cost-benefit from monies expended ultimately impacts legislative support for restoration and conservation. For example current methods lump fresh- and saltwater marshes together in value, ignoring the differential values between salt- intermediate and freshwater marshes, thus making it difficult to compare projects focused on different marsh types and those replacing swamps or other coastal landscapes. A common currency is necessary to accurately compare the cost-benefit of different projects. Emergy is the embodied energy required to develop a landscape over time and the embodied energy value of the annual services provided by that landscape structure. Emergy analysis values the structure and function of a system providing a consistent method for valuing and comparing different habitat types and subsequent restoration cost and feasibility. Furthermore, other landscapes and habitats that cannot currently be evaluated using CWPPRA methods, such as oyster reefs and barrier islands, can be evaluated using Emergy. For example, Bardi and Brown (2000) estimated the value of natural capital (structure) for herbaceous and forested wetlands in central Florida to be em\$6,170,664/ha and em\$11,472,451/ha, respectively (1998 basis). The rate of environmental services (function) provided by these systems was estimated

to be em\$4,372/ha/yr for herbaceous wetlands and em\$7,355/ha/yr for forested wetlands. Based on these estimates, project evaluation using the CWPPRA approach may be undervaluing these systems by a large margin. In this work we describe the methodology for developing Emergy evaluations across a spectrum of Louisiana landscapes considered under CWPPRA and other Louisiana restoration programs. Further, we present examples of cost-benefit analyses from CWPPRA using current methods and compare those results to estimates made using Emergy analysis.

**Broussard, Whitney**

Department of  
Oceanography and Coastal  
Sciences, Louisiana State  
University

**Westra, John** Department  
of Agricultural Economics  
and Agribusiness, Center for  
Natural Resource Economics  
and Policy (CNREP),  
Louisiana State University

**AGRICULTURAL POLICY, LAND MANAGEMENT, AND WATER QUALITY IN THE MISSISSIPPI RIVER BASIN: AN ECONOMIC TEMPORAL AND SPATIAL ANALYSIS**

Several quantitative analyses of the historical variability in water quality and land use among sub-basins within and outside of the Mississippi River Basin are presented that indicate that land use is directly related to nitrogen yields and influenced by national policies such as government farm programs. A century-long quantitative comparison of water quality and land use records in the beginning and end of the 1900s was developed using monthly water quality monitoring data from the US Geological Survey and county level census data from the US Census Bureau and Department of Agriculture. Using spatially explicit data mapping techniques, county-level agricultural statistics are graphically presented in national maps to demonstrate the national consolidation of major commodity cropland in the corn and grain belts, both of which lie entirely in the Mississippi River Basin. Explanatory relationships are then established to describe sub-basin N-NO<sub>3</sub> loadings in terms of the changing landscape. Indicators of this changing landscape include increasing government support for specific commodities, an increase in the acreage of these same commodity crops, and an increase in the average farm size coupled with a general trend towards fewer farmers per acre of farmland. Analyses show how the relationships have changed with land use intensification at the sub-basin scale and indicate that a decline in landscape diversity is associated with historical trends towards more intensive land use and subsequent water quality problems. The impact of these changes on water quality and the role of diverse landscape features are discussed in light of the potential policy supported increase in corn production in a biofuel driven market. What are the potential ramifications for the Mississippi River Basin and Gulf of Mexico hypoxia?

**Caffey, Rex H.**

**Kazmierczak, Richard F. Jr.,**

**Diop, Hamady**

**Keithly, Walter R. Jr.**

Center for Natural Resource  
Economics & Policy,  
Louisiana State University

**FISHERIES IN TRANSITION: RECONCILING ECONOMIC RECOVERY AND ECOSYSTEM RESTORATION**

Hurricanes Katrina and Rita severely damaged the infrastructure and livelihoods of commercial and recreational fishers along the northern Gulf of Mexico, with the majority of this damage occurring within the Louisiana coastal zone. Rapid assessments of the economic damage were widely published in the popular media and used as the basis for proposed economic and ecosystem recovery efforts even though many of the initial estimates were inconsistent with established economic procedures for damage assessment following natural disasters. As part of an ongoing effort to assist coastal states in the acquisition and distribution of federal aid during the recovery process, this study provides a more detailed examination of fisheries infrastructure damage using new estimates that were generated from both established and novel procedures for quantifying damage from natural disasters. Because of the large geographic scale of the impacts in Louisiana, a regional approach was developed in order to characterize damages within the physical sub-basins and political parish boundaries of coastal Louisiana. As might be expected given the storm tracts, the bulk of the physical impact from the hurricanes was concentrated in the southeast and southwest parts of the state. Consequently, these two regions had the highest levels of economic damage, with total fisheries damages at \$225,677,097 and \$134,074,511, respectively. At \$582 million, the final overall damage estimate for Louisiana is almost twice the reported damages incurred to fisheries infrastructure in coastal Mississippi (\$293 million) and more than four times the level of damages in Alabama (\$112 million).

**Caffey, Rex H.**

**Aust, Christiane**

**Diop, Hamady**

Center for Natural Resource  
Economics & Policy, LSU

**WHAT BENEFITS ARE WE REALLY AFTER?**

**EXAMINING COST EFFICACY AND PROJECT SELECTION IN CWPPRA**

The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) has been the largest single source of restoration funding in Louisiana for the past two decades, providing more than half a billion for projects since 1991. However, recent evaluations of CWPPRA indicate that the annual level of program spending constitutes less than 10% of the funding required to sustain coastal Louisiana as it exists today. This constraint, combined with obvious need to maximize restoration benefits, provides the rationale for an examination of program cost-efficacy. A descriptive analysis of all authorized, active CWPPRA projects (n=128) was conducted to examine the costs and benefits associated with various attributes (e.g., location, technology, and sponsor). Results of the analysis indicate that barrier island and shoreline protection have become preferred restoration approaches under the CWPPRA program in recent years. Despite their popularity, such projects yield the lowest average ratio of benefits to costs according to the Wetland Valuation Assessment (WVA) method, the primary protocol used within CWPPRA for project comparison. A second stage of the research employed a binary logit analysis to determine the degree in which the economic and physical attributes of candidate projects (n=299) affected project selection in the CWPPRA program. Cost-efficiency was found to be significant ( $Pr > z = 0.002$ ) and negatively related to project selection over the 14 year span of the program, indicating that managers have been generally mindful of the annual budget constraint. This was especially the case during the initial years of the CWPPRA program (1990-1995), when projects were ranked according to cost-efficiency, and those with the lowest \$/AAHU were usually selected for funding. In recent years (1999-2004), however, the least efficient projects (i.e., higher costs per AAHU) were found to be significantly and positively related to project selection ( $Pr > z = 0.001$ ). In many cases,

these less efficient projects were very expensive, large-scale barrier island and shoreline protection projects. At a minimum, the recent trends identified in this research are problematic given the program's fixed annual budget. Additional implications emerge regarding the past and future evolution of the WVA protocol, and the degree to which the current model is capturing the full suite of direct and indirect benefits available through various restoration project types.

**Clairain, Ellis "Buddy"**  
**Hird, Jonathan**  
Moffatt & Nichol  
Baton Rouge, LA

#### **ASSESSING THE CONSTRAINTS IN THE LINKAGES BETWEEN NUMERICAL & ENVIRONMENTAL RESPONSE MODELING: CURRENT CAPABILITIES & FUTURE NEEDS**

Part of the largest coastal wetland community in the United States is being lost at rates of 25-35 square miles per year to natural coastal land loss processes, the rates of which have been doubled by man's engineering of the Mississippi delta. Notwithstanding the ecological impact of such land loss, the economic consequences of not maintaining a sustainable coastal zone have proven devastating to the state of Louisiana. Passive acceptance of this land loss will result in large parts of south Louisiana no longer being a viable place to live and work for the 70% of the state's population that currently resides in the area under threat, a threat made so devastatingly clear by Hurricanes Katrina and Rita. Significant progress has been made in the science and engineering of restoration strategies, that when implemented are intended to provide both the sustainable restoration of a coastal ecosystem, while at the same time providing vital storm and hurricane protection. The progress made in the science of this restoration and the success of combining the needs of both restoration and storm protection is contingent on being able to design implementable and sustainable solutions through the innovative use of advanced modeling techniques. Previous modeling efforts were necessarily broad in scope and provided valuable initial screening of project alternatives but provided limited detailed assessment of project-specific impacts from an environmental response perspective or an accurate assessment of unintended consequences. These efforts to develop an effective plan to address coastal ecosystem degradation as well as providing necessary storm protection have also been constrained by a lack of effective tools (models) to accurately assess project impacts from both a geomorphological as well as from an environmental and ecological response perspective. As such they also provide only limited recognition of the vital role that coastal natural resources play in the ecological, economic, and social stability of coastal communities. A key weakness in the modeling efforts to date is the linkages between the state-of-the-art numerical models that accurately predict physical response to the recommended alternative, but have had limited success in accurately extrapolating the biological response to the environmental and ecological conditions. It is the effective quantification of these environmental responses that is essential in the effective quantification of the relative sustainability of a proposed solution and strategy. This study identifies constraints in analytical tools (models) currently applied to coastal ecosystem restoration strategies and provides recommendations and research needs to address these constraints and quantify the cause and effect relationships between conventional numerical modeling (hydraulic, hydrodynamic, geomorphological and water quality) and environmental response modeling. As such it is intended to more accurately assess the responses of the governing environmental and ecological responses and how such processes manifest themselves in the sustainability of current and proposed restoration strategies. It will also provide an assessment of the unintended consequences on proposed storm protection strategies and the sustainability of concurrent restoration strategies. The study also establishes research needs (ecological, socio-political/economic) that could contribute to improved analytical tools.

**Debaie, Lisa**  
**Murphy, Kelly**  
Strategic Analysis &  
Research Division,  
Environment Canada  
**Martin, Giles**  
**Chouinard, Omer**  
Environnemental Studies  
Programme, Université de  
Moncton, New Brunswick,  
Canada

#### **IMPACTS OF SEA-LEVEL RISE AND CLIMATE CHANGE ON THE COASTAL ZONE OF SOUTHEASTERN NEW BRUNSWICK: SOCIO-ECONOMIC IMPACTS**

This study forms part of a larger project on the physical, ecological and socio-economic impacts of climate change, more specifically sea-level rise, storm surge and coastal erosion, on the Gulf of St Lawrence coastal zone of southeastern New Brunswick in support of sustainable management, community resilience and the development of adaptation strategies. Sea-level rise, coastal erosion and increased intensity and frequency of storm-surge events have significant socio-economic impacts on coastal communities, ecosystems and various economic sectors. An important dimension of this research project has been the examination of socio-economic impacts associated with climate change in the Gulf of St Lawrence coastal area. The research objectives of the socio-economic impacts study were to; identify local knowledge of climate impacts (past and present), enhance communities' understanding of the economic implications of climate change and adaptation in the coastal zone, develop a template for applying various economic techniques to climate change impact analysis, assess the community's ability to response to climate change, and identify ways to enhance adaptation capacity in the coastal zone. Through community engagement and a case study approach the impacts of sea-level rise, storm surge and coastal erosion on the eco-tourism sector and communities' property and infrastructure were assessed. The presentation will review the results obtained from the two case studies: the evaluation of integrated effects upon the eco-tourism and cultural tourism sector of Bouctouche and the potential damage costs from storm surge and coastal flooding in Shediac Bay. The presentation will emphasize the process used to develop future-oriented socio-economic scenarios, the methodology and approach used to assess economic impacts, the role of community engagement and the need to develop adaptation decision making tools.

**Dedah, Cheikhna  
Keithly, Walter R.  
Kazmierczak, Richard F.  
Jr.,**  
Center for Natural Resource  
Economics & Policy,  
Louisiana State University  
Agricultural Center

## **DEMAND ANALYSIS FOR OYSTERS**

In response to growing concerns about illness and deaths associated with *Vibrio vulnificus*, California initiated a program in March 1991 that required anyone selling oysters to notify potential consumers that the "consumption of raw oysters can cause serious illness and death among people with liver disease, chronic illness, or weakened immune systems." This mandatory warning label, followed shortly thereafter by a similar warning in other states, received extensive media coverage. While consumption of contaminated raw oysters is relatively innocuous for healthy individuals, it can lead to serious illness and even death among individuals with compromised immune systems. With an approximate fatality rate of 50 percent, *V. vulnificus* generates the highest fatality-to-case ratio of any food borne pathogen. Even so, the economic impact of the *V. vulnificus* warning labels and associated media coverage is not well researched from an empirical perspective. One study analyzed the impact of warning labels on ex-vessel oyster prices in the Gulf of Mexico and Chesapeake Bay regions, finding that the labels were associated with a price reduction of \$0.86 per pound for Gulf product in the summer months and a slightly smaller reduction of \$0.63 per pound in the winter months. A similar decline in price was reported for Chesapeake Bay product in the winter season. Other than this one study, however, no published studies examine the impact of these warning labels on the oyster industry. The primary goal of this study was to consider the impact of warning labels within the context of a complete demand system. Given that previous research shows consumers have difficulty in distinguishing among product sources in a warning label context, the oyster warnings targeted at Gulf of Mexico products may have negative and/or positive effects on other oyster sources that compete for the consumer's budget. A secondary goal of the study was to estimate the cross-quantity substitution effects that changes in oyster production in one region have on the prices received for oysters in another region. The estimated IAIDS model of Gulf, Chesapeake, Pacific, and imported oysters indicates that the warning labels led to statistically significant declines in Gulf of Mexico and Chesapeake oyster market shares, and that the beneficiaries of these declines were oyster importers and suppliers in the Pacific region that instituted the warning labels.

**Deshotels, Michele**  
CPRA Integrated Planning  
Team, Louisiana Dept. of  
Natural Resources

## **COASTAL COMMUNITIES AND THE CPRA PLANNING PROCESS**

For over 12,000 years people have lived, worked and played in Louisiana, leaving their mark on the landscape. During all of this time, access to Louisiana's water resources, including the Mississippi River system and the coast was important, driving community location decisions. Access to the coast (for apparently the same reasons held by Native Americans: proximity to diversified natural resources and facilitation of long-distance trade) has continued to drive historic and modern decisions in Louisiana regarding community location. This includes the 1718 founding of the city of New Orleans. Located strategically, New Orleans quickly prospered as a trade city. It is perhaps that New Orleans was so early a center of international trade, that Louisiana has such a rich and diverse heritage. This richness is in part driven by the history that is present throughout the state. In coastal Louisiana alone, there are well over 634 properties listed on the National Register of Historic Places (and many of these properties are historic districts containing multiple historic structures). New Orleans, with approximately 37,000 identified historic structures, has the highest concentration of historic buildings in the entire of the United States. What is unique about Louisiana and particularly coastal Louisiana, is not that it has a distinct culture, but that what is regarded as "Louisiana culture", both within and without the state, is one that is not homogenous. Like gumbo itself, south Louisiana's culture is made up of diverse ingredients from all parts of the world, each retaining its individual identity and flavor, but coming together to make a distinctive dish with its own immediately recognizable identity. It is also an identity that is strongly embraced by its residents. According to the 2000 census, Louisiana is the state with the highest percentage of native born residents (79.4% of current residents were born in Louisiana). This same census indicated that two million, or over 65% of the population of Louisiana, live within 50 miles of the coast. Louisiana's economy is also concentrated in the southern region of the state. Industries directly tied to locations on the coast and major waterways include not only the production of oil and gas, but offshore oil and gas exploration, development and transport; shipbuilding and other manufacturing of transportation equipment; petroleum refining; chemical; port and water transportation; fisheries, along with specialized agricultural crop production, such as citrus, sugar cane and alligator. Change in any community is inevitable. In some cases, as in Louisiana after the storms of 2005, it is unexpected and rapid. Communities are resilient, but need support when confronted with forced unanticipated change that threatens functionality. The CPRA planning process has given communities the opportunity to actively participate in making the Master Plan. This plan provides a means for coastal communities to reduce future uncertainty. The Master Plan also recognizes that ultimately, sustaining Louisiana's coastal communities is dependent on sustaining Louisiana's coast.

**Diop, Hamady  
Keithly, Walter**  
Louisiana Sea Grant and  
Center for Natural Resource  
Economics & Policy,  
Louisiana State University

## **PROFILING THE GULF OF MEXICO GROUPER FISHERIES**

To profile the Gulf of Mexico Grouper fisheries, we will examine vessel grouper fishing activities. Special focus will be on harvest by state, proportion of grouper share on total revenues and poundage. We will also attempt to identify who is drawing most of its income, based on the number of species fished, from the grouper fishing activity. Finally, we will group vessels into different size categories and we will look at their movement from one size to the other and the overall impacts of those movements on the fisheries.

**Dunn, Michael A.**  
Center for Natural Resource  
Economics & Policy, LSU  
AgCenter  
**Chambers, Jim**  
School of Renewable Natural  
Resources,  
LSU AgCenter

## **BIOLOGICAL AND ECONOMIC PERSPECTIVES OF COASTAL WETLAND FOREST LOSS IN LOUISIANA**

Wetland forests are freshwater ecosystems dominated by trees or shrubs. The two general categories of wetland forests found in Louisiana are swamps and bottomland hardwoods. The coastal area of cypress-tupelo forests or swamps both influence and are influenced by coastal processes. Many of these forest stands are flooded for most if not all the growing season, and are dominated by tree species including: baldcypress and water tupelo and sometime pondcypress and swamp tupelo. The importance of these coastal forests both in human terms and in terms of their biological functions is significant. These forests provide wildlife habitat not only for recreational benefit but also for critical habitat for endangered species, flood and storm protection, carbon storage, soil stabilization, and economic benefits from a variety of enterprises. People also inhabit these areas. Louisiana's Coastal Wetland Forests (CWFs) were once and in some cases still are inexorably connected with the Mississippi River system. Annual Mississippi River flood events dispersed pulses of freshwater, sediments, and nutrients throughout the Lower Mississippi Valley and the Deltaic Plain. The system maintained itself through these annual flood events, providing nutrients to the living organisms of the Deltaic Plain and a supporting infrastructure through sediment collection. The various protective structures that have been built since the great Mississippi Flood of 1927 have served to protect human activity within the area. However, these structures that have contributed so much to human welfare are the same structures that are serving to starve CWFs in southern Louisiana. The loss of annual flood events in the region contributes to the decline of the system as a whole. Projections are for a 42% loss of current cypress-tupelo wetlands in the Deltaic Plain by 2050. In early 2003 the Louisiana Governor's Office commissioned a group of scientists (the Science Working Group or SWG) to conduct a comprehensive assessment of the current knowledge of conditions in Louisiana's coastal wetland forests. At the request of the SWG, the Governor's Office also commissioned a companion advisory panel (AP) composed of stakeholders and charged this group with assisting and serving as a resource to the SWG as well as providing comments on the draft report of the SWG. In this paper we present both biological and economic perspectives to the issue of coastal wetland forest loss in Louisiana. We will start with a brief economic history and biological history of the area. We will present the findings of both the SWG and the AP and, as participants in both groups commissioned by the Louisiana Governor, the process by which both groups reached resolution regarding their mandates. In addition we will indicate where the process to conserve and protect Louisiana's coastal wetland forest is headed. We will also attempt to merge biological and economics sciences by providing our perspectives regarding what would constitute a successful recovery of Louisiana's Coastal Wetland Forests, the methods by which both recovery and measurement of recovery will be achieved, the policies necessary and possible to achieve recovery, and finally the likelihood recovery will occur.

**Emmer, Rod E.**  
Louisiana Sea Grant  
Program

## **ZONING, INSURANCE, AND LAND-USE PLANNING CONSIDERATIONS POST-KATRINA**

Coastal restoration and protection programs are more than engineering projects to improve levees and rejuvenate, create, and enhance wetlands and barrier islands/beaches. The aspects of coastal programs that receive less attention are people and jobs, the most important reasons to save the coastal zone. If the populace wishes to retain viable communities and a working coast then parish, local, and state officials must think beyond the entrenched bureaucratic process. At the same time the state can extricate itself from the national perception of being a flood-prone wasteland that siphons more than its fair share from the National Flood Insurance Program. But changing attitudes means making a commitment to comprehensive planning that includes an aggressive natural hazards element and the necessary enforcement tools, such as zoning. Are we ready? When the impacts of hurricanes, floods, sea level rise, and subsidence are superimposed onto the coastal landscape, mitigation will include decisions that direct how, where, and if activities may occur. To reduce or eliminate damages from natural events requires a degree of specificity untested in Louisiana. The Legislature has several options. First, state statutes should be revised to require parishes and communities prepare comprehensive plans that include a "Natural Hazards" Element. Second, mitigation practices should exceed minimum federal requirements, such as mandatory purchase of flood insurance by property owners within leveed areas (no matter if it is an A-zone, a X-zone, or a No Parking zone). Third, owners of parcels in benefited areas below dams and diversions or in mapped storm-surge zones that exceed the communities floodplain management ordinance should be required to purchase flood insurance. Fourth, setback lines should be established along eroding shorelines and no development or rebuilding allowed seaward of that line. Fifth, a freeboard should be added to all community floodplain management ordinances to account for sea level rise and subsidence. When programs get to the specifics, political courage is in demand and changes must be made in related areas, for example funding sources and personal responsibility. Decision-makers have become over-reliant on federal grants and matches. Governments are obliged to wean themselves from the federal piggy bank and become more self-sufficient. Second, individuals must return to greater personal responsibility for their own safety and actions. Today what is at stake is community survival. Recovery must be built on resilience. CAUTION – WE CANNOT BE DISTRACTED: To our detriment, Federal, state, and local decision-makers favor passive agendas. Time-honored techniques that suggest progress but really delay or deflect true solutions include proposing additional "education and outreach", collecting and sharing of "more data", needing "to improve levels of interagency coordination", and building more "construction projects." These activities have been underway for years with spotty results. Will one more year of meetings, a color brochure, or a Memorandum of Understanding really make a difference? History suggests they will not. Highlighting the past and not looking to the future exemplifies limited vision and imagination. As demonstrated in 2005, avoiding difficult choices only results in greater losses when the next disaster strikes.

**Fannin, Mathew<sup>1</sup>**  
**Hughes, David W.**  
Clemson University  
**Keithly, Walter<sup>1</sup>**  
<sup>1</sup>Center for Natural  
Resource Economics &  
Policy, Louisiana State  
University Agricultural  
Center  
**Olatubid, Williams, O.**  
American Express  
**Guae, Jiemin**  
Bureau of Economic  
Analysis, Washington DC

## **DEEPWATER ENERGY INDUSTRY IMPACTS ON ECONOMIC GROWTH AND PUBLIC SERVICE PROVISION IN LAFOURCHE PARISH, LOUISIANA**

Oil and gas produced from active deepwater leases (over 1000 feet water depth) in the Gulf of Mexico as a percentage of total output increased from 27% in 1992 to 54% in 2005. This increase is requiring more land-based services. Port Fourchon's strategic location provides it with a competitive advantage as a supply base for a diverse set of deepwater oil and gas related activities, ranging from petroleum rig supply boats to the maintenance and repair of mobile drilling rigs. Further development of Port Fourchon as a supply base is expected to markedly impact Lafourche Parish. Community Impact Models (CIM) quantify the linkages among local economic activity and the demand for, and ability to support, local government services. A CIM developed for Louisiana, including an input-output module of the local economy, is used to evaluate the impact of the deepwater energy industry on the economy and government finances of Lafourche Parish. According to model results, the deepwater energy industry will continue to have a significant impact on that economy. By 2010, the industry was predicted to be directly and indirectly responsible for 2,593 new jobs and \$571 million in total output. Such activity should not strain the ability of local governments to deliver services.

**Glavovic, Bruce C.**  
Massey University  
New Zealand

## **CRITICAL SOCIAL INFRASTRUCTURE FOR BUILDING SUSTAINABLE, HAZARD-RESILIENT COMMUNITIES**

Coastal ecosystems sustain the livelihoods of coastal communities around the world. But these ecosystems are subject to intense and growing population and development pressure. Future prospects are bleak for many of these ecosystems and the communities that depend upon them. Moreover, with relentless development intensification, these communities are becoming increasingly vulnerable to coastal hazards, especially in the face of global warming and sea-level rise. The consequences of living in hazard-prone coastal areas has been brought home by graphic television coverage of the catastrophic 2004 Indian Ocean tsunami and the hurricanes that devastated the Gulf coast of the USA in 2005. It is therefore urgent and imperative that we learn to build more sustainable and hazard-resilient coastal communities. This paper will present case studies of recovery experiences in Indonesia and the Maldives in the aftermath of the 2004 Indian Ocean tsunami, and recovery experiences related to Hurricane Katrina with a particular focus on New Orleans. Personal observations and interviews with planners, academics and others involved in recovery efforts inform this analysis. Notwithstanding significant contextual differences between these three case studies, they provide lessons that can help to inform future coastal policy, planning and decision-making processes. These lessons from real-world experience, together with insights from diverse literatures, including coastal management, natural hazards planning, collaborative planning, sustainable communities, sustainable livelihoods, ecological economics, environmental governance, adaptive management and co-management, will be synthesized to develop a conceptual framework and outline substantive and process principles to guide action. The following principles are suggested: Put people first: Prioritize people's concerns, especially vulnerable people, by striving for social equity, respecting cultural diversity and securing sustainable livelihoods. Develop responsive and participatory processes: Ensure authentic participation and collaboration through responsive, accountable and transparent governance institutions and processes. Prioritize empowerment: Foster social learning and build social institutions that enable and strengthen resilience and adaptive capacity. Prioritize ecological sustainability: Respect and restore coastal ecosystems and the powerful and often unpredictable processes that structure these ecosystems to sustain coastal communities. Adopt a proactive but precautionary approach: A visionary outlook must be implemented in a risk averse manner in face of uncertainty: Avoid exposing coastal communities to coastal hazards; Place the 'burden of proof' on those engaged in unsustainable practices; and Ensure that public services and infrastructure are examples of 'best practice'. Key opportunities and challenges for translating these principles into practical reality are explored. This analysis demonstrates that building sustainable, hazard-resilient communities will remain elusive unless 'business as usual' is confronted by a transformational process of developmental planning: Sustainable, hazard-resilient coastal communities are founded upon robust 'critical infrastructure' (including ecological, political, social, livelihood and physical dimensions) that is secured by planning and decision-making processes that enable coastal communities to build 'layers of resilience' to overcome 'waves of adversity'. Developing robust critical social infrastructure is core to this process.

**Goodin, Dean**  
**Dohner, Eric**  
**Sutherland, Kristin**  
Tetra Tech, Inc.

## **IMPACTS OF DEVELOPMENT ON THE GULF INTRACOASTAL WATERWAY: A CASE STUDY IN ALABAMA**

Due to the threat of tropical storms and escalating prices of beachfront property, developers have begun to build residential and commercial communities further inland from the Gulf Coast. The newest development trend in the northern Gulf Coast region is construction along the Gulf Intracoastal Waterway (GIWW), which extends from Brownsville, Texas to Apalachee Bay, Florida. In coastal Alabama, a 10-mile stretch of the GIWW, identified as the Foley Land Cut (FLC), is currently poised for luxury condominium, marina, and retail development. The FLC extends from Wolf Bay in the east to Oyster Bay in the west and lies within the city limits of Gulf Shores and Orange Beach, Alabama. The FLC is located approximately two miles inland of the coast and thus may be slightly sheltered from tropical storm-related impacts. The authorized channel dimensions of the FLC are 125 feet wide by -12 feet deep, which the United States Army Corps of Engineers currently maintains for commercial barge traffic operations. The commercial tonnage transited through the FLC each year provides the basis for federal funds that maintain the authorized depth through dredging. Permit applications for development along the FLC propose construction of 16 mixed-use communities, which would include approximately 17,500 condominium units, 3,725 boat slips, marinas, retail shops, office space, and amenities, such as pools and boardwalks. These developments



will likely increase the recreational use of the FLC, which has the potential to adversely impact commercial barge traffic on the waterway. To address potential impacts to the FLC and the surrounding communities, an environmental impact statement is being prepared to evaluate the potential environmental and socioeconomic consequences of granting permits for development along the FLC. A waterway capacity study is being conducted to evaluate the compatible uses and potential conflicts between private and commercial use of the FLC. The study focuses on the current and predicted levels of commercial barge and recreational traffic, and any anticipated adverse impacts due to development along the waterway. Since the federally authorized use of the FLC is for commercial traffic, increased recreational use must not impact present and future commercial operations. Safety and navigation concerns, for both commercial and recreational users, are the primary issues that will determine the waterway capacity of the FLC. Factors related to safety and navigation include speeding, uneducated boaters, and congestion in high use areas (e.g. boat ramps). As a result of the rapid growth rate of the Gulf Shores/Orange Beach area, impacts of the proposed developments on housing, employment, schools, and other socioeconomic factors will be evaluated. The socioeconomic analysis will include an evaluation of labor force capacity, availability of affordable housing, public services, educational facilities, impacts to regional transportation, and fiscal revenues. Economic models will be used to forecast the expected long-term growth based on existing trends and conditions and projected changes resulting from FLC development. The results of this study will help guide future development along the GIWW and promote sustainable use for both commercial and recreational traffic.

**Gramling, Robert**  
**Darlington, JoAnne**  
**Wooddell, George**  
**Brassieur, Ray**  
Department of Sociology  
and Anthropology  
University of Louisiana at  
Lafayette

#### **SUBSISTENCE USE AND VALUE: THE USE AND EXCHANGE OF WETLAND RESOURCES AMONG HOUSEHOLDS IN COASTAL COMMUNITIES**

There is good reason to believe that in the Louisiana coastal marsh a relatively large proportion of local human support is provided through non-market activities – what we are calling “subsistence” activities. People in and around the Louisiana marshes famously eat fish they catch and ducks they shoot. However, the variety and quantity of local items used for personal consumption is unknown. Neither do we know much about patterns of exchange, trade, or barter for these items collected directly from nature. Like commercial harvests, many coastal subsistence activities are at risk, but their values are not addressed in any existing data. These subsistence activities may be worth more to coastal residents and communities than all the reported resource harvest economic activity that can be estimated through existing data sources. During the fall and winter of 2005-2006, we developed and pre-tested a mail-in survey instrument designed to collect data related to non-market subsistence activity. The survey asked respondents about their acquisition and use of 45 coastal species, and about whether their use patterns had changed since the hurricanes. The commercial values of some of these items -- like shrimp and redfish -- are better known, but most items on this list – like choupique, soco, and poule d'eau – have no documented market value. Our mail-in survey was followed up by interviews in the field designed to confirm and expand on the findings of the survey. The result of our efforts was the retrieval of considerable -- and somewhat surprising -- data related to resource use and exchange along the coast. Thus far, our project convincingly suggests that subsistence activities indeed are very important in coastal Louisiana – and that we have barely touched on the scope and significance of these activities.

**Gramling, Robert**  
Department of Sociology  
and Anthropology  
University of Louisiana at  
Lafayette

#### **LEARNING FROM THE PAST: AVOIDING RESTORATION CATASTROPHES.**

Generalizing from existing projects and their successes and failures to design and plan new proposed projects offers promise and intuitively makes sense. However, unless we go beyond ecological/engineering considerations and consider the socioeconomic impacts of projects, this is an approach that can lead us toward projects that could have disastrous consequences and that are not reversible. This presentation examines four restoration projects – two completed and two proposed. In one case it appears that the completed project can help us better design the proposed project, but in the other case it appears that existing generalizations (hydrological, ecological and engineering) from an existing project (the Wax Lake Outlet) to one that is proposed (the Third Delta Conveyance Channel) has the potential to lead us toward a dangerous irreversible experiment.

**Grandy, Gregory M.**  
Louisiana Department of  
Natural Resources  
Office of Coastal Restoration  
and Management

#### **COASTAL RESTORATION PROJECT SELECTION IN LOUISIANA: FROM CWPPRA TO CIAP**

During the 20th century, coastal Louisiana lost over 1.2 million acres and scientists estimate that the state will lose an additional 431,000 acres by 2050. These coastal wetlands represent over 40% of the coastal marshes in the continental United States which provide habitat for diverse fish and wildlife, have extraordinary ecological and economic importance, and provide storm protection benefits to vital energy infrastructure and coastal communities. Concern over the coastal Louisiana wetland loss led to the establishment of restoration programs aimed at protecting fragile coastal landscapes and ameliorating the land loss problem. The Coastal Wetlands Planning, Protection and Restoration Act or CWPPRA was enacted in 1990 (PL 101-646). A multi-agency task force, composed of five federal agencies and the Governor of Louisiana, authorized it to select high-priority wetland restoration project in Louisiana, and then design, construct, operate, maintain and monitoring those projects. CWPPRA project development and implementation is a transparent public process with regular public meetings and publicly accessible program documentation. Annually, the CWPPRA Priority Project List (PPL) selection process solicits proposals from the public and involved agencies, evaluates and ranks those proposals. The ranking process includes the use of the Wetland Value Assessment (WVA) methodology to predict the net habitat benefit over the 20 year project life, and a prioritization scoring system which emphasizes cost effectiveness, sustainability, compatibility with regional restoration planning and other factors. The result of the PPL process is the selection of a group of coastal restoration projects, each of which will then undergo detailed engineering and design and ultimately compete for CWPPRA construction funding. The Coastal Impact Assistance Program (CIAP) was

established by Section 384 of the Energy Policy Act of 2005 to help oil producing states and their coastal political subdivisions to mitigate impacts from Outer Continental Shelf (OCS) oil and gas production. The CIAP program authorizes, among other uses, the projects and activities for the conservation, protection, or restoration of coastal areas, including wetlands. The 19 coastal parishes (CPSs) will receive 35% of those funds and the State will receive 65%. The State worked with the 19 coastal parishes to prepare a draft Louisiana Coastal Impact Assistance Plan (Plan) that identifies restoration, conservation, and infrastructure projects to be supported by the State and each coastal parish for the 4 years of CIAP funding. The primary criteria used to evaluate projects for the Louisiana CIAP was: 1) Is the proposed project free of issues that may impact timely implementation of the project features? 2) Is the proposed project linked to a regional strategy for maintaining established landscape features critical to a sustainable ecosystem structure and function? 3) Does the proposed project protect health and safety or infrastructure of national, state, regional or local significance? 4) How cost effective is the proposed project? 5) What is the certainty of benefits resulting from implementation of the proposed project? 6) Does the proposed project address an area of critical conservation/restoration need or a high land loss area? and; 7) How sustainable are the benefits of the proposed project?

**Hanson, Terrill R.**  
**Evans, Garen**  
**Myles, Al**  
**Petrolia, Dan**  
**Coble, Keith**  
**Posadas, Benedict**  
**Hodge, Sharon**  
**Sempier, Steve**  
Department of Agricultural  
Economics, Mississippi State  
University

#### **DEVELOPING A FOUNDATION FOR ANALYSIS OF NATURAL AND HUMAN-INDUCED DISTURBANCES TO COASTAL ECONOMIES**

Coastal communities are tightly linked to the marine resources that fully or partially support their economic activities, and are also threatened by hazards unique to coastal development. In 2007 NOAA funded a new cooperative institute (CI) that focuses on research priorities in the northern Gulf of Mexico. This CI is called the Northern Gulf Institute (NGI) and is administered from Stennis Space Center (Bay St. Louis, Mississippi). This poster presents the goals of the economic portion of the NGI. The overall goal of this project is to develop regional economic valuation (REV) models that will define the interconnected relationships between the economic activities and drivers in coastal communities of the Gulf of Mexico. Input/output models will capture the intricate economic impacts and linkages between changes in policy, weather, development, coastal ecosystems, water dependent industries or other events to better understand community, county, and state level changes in employment, total industrial output, and income resulting from natural and human-induced disturbances. Further, the developed models will assess coastal economic activity changes caused by weather shocks by altering the frequency, magnitude, spatial, and temporal scales of the impact in the model. Predicting savings from improved hurricane forecasting is an integral part of the model development process. Concurrently, economic growth and development data related to marine ecosystems and water dependent activities will be integrated into the REV models. This addition will provide a means of analysis for the changes in the economic value of marine resources under different management, regulatory and environmental conditions and enhance the economic forecasting model's ability to estimate impacts to ecosystem and water dependent activity values from alternative weather and resource management practices. Improved management, policy, and development decisions can be made through a better understanding of the value of coastal ecosystems, water dependent industries and the potential economic impacts of coastal hazards. Local, state, and federal agencies along with economic developers, city planners, researchers, community residents, and other stakeholders will benefit from this project.

**Hart, Zac**  
I.M. Systems Group, Inc.  
Human Dimensions  
Program, NOAA Coastal  
Services Center  
**Safford, Thomas**  
Department of Sociology  
University of New  
Hampshire

#### **THE DESCHUTES ESTUARY: A CASE STUDY OF STAKEHOLDER PARTICIPATION IN SOCIOECONOMIC ANALYSIS OF COASTAL RESTORATION**

Conventional studies of the social and economic values of natural resources do not always capture the full range of values that are important to local communities. Additionally, the high cost of conducting purely quantitative valuations of nonmarket goods has meant that these studies are not always feasible, given the limited resources available for restoration and other coastal management efforts. The State of Washington recognized these issues when it began considering restoration options for Capitol Lake in Olympia. Established in 1951 as a reflecting surface for the adjacent Washington State Capitol Building, Capitol Lake was created by damming the Deschutes River before its entry into the saltwater Budd Inlet. State officials are considering restoring the lake to an estuary to alleviate several of the problems associated with maintaining the lake environment, such as sedimentation, invasive species, and compromised water quality. In 2005, the National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center partnered with the Washington Department of Fish and Wildlife (WDFW) to develop an innovative approach to involving stakeholders in assessing the net social and economic changes associated with a restored estuary. The WDFW and the Center conceived a process in which local stakeholders, through focus groups, would identify social and economic values to be studied and would suggest methodologies for performing these studies. This process would contribute to the Net Benefits Analysis (NBA) of restoring the Deschutes Estuary, an important component of the larger Deschutes Estuary Feasibility Study which also includes engineering, environmental, and other analyses. The stakeholders would also suggest ways for the community to be involved in decision-making about long-term management of the resource. NBA participants accomplished all three objectives of the stakeholder involvement process and enjoyed working together in a cooperative atmosphere to create a tangible product. The stakeholders' input was synthesized and delivered to a professional economic consulting firm who performed the net benefits analysis. NBA participants and the public will be re-convened to comment on the results of the analysis. This project demonstrates a process wherein stakeholder input is used as the foundation of a socioeconomic assessment of restoration options, generating public support for governmental management of coastal natural resources.

**Haydel, Judith**  
**Thibodeaux, Cassie**  
IAP World Services, Inc.  
USGS National Wetlands  
Research Center

#### **TIRED OF SEARCHING ENDLESSLY FOR COASTAL WETLANDS RESOURCES? THE U.S. GEOLOGICAL SURVEY'S NATIONAL BIOLOGICAL INFORMATION INFRASTRUCTURE CAN HELP**

The National Biological Information Infrastructure (NBII) <<http://www.nbii.gov>> is a broad, collaborative program that provides increased access to data and information on the nation's biological resources. The user can access topical information in a variety of ways, including by ecosystems, regional themes, and geographic perspectives. One of the geographic perspectives is the Central Southwest/Gulf Coast Information Node (CSWGCIN) <<http://cswgcin.nbii.gov>>. It addresses the biodiversity aspects of sustainable development within the region through research into the applications of new geospatial data analysis and visualization technologies. The NBII toolkit contains a number of resources for researchers. There is a biocomplexity thesaurus; a searchable online directories of experts; inventory and monitoring data; metadata information resources and more.

**Henderson, James E.**  
**Dunn, Michael A.**  
Center for Natural Resource  
Economics & Policy,  
Louisiana State University  
Agricultural Center

#### **LIABILITY, INSTITUTIONS, AND DETERMINANTS OF LANDOWNER ACCESS POLICIES FOR FEE-BASED RECREATION ON PRIVATE LANDS**

Fee-based recreation on private land for public use can provide income to landowners and draw out-of-area recreationists, thus benefiting local rural economies. Generating additional income for landowners by allowing recreational access brings with it the possibility of legal action as landowners may be sued if bodily injury results to a user of the property. All 50 states have adopted recreational use statutes that are intended to encourage landowners to make their lands available for public recreational use by providing liability protection to the landowner. Yet, liability issues and perceived liability risks continue to be a major concern to landowners. Most state recreational use statutes insulate landowners from liability if access is granted without a charge; however, there are an increasing number of states that allow landowners to charge a fee and retain the liability protection afforded to free access granting landowners. The Louisiana recreational use statute (La. R.S. § 9:2791) does not extend liability protection to private landowners if a fee is charged for access. From the perspective of economics and institutional change, a shift in direction of policy will likely lead to a change in incentives and behavior among a target group. Therefore, an interesting research objective is to see how private landowner leasing policies might change by expanding the liability protection of recreational use statutes to allow for the charging of a fee intended to generate a return. Investigating the effect of such an institutional change can provide insights into landowner leasing behavior and possible resulting effects on the supply of available recreational land. Using a survey and econometric techniques, the study will seek to identify landowner characteristics that may have a positive effect on a landowner's probability of choosing to offer fee-based recreation. The level of incentives needed by landowners not leasing land can not be assessed by looking only at revealed preference (i.e., existing lease prices). In such cases contingent valuation can be used to assess landowners' willingness to accept (WTA) for recreational leasing. Possible reductions in transaction costs associated with recreational leasing or fee-based access can be investigated by examining survey responses to stated leasing rates (WTA) following the hypothetical institutional change. Asking landowners to indicate their WTA for fee-based recreation under two scenarios may provide evidence of reduced transaction costs associated with a potential institutional change. Given the assumption that the recreational use statute could be applied to fee-based recreational access, then a WTA reduction may reflect a reduced transaction cost associated with mitigating the liability risk involved in the recreational access rights transaction. The reduction in transaction costs, proxied by the reduced WTA value, can include acquisition of liability information, cost of contracting, legal fees associated with the transaction, etc., which are all costs associated with the transaction intended to reduce the liability risk (real or perceived to the landowner) after the transaction during the use of the property. The primary objectives of this study are to 1) understand the attitudes and perceptions of landowners in the Louisiana Delta regarding fee-based wildlife-associated recreation, 2) determine the existing level of fee-based recreation, 3) examine how liability concerns and other possible disincentives collectively influence landowners' access decisions, and 4) investigate the relationship between institutional change and reductions in transaction cost associated with fee-based recreation. The proposed study and methodologies using qualitative choice and limited dependent variable econometric models will be presented using a poster format.

**Hindsley, Paul**  
Coastal Resources  
Management, East Carolina  
University  
**Landry, Craig**  
**Bin, Okmyung**  
Department of Economics,  
East Carolina University  
**Vogelsong, Hans**  
Department of Recreation  
and Leisure Studies, East  
Carolina University

#### **THE ROLE OF CONGESTION IN RECREATIONAL BEACH SITE CHOICE**

Recreational demand models have been important tools in the valuation of recreational sites and the attributes of those sites. In a discrete choice context, individuals' site choices for recreation are dictated by their preferences for numerous factors, including site access, environmental amenities, and managed or built site amenities. As this paper's primary focus, we explore the role of congestion in a RUM of beach site selection. Our data pertain to seven barrier island sites on the North Carolina coast. Our estimation strategy adjusts for endogenous stratification due to onsite sampling, incorporates unobservable site characteristics, and differs from previous work in the method of instrumenting for endogenous congestion. Our results suggest that failure to account for congestion in parameter estimates does bias parameters. We address this endogeneity through the application of a traditional instrumental variables approach with happens to be a "special case" application of a control function. Our control function method incorporates unobserved site attributes that influence congestion using a fitted congestion measure.

**Hoffpauir, Helen**  
Louisiana Department of  
Natural Resources  
Coastal Restoration Division,  
Land Section Manager

## **ELEMENTS OF LANDRIGHTS ACQUISITION FOR LOUISIANA'S COASTAL RESTORATION PROGRAMS**

The basic mission of the Land Section of the Department of Natural Resources (DNR), Coastal Restoration Division is to acquire landrights for coastal restoration projects. There are a number of critical elements that have to be evaluated and managed throughout the landrights acquisition process. Those critical elements, outlined below, will be discussed in detail in the presentation. Scale – The size of the project, as in number of landowners and tracts, NOT as in acres restored, the footprint of the project or size of budget. Scope – The duration of the project, i.e. a demonstration project with no monitoring and/or maintenance with an easement term of 5 or less years, or CWPPRA projects with a 20 year life with monitoring and maintenance obligations for DNR. Scope also encompasses the number and type of project features. The more complex and costly the features, the greater is the exposure to liability. There are several proposed projects which are massive in scope, such as the Bayou Lafourche project or the Third Delta. These will present scenarios that are actually outside the scope of what the current land section can accomplish. Type - Shoreline protection usually impacts pipelines; freshwater introduction projects could raise water levels and require flowage easements; hydrologic restoration projects could impact active oil and gas activities; barrier island restoration could involve reclamation issues. Owners, Titles, and Encumbrances: These are questions that are posed on each project: Who are and where are the owners? Are they responsive to telephone calls, mail, email, or personal visits? Are they knowledgeable about coastal restoration, or do they even know they are an owner of the tract needed for the project? Are they cooperative, or are they suspicious of any governmental agency? Does the land have clear title, or are their clouds on the title, unfiled successions, mortgages, liens, etc.? Does the fact that the easement is a long term encumbrance on the property have an impact on negotiations? How many encumbrances already exist on the property in the form of easements and rights-of-way? Leasehold interests: These are questions concerning leaseholders that must be addressed also: Does the landowner receive income from hunting and/or fishing leases? If so, will they assist in providing contact information and helping with hunters and fishers? Will they require special restrictions during hunting season? Are there oyster leases? If so, how many acres will be directly impacted by the project? Will that impact the overall project budget? How are oyster lease acquisition costs estimated? Is there oil and gas activity in the area? Are there orphaned or shut-in wells? Are there flowlines that have been abandoned that should be removed? Can certain pipelines be lowered by the owners? Are there pipelines that are now exposed due to shoreline erosion? These questions and others will be explored during the presentation, and questions from attendees are welcomed.

**HOSKING, ADAM**  
Halcrow Inc, Tampa, Florida

## **DELIVERING SUSTAINABLE DEVELOPMENT ON THE UK COAST**

"We want to live within environmental limits and achieve a just society, and we will do so by means of sustainable economy, good governance, and sound science". This statement is at the heart of the UK governments vision for future coastal flood and erosion risk management. It is recognised that delivery of this vision will not be achieved through engineering approaches alone. The UK strategy places emphasis on the important role of strategic long-term coastal planning in delivering this vision on the coast. Achieving this will require continued evolution of the planning process until full integration with spatial planning priorities is achieved. The principals of spatial planning are that it should be: visionary, wide-ranging, participative, integrating, responsive, and deliverable. This clearly contributes to the aims of strategic coastal planning and vice versa. Within the UK, strategic coastal planning has been undertaken for the last 15 years, and has evolved from what was originally a purely engineering driven process. The engineering emphasis resulted in a lack of land use planning involvement in early coastal plans, and this was recognised as a weakness. Whilst new national guidance for strategic planning (Defra, 2006) aims to redress this there is still much work to do. Central to this is the need to recognise that coastal strategy plans are fundamentally planning documents. This needs to be clearly communicated to planning and engineering communities alike. There is an increasing awareness that in the face of a changing climate, limited budgets and recognition of the importance of natural processes, it is often not appropriate (or possible) to 'engineer' solutions to flood and erosion risks. Indeed, the policy recommendations arising from the recent pilot Shoreline Management Plan (SMP) reviews (Jay et al, 2004), have presented future scenarios with potential losses of large numbers of properties, many of which are currently afforded protection from flooding and erosion risks. Under current UK arrangements, those who lose their assets under the implementation of such policies will largely not be eligible for any form of compensation, which has led to suggestions that such policies are not implementable and do not provide social justice. These concerns may lead to the non-adoption of plans in areas where there are likely to be significant property losses, as political leaders support those who are losing out. Without adoption, these plans are unlikely to feed into the land use planning process as intended, weakening the management of flooding and erosion risks. In recognition of this issue, UK government has established research to consider alternative approaches to long term risk management. This includes consideration of the scale of the risks involved, the implications for both engineers and planners and the socio economic impacts of change on the coast. A review of the "tools" that might be necessary to achieve sustainability has been undertaken, including consideration of what can be done from a planning perspective. The outputs from this study include various ways to compensate landowners together with alternative approaches that may assist in the management of future risks. The paper will discuss the parallels between the issues facing sustainable management of the coast in the UK, with those facing coastal Louisiana, and consider the concepts being proposed in the UK for dealing with issues of social justice and how they may be applied here in Louisiana.

**Jenkins, Pamela**  
**Laska, Shirley**  
**Williamson, Gretchen**  
Center for Hazards  
Assessments, Response,  
Technology, UNO

#### **EVACUATION OF THE SOCIALLY VULNERABLE**

Evacuation of the socially vulnerable is a challenge remarkably poorly planned for and resourced by large communities, especially for catastrophe. The abject failure of the Katrina evacuation for the socially vulnerable by the City of New Orleans and the government organizations above the city at the state and national levels responsible for assisting now places the city as the most noteworthy in American history in failing to provide safely for its socially vulnerable population during a time of crisis. In fact, the same factors that created the vulnerability also created the evacuation that contributed to the death of so many. Almost two years after Katrina the second hurricane season brings a condition for the vulnerable that may in fact put them at more risk during a hurricane response than they were during Katrina. This presentation reports on the applied, collaborative project that is combining 1) data collection in New Orleans, 2) extracting relevant past nationwide research and 3) an evacuation collaborative format of a "table" of stakeholders, all geared to reduce the risks that are anticipated will be present in any future evacuation of the elderly and other vulnerable residents from New Orleans.

**Johnson, Jay**  
College of Business  
Loyola University New  
Orleans  
**Bowes, David**  
Southeastern Louisiana  
University

#### **NON-MARKET EVALUATION OF LOUISIANA COASTAL RESTORATION: A CONTINGENT VALUATION SURVEY OF THE MAUREPAS SWAMP**

A contingent valuation survey was used to estimate an average individual's willingness-to-pay (WTP) for restoration of Maurepas wetlands. A sample of 404 participants produced an estimated WTP of \$21.41. We then calculated an aggregate value of \$35,456,095 (\$985 per acre) by Louisiana residents which substantially offsets the project cost of \$50 million. We also estimated a non-use value between \$5,051,000 and \$24,361,000 (14.3 % to 68.7% of the total). Several significant factors that contribute to these values were identified which can suggest further research strategies and outreach programs one of which is the relationship between home value and storm protection.

**Kazmierczak, Richard F. Jr.,**  
**Niu, Jane**  
**Caffey, Rex H.**  
**Diop, Hamady**  
**Keithly, Walter R. Jr.**  
Center for Natural Resource  
Economics & Policy,  
Louisiana State University

#### **ESTIMATING FISHERIES INFRASTRUCTURE DAMAGES WITH HURRICANE SURGE DATA**

This study combined storm surge modeling with data on commercial fishing revenues and vessel markets to obtain geographically-specific estimates of the damages to coastal fisheries infrastructure after Hurricanes Katrina and Rita. A GIS context was developed to map peak storm surge height for approximately 20,000 geo-coded fishing infrastructure locations in coastal Louisiana (i.e., fishing vessels, seafood dealers, and processors). Survey data from sample sites was used in estimating, among other things, the percent of infrastructure that was lost due to the storms and the dollar amount of that damage for each location. This information was then used to statistically estimate surge-specific damage functions that were subsequently applied to all (non-sample) infrastructure sites, thereby allowing the calculation of aggregate storm impacts. Estimates of direct damages to the commercial and recreational fishing fleet were based on characteristics obtained from pre- and post-storm vessel registration records and from price regressions estimated using data from marine trade publications and websites. Total losses, estimated at near \$582 million, fall near the mid-point of the range of loss estimates generated by various rapid assessments in the weeks following the storms, suggesting that rapid assessment methods (at least in aggregate) may not be as subjective as they first appear.

**Keithly, Walter R. Jr.**  
**Kazmierczak, Richard F. Jr.,**  
LSU Center for Natural  
Resource Economics &  
Policy, Louisiana State  
University

#### **ECONOMIC ANALYSIS OF OYSTER LEASE DYNAMICS IN LOUISIANA**

State water bottom acreage leased by the oyster industry has increased sharply over the past 50 years. Because of the property rights associated with these leases, there has been increasing conflict between the oyster industry and other coastal resource users in particular, oil-and-gas companies and entities engaged in coastal restoration activities. A complete understanding of these conflicts depends upon knowledge of the economic incentives that drive the oyster industry and those individuals that lease water bottoms from the state. At the extreme, nominal lease fees and the potential to generate lease-based income from non-harvest sources can lead to speculative leasing that might be socially inefficient. This project was designed to estimate the speculative value of oyster leases in Louisiana; compare them to the producing value of oyster leases; and draw some inferences about the relative importance of these two revenue sources to the oyster industry. The analysis suggests that the speculative value of leases may equal, or in some cases exceed, the lease value based on income generated from oyster production and harvesting activities. Gross income to lease holders from compensation for oil and gas activities was estimated to be from \$10.1 million to \$14.79 million per year under current conditions. Given current leased acreage of approximately 392,000 acres and rental fees of \$2.00 per acre, this translates into approximate net revenues derived from oil-and-gas activities in the range of about \$24 per acre to \$36 per acre. Over the same time period, net revenues to fixed costs for oyster production and harvesting were estimated to equal approximately \$31 per acre. Furthermore, the compensation-based revenue stream appears to flow to leases irrespective of their ability to produce marketable oysters.

**Keithly, Walter R. Jr.**  
**Xu, Baifu**  
LSU Center for Natural  
Resource Economics &  
Policy, Louisiana State

#### **THE VALUE OF WETLANDS VERSUS OPEN WATER IN LOUISIANA**

Using a hedonic model, we examined how percent of marsh type (fresh, intermediate, and brackish), open water, and other property-based variables (location, distance to roads and the coast, percent interest sold, etc.) affected the market sales price. Primary data was collected from coastal parish courthouses and overlaid in a GIS

University  
**Barras, John**  
USGS National Wetland  
Research Center  
**Kazmierczak, Richard F.**  
Jr.,  
LSU Center for Natural  
Resource Economics &  
Policy, Louisiana State  
University

framework with land-feature data obtained from the Louisiana Department of Natural Resources in order to generate property characteristic information. Model specification relied on a modified Aitchison approach to handle marsh type distribution intra-property, and a double-log functional form was employed. The estimated model was statistically significant and explained 65 percent of the variation in the data. Parameter estimates for all 4 land-type percentages (fresh, intermediate, and brackish marsh, along with open water) were statistically significant, as were parameters for property size, percent interest sold, location and year. Parameters associated with distance from the coast and the nearest road access were insignificant. Most interestingly, sales price per acre was found to decline with increasing percentages of all three marsh types, while sales price per acre was found to increase with increasing percentage of open water. This suggests that private market incentives may work against initiatives to restore and maintain coastal wetlands, and that programs that seek to enlist private landowners in coastal restoration efforts will need to overcome these private market incentives. Although the reason for these results is not entirely clear at this point, we hypothesize that the revenue-generating potential of open water and mixed open water/marsh properties for hunting leases is capitalized into the property values, and that this potential increases as the percentage of open water increases.

**Landry, Craig**  
**Bin, Okmyung**  
Department of Economics,  
East Carolina University

#### **AMENITY VALUATION IN SIMULTANEOUS HEDONIC PROPERTY MARKETS**

Hedonic property models have become ubiquitous in urban, environmental, and resource economics, as they are useful for assessing the importance of non-marketed goods to homeowners. Since agents trade in a single unit of the commodity, competitive market prices adjust to reflect differences in quality. Ownership of more than one property in distinct markets engenders a situation in which a property can be traded in simultaneous markets—the rental and sales market. Since households typically do not occupy both properties simultaneously, they have the ability to offer one of the properties as a seasonal rental. This situation is common for many unique environmental resources, such as remote lakes and streams, coastal locations, alpine terrain, and areas adjacent to national parks and hunting grounds. When a household owns a vacation home in such a location, they spend only a fraction of their time there. In some cases, they let their second home stand vacant, but in others they rent the property when they are not using it. For some households rental income can be an important source of funds for making mortgage, property tax, and insurance payments. It is not uncommon that resource economists are interested in some aspect of environmental quality in these types of locations. They sometimes turn to the property market for signals of value on preferences for environmental quality. If properties are traded in two different markets, which market should they consider? Does it matter? What are the implications of trading in simultaneous markets for the standard hedonic results? Can the information from simultaneous markets for the same good be used to improve estimation techniques? These are some of the questions we explore in this paper. We posit two hedonic price schedules—one for property rental and the other for property sales—as functions of property attributes. We expect many attributes to be common to both schedules, though we hypothesize that risk factors (e.g. flood and erosion risk) will affect the sales price but not the rental rate. Each price schedule expresses equilibrium market price as a function of property attributes. Both the sales and rental hedonic price schedules can affect homeowner behavior—the sales price is an element of household expenditures as in the conventional hedonic model, while the rental rate affects the budget constraint. The homebuyer's optimization problem entails choosing not only the array of property characteristics but also the amount of time to supply the property in the rental market. We derive first-order conditions for the homebuyer's problem under the existence of a "side" rental market. We show how both the hedonic sales and rental gradients affect choice of housing attributes and rental supply. Further, we show that for properties traded in both markets simultaneously, true marginal WTP for a property attribute will reflect both hedonic gradients. Estimating WTP from only the sales price function, as is commonly done, may result in biased conclusions. We explore these implications using rental and sales data for a sample of coastal North Carolina properties.

**Landry, Heidi**  
**Henning, Steve**  
Center for Natural Resource  
Economics & Policy  
Louisiana State University  
Agricultural Center

#### **RAISING CANE: THE USE OF BMPS TO MANAGE AGRICULTURAL NONPOINT SOURCE WATER POLLUTION IN SOUTH LOUISIANA**

Agriculture has been cited as a major source of nonpoint source water pollution in Louisiana. The federal EPA has the responsibility for monitoring nonpoint pollution from all sources. In agriculture, the federal agencies are applying best management practice guidelines developed by NRCS. The state of Louisiana currently regulates agricultural nonpoint source water pollution through the use of voluntary compliance. The LSU AgCenter serves as the education center for farmers. The AgCenter has developed the Master Farmer Program as an education tool to promote farmer compliance within nonpoint regulation. This program has been adopted by the state legislature as the state's primary compliance program for agriculture. The objective of this poster is to present evidence from previous studies on rates of bmp adoption by farmers and the impact the Master Farmer program has had on improving rates of adoption. The poster will also discuss factors influencing adoption rates and potential policy steps to advance further bmp adoption. Finally, the poster will outline plans for further analysis of bmp adoption by rice producers.

**Lane Robert R.** <sup>1,2</sup>  
**Day, John W.** <sup>1,2</sup>  
**Lindsey, Joel** <sup>1</sup>  
**Day, Jason N.** <sup>1,2</sup>

#### **WETLAND ASSIMILATION OF TREATED MUNICIPAL EFFLUENT: IMPROVED WATER QUALITY & WETLAND RESTORATION IN LOUISIANA**

Normally, treated municipal effluent is discharged directly into nearby rivers and streams, often causing water quality problems. When effluent is discharged into wetlands first, water quality is greatly improved in the receiving rivers and streams. In the receiving wetlands, plant productivity is stimulated, increasing organic matter production and deposition, leading to increased wetland surface elevation that can offset regional subsidence,

<sup>1</sup> Comite Resources, Inc.

<sup>2</sup> Department of Oceanography and Coastal Science, Louisiana State University

which is as high as 10 mm/yr in Louisiana. Wetland assimilation of municipal effluent creates a positive feedback loop of decreased flooding depth due to increased wetland surface elevation, decreasing flooding stress and promoting even higher rates of plant production, organic matter deposition, and surface elevation gain. We present results from several wetlands in coastal Louisiana that have been receiving secondarily treated municipal effluent for a number of years (the effluent has no toxic inputs, has gone through retention ponds, and has been disinfected prior to discharge). The city of Thibodaux has been discharging 4-6 MGD into a 231 ha forested wetland since 1991, and the city of Breaux Bridge has been discharging 1 MGD into a 1475 ha forested wetland since 1950. Data from these case studies indicate very high nutrient removal (up to 100% for NO<sub>x</sub>, 69-80% for TN and 70-87% for TP), long-term increases of vegetative productivity, and substantial increases of wetland surface accretion rates. Other municipalities in Louisiana using wetland assimilation of municipal effluent include Amelia, Mandeville, Luling and Hammond, and the cities of Broussard, St. Martinville, and Franklin are in various stages of implementation. The introduction of treated municipal effluent into the highly perturbed wetlands of Louisiana is a major step towards their ecological restoration. In addition to increasing wetland surface elevation, the freshwater component of effluent provides a buffer for saltwater intrusion events, especially during periods of drought, which are predicted to increase in frequency in the future due to global climate change. These ecological benefits to wetlands are in addition to improving water quality in surrounding rivers and streams, and providing municipalities with an economical and energy efficient means to meet more stringent water quality standards. Also, wetland assimilation projects are very resilient to hurricane damage compared to conventional tertiary treatment plants.

**Laska, Shirley  
Peterson, Kristine**  
Center for Hazards  
Assessments, Response,  
Technology, University of  
New Orleans

### **RELOCATION FROM THE COMMUNITIES' PERSPECTIVES**

Relocation is a concept that bears many meanings and nuances post Katrina and Rita for residents of severely impacted Louisiana coastal communities. And the meaning assigned by residents has been constantly in flux during this first (almost) two years since the storms. It also is an emotionally laden term, a very personal challenge but also a socially constructed consideration. Such complexity is in contrast to the question often asked by non community members: "Shouldn't they (the severely impacted coastal community) relocate?" This presentation will examine the meaning of relocation from the impacted communities' perspectives by presenting the framings of the communities in their own words. This presentation is a compilation of research from several collaborative applied projects conducted and currently underway by CHART Faculty Associates and Graduate Research Assistants. The communities from which the relocation framings have been drawn for the presentation include: Grand Bayou in Diamond and Venice/Boothville, Plaquemines Parish; Yscloskey Isles and Chalmette, St. Bernard Parish; Lake Catherine, Lakeview/Gentilly and Village de L'est Vietnamese, Orleans Parish; In addition, consideration of loss of community and fears of relocation prior to the storms will be drawn from Grand Isle, Jefferson Parish; Delcambre, Vermillion Parish and Terrebone bayou "finger" communities. The presentation will end with a discussion about what the role can and should be for professionals who want to support the post disaster adaptation responses of coastal communities and their residents.

**Leitz, Jeremy  
Grubbs, Faye**  
Texas Parks and Wildlife  
Department, Coastal  
Fisheries Division

### **ASSESSING ANGLER'S BOATING BEHAVIORS IN, AND PERCEPTIONS OF, SHALLOW WATER SEAGRASS HABITAT**

Texas conservation agencies developed a Seagrass Conservation Plan for Texas in 1999. That plan focused on research, management, policy issues, and public outreach and education regarding seagrass beds. In June of 2000, Redfish Bay near Port Aransas was designated a scientific area (Redfish Bay State Scientific Area - RBSSA) by the Texas Parks and Wildlife Department (TPWD) for the purposes of protecting and studying seagrasses. RBSSA contains unique, fragile biological communities of seagrass beds that provide valuable feeding and nursery habitat for fish and other aquatic species. Three areas within RBSSA were marked as voluntary no-prop zones to boaters from 2000 through 2005 to minimize destruction of seagrass beds by boat propellers. These zones proved largely ineffective in reducing seagrass damage. In May 2006, TPWD passed a regulation making it unlawful to allow any rooted seagrass plant to be uprooted or dug out from the bay bottom by a submerged propeller within RBSSA. A mail questionnaire was developed to collect information on Redfish Bay angler's behaviors in, and perceptions of, seagrass habitat and other issues pertinent to fisheries and seagrass management in Texas. Some questions were repeated from a similar survey conducted in 2001 of Redfish Bay and Nine-Mile Hole anglers to allow for comparative analysis. Between March and April of 2006, 2,087 questionnaires were mailed to anglers intercepted during access point creels in Redfish Bay from January 1, 2003 through September 30, 2005. This study targeted private boat anglers fishing in Redfish Bay. 1,229 anglers responded with an effective response rate of 63%. More than 90% of anglers reported they "sometimes" or "always" use methods other than motoring to reach deeper water when they encounter shallow water over a grass flat. When asked what method they use to reach deeper water, the large majority of anglers (96%) indicated they "sometimes" or "always" drift. Other responses included polling, and wading/pushing. The majority of Redfish Bay anglers (90%) agreed that "seagrass coverage in bays is important." Similar numbers of anglers agreed that "seagrasses are important to water quality", and "seagrasses provide important nursery areas." Anglers were not as certain if seagrass acreage is increasing or if seagrasses recover quickly from scarring. We believe these results can be used to enhance the effectiveness of our public outreach and education efforts to encourage anglers to minimize their impact on seagrass beds.

**Lin, Shanshan**  
**Mullen, Jeffrey D.**  
**Hoogenboom, Gerrit**  
Dept. of Agricultural &  
Applied Economics  
University of Georgia

## **INFLUENCE OF RISK AVERSION ON OPTIMAL IRRIGATION MANAGEMENT STRATEGIES**

Water resources in Georgia are under increasing pressure from human activity. As in many regions of the United States, irrigation constitutes the largest consumptive use in Georgia, highlighting the value of efficient management of irrigation water. This study uses a bio-economic engineering simulation model to assess irrigation choices for peanut production in two sites (Mitchell, Georgia and Gainesville, Florida) under stochastic weather conditions. The agronomic crop growth model, Decision Support System for Agro-Technology Transfer (DSSAT) model is used to simulate long-term (20 years) peanuts yields and irrigation applications under different irrigation thresholds, in addition to rainfed production. Outputs from the plant simulation model are incorporated into an economic model for the determination of optimal irrigation scheduling under two systems of historical product prices: quota and additional peanut prices. Two mean-variance utility functions are employed to examine solutions across a range of risk aversion coefficients – one represents constant relative risk aversion (CRRA), the other represents the conventional constant absolute risk aversion (CARA) model. Preliminary results suggest the optimal irrigation strategy for risk neutral farmers is 50% and 40% soil moisture for quota peanut price and additional peanut price, respectively. (Final results will be compiled prior to the conference.) Under both the CRRA and the CARA models, as risk aversion increases the optimal strategy is to reduce irrigation water use. With the CRRA model the divergence from the risk neutral strategy occurs at a lower level of risk aversion for quota peanut prices than for additional peanut prices. The converse occurs for CARA model. There is, however, a substantial range of risk aversion over which the optimal strategy in both models is the same for both price levels. This result suggests that recent changes in peanut price support policy will likely have a limited impact on the amount of water used to produce peanuts in this region.

**Loomis, David K.**  
Human Dimensions of  
Marine & Coastal  
Ecosystems  
Dept. of Natural Resources  
Conservation  
University of Massachusetts  
Amherst  
**McTigue, Terry**  
Center for Coastal  
Monitoring & Assessment,  
National Centers for Coastal  
Ocean Science

## **COASTAL RESTORATION: MONITORING, PLANNING AND EVALUATION**

The Estuary Restoration Act of 2000 authorized funding for coastal habitat restoration projects throughout the U.S. Within the Act is the requirement that project monitoring plans be developed and implemented. Although much of the restoration monitoring will focus on biological and ecological aspects of each project, NOAA also intends to integrate human dimensions aspects into the restoration monitoring plans. During April, 2004, a workshop was held at the University of Massachusetts Amherst for the purpose of identifying and discussing the human dimensions outcomes that would reasonably be expected to result from the restoration of coastal ecosystems. From this were developed a total of 16 goals, which were further specified by identifying a total of 83 measurable parameters, with each parameter being associated with one or more restoration goals (See Science-Based Restoration Monitoring of Coastal Habitats, Chapter 14). Those engaged in coastal restoration efforts can refer to these goals and parameters and include them, as appropriate, in their monitoring plans. The intent is to measure some subset of these parameters after the restoration project has begun or ended. However, there is no clear requirement that these goal or parameters be included as part of any restoration planning effort. In the above context, use of the term monitoring is correct. It implies that various human dimensions parameters relating to a restoration effort can and should be examined to simply see if any change has occurred. Unfortunately, because these human dimensions aspects are typically not included as part of a restoration plan, there should be no expectation for specific changes in specific parameters. No predictions can be made, since the goals and parameters are not part of the planning effort. The ability to properly identify and quantify the human dimensions benefits arising from a restoration project is thus greatly hampered. This is a weakness that can be addressed. We suggest that 1) human dimensions goals and parameters be included in the restoration planning process, and 2) replace the notion of monitoring with evaluation research. By incorporating human dimensions goals and parameters in the initial plan, it is possible to identify and predict likely human dimensions benefits. Once these have been identified and predictions made, evaluation research methods can be applied. The results of such research will be much more helpful to restoration planners. The purpose of our paper is to outline this approach. We will discuss human dimensions "monitoring" as a planning-evaluation process. In this process, human dimension goals and specific measurable parameters would be identified, likely outcomes predicted, and through evaluation research the success of the restoration project measured. The results of such a process will allow better judgments to be made about restoration projects, and the use of such information will permit changes and improvements to occur. The worth of a restoration effort will be better identified, which will in turn provide evidence that stakeholder efforts and scarce funding have been well used.

**Lupi, Frank**  
Department of Agricultural  
Economics, Michigan State  
University  
**Kaplowitz, Michael D.**  
Department of Fisheries and  
Wildlife, Michigan State  
University  
**Arreola, Oscar** Department  
of Community, Agriculture,  
Recreation and Resource  
Studies, Michigan State  
University

## **PUBLIC WILLINGNESS TO FINANCE WETLAND PRESERVATION AND CONSERVATION**

The research investigated public preferences and willingness to pay for Great Lakes coastal wetland programs. Data was collected using a mail survey of a random sample of Michigan residents. The survey included a stated preference valuation question as well as questions about use and knowledge of Great Lakes coastal wetlands. The survey asked respondents to vote on a coastal wetland program with tax implications and program attributes that varied across the sample. Program attributes included environmental services to be preserved or restored, and the types of property acquisition mechanisms (i.e., via land contracts, easements, and fee simple purchase). The model estimates revealed that respondents significantly prefer wetland programs focusing on providing (1) water quality and flood control, (2) biodiversity, and to some extent (3) those focusing waterfowl, above other possible priorities (e.g., fish habitat, open space). Respondents preferred programs where more effort was directed at wetland preservation as opposed to wetland restoration. The lower bound mean willingness to pay for the wetland programs was \$163/household which results in a present value of \$20,500/acre of coastal wetland protected or restored. However, less than half of the respondents indicated they would "definitely vote for" the program.



**Hoehn, John P.**  
Department of Agricultural  
Economics, Michigan State  
University

**Mack, Sarah K.**  
**Austin, G.C.**  
Sewerage and Water Board  
of New Orleans, New  
Orleans, LA  
**Englande, A.J. ,Jr.**  
**Reimers, R.S.**  
Tulane School of Public  
Health and Tropical  
Medicine, New Orleans, LA  
**Day, John**  
LSU-Coastal Ecology  
Institute

**MacNair, Doug**  
**Ung, Poh Boon**  
Triangle Economic Research,  
An ARCADIS Company

**Mark, Tyler**  
Dept of Agricultural  
Economics & Agribusiness,  
Louisiana State University  
**Allan Gray**  
**Brad Joern**  
**Michael Boehlje**  
Dept of Agricultural  
Economics  
Purdue University

Thus, while there was substantial average willingness to pay, per acre, for the typical programs, the programs would be unlikely to pass as a tax financed ballot initiative.

#### **A REGIONAL INITIATIVE OF THE SEWERAGE AND WATER BOARD OF NEW ORLEANS AND ST. BERNARD PARISH GOVERNMENT TO USE MUNICIPAL WASTEWATER EFFLUENT FOR WETLAND RESTORATION AND STORM PROTECTION**

The separation of humans from the environment through conventional engineering resulted in environmental degradation, an increased vulnerability to global climate change, and a false sense of security in manmade structures. The tragic consequences of Hurricane Katrina brought the realization that people are part of the ecosystem. The sustainability of New Orleans will now require innovative solutions that facilitate a reconnection to the natural environment through ecosystem management that incorporates ecosystem services with human welfare. To be successful infrastructure will need to incorporate human dimensions and the environment into implementation plans. For these reasons the regional infrastructure initiative of the Sewerage and Water Board of New Orleans (S&WB) and St. Bernard Parish Government (SBPG) for municipal effluent treatment through wetlands assimilation has been recognized as one of the most innovative and sustainable efforts in the recovery of the Gulf Region. The goal of this project is to elevate the region to national and international excellence in a multi-disciplinary approach to infrastructure and wetland restoration to be used as an international model of recovery, policy change, sustainability, and hazard mitigation. The Sewerage and Water Board of New Orleans and St. Bernard Parish Government have partnered to implement what will be the largest wetland assimilation system in the world. The design will utilize natural wetlands to assimilate over 100 million gallons a day (MGD) of secondarily treated municipal effluent to restore approximately 15,000 acres of critical cypress wetlands. Currently nutrient rich effluent from both parishes is discharged to the Mississippi River where it contributes to the hypoxia, or dead zone in the Northern Gulf of Mexico. Rerouting the effluent will allow the nutrients to be used to replenish the wetlands, rather than increasing damage to the coastal environment. The wetland restoration project will integrate sustainability with mitigation measures. The enhanced wetlands will protect Orleans and St. Bernard Parishes from future storm vulnerability, while the environmental improvement will protect the local economy and culture that is dependent on productive wetlands.

#### **TRADE-OFF ANALYSIS FOR VALUING SOCIO-ECONOMIC AND ECOSYSTEM IMPACTS**

Coastal wetland policies have multiple impacts across ecosystems and stakeholders. In order to effectively evaluate alternative policies, policymakers must determine, either explicitly or implicitly, the relative weight or importance that should be given to each impact. There are a variety of techniques for explicitly estimating these weights. To provide meaningful values, we believe that a technique should have three key characteristics: Intuitive appeal to respondents; Minimal opportunity for "strategic" or "self-serving" answers; and, Input from the correct stakeholders. Trade-off analysis using conjoint surveys is the most appropriate tool for evaluating relative weights for multiple impacts. Trade-off analysis uses a structured approach to identify the appropriate stakeholders (e.g. having scientists/not the public evaluate trade-offs in ecosystem function) and the criteria they feel are most important. In a conjoint survey, respondents evaluate "packages" of outcomes (see Figure 1 for a simplified example), and a statistical model estimates the weights they give the criteria based on their choices (Figure 2). It is usually easier for respondents to evaluate outcome bundles than to assign numerical weights directly. Further, the conjoint survey process requires respondents to make trade-offs between impacts, preventing them from weighting all the impacts as "very important" or giving "strategic", which is a common problem in weighting surveys. To show the potential value of trade-off analysis, this paper and presentation will conduct two pre-conference trade-off web surveys of attendees. The two surveys will include questions similar to the example in Figure 1. One survey will address socio-economic impacts and the other will address ecosystem impacts. The results from the surveys will be incorporated into the presentation. The presentation will cover the following topics: Appropriate uses of trade-off surveys; Survey design and implementation; Determination of the correct stakeholders; Interpretation of the survey results; and, Strengths and limitations of trade-off surveys. The presentation and hands-on survey will provide respondents with a concrete example of an important tool that can be used to value socio-economic and ecosystem impacts.

#### **GROWING THE U.S. LIVESTOCK ECONOMY: THE ENVIRONMENTAL (PHOSPHORUS ASSIMILATION) CHALLENGE**

Divisive and intense debate surrounds the decisions concerning the location and siting of livestock production facilities in the U.S. Strong opposition is often expressed by environmental groups and many rural residents concerned about water quality and odor and air quality, as well as congestion near the locale of a proposed site. Animal nutrient production and assimilation capacity could be one of the most limiting factors in the future in terms of growth in the livestock industry as phosphorus-based manure land applications are phased in across the U.S. Shifting from a nitrogen-based land application standard to a phosphorus standard reduces the nutrient assimilation capacity of agricultural fields by approximately 66% since nitrogen can be assimilated at about three times the rate of phosphorus. This discussion summarizes the analysis of the potential for manure utilization and phosphorous assimilation in various geographic regions in the U.S. to assess the constraints that might be encountered, and thus the challenges and opportunities for growth in the livestock industry.

**Miller, Craig A.**  
Warnell School of Forestry  
and Natural Resources  
University of Georgia

## **PUBLIC AWARENESS AND SUPPORT FOR COASTAL RESTORATION**

We conducted a return mail survey of 4,500 homeowners throughout the Mississippi River Valley during summer 2006 to determine public awareness and perceived impacts of coastal erosion, and support for actions and funding for restoration. A total of 1,991 (28.4%) completed questionnaires were returned. A majority of respondents (71.3%) reported "protecting wetlands" was an important concern for them; 66.8% responded that ecosystem restoration was important; 64.2% felt protecting coasts from hurricane damage was an important issue. Few respondents (7.2%) could accurately define the America's Wetland Campaign, whereas 54.5% reported they had not heard of the educational program. Less than half (40.2%) of respondents indicated they could explain the process by which coastal ecosystems are restored, with slightly more than one-quarter could explain the importance of coastal ecosystems to their everyday life (27.2%) and why coastal ecosystem restoration is conducted (26.5%). More than half (54.4%) felt comfortable explaining causes of hypoxia in the Gulf of Mexico. When asked if they were aware of the role Louisiana coastal wetlands plays in various roles, 62.7% of respondents stated they were unaware of that Louisiana was the leading producer of oysters, 50.8% were not aware of the state's role in shrimp production, and 72% were unaware of Louisiana's place in total live fish catch in the United States. When provided with total annual funding for coastal wetland restoration in Louisiana, 58.7% of respondents felt that amount was too low. This paper will present differentiation of public attitudes between states in the upper and lower Mississippi Valley, Louisiana and Mississippi. We discuss values-orientation and educational market segmentation based on likelihood of acceptance of messages concerning coastal erosion and restoration.

**Morehead, Sally**  
Mission-Aransas NERR  
University of Texas Marine  
Science Institute

## **A COMMUNITY CHARACTERIZATION OF THE MISSION-ARANSAS NATIONAL ESTUARINE RESEARCH RESERVE WATERSHED**

The human dimension is characterized by the social, cultural, economic, and political aspects of our surrounding environment. Changes to these aspects influence human perception and behaviors, which affect resource management decisions. An examination of the human dimension can provide a better understanding of not only resource flow but also human perception and behaviors. The Mission-Aransas National Estuarine Research Reserve (NERR) created a community characterization for nine counties within the Mission-Aransas NERR watershed as a baseline assessment to understanding the human dimension within this region. A total of 38 maps depicting census data from 2000 were produced at state and regional scales to analyze social trends in the community such as population, social class, economics, ethnicity, and age. Variables such as these will provide resource managers with information on the interaction between human communities and biophysical systems. A better understanding of this interaction will help resource managers apply social-ecosystem spatial trends when making decisions regarding the local watershed.

**Morgan, Ash**  
**Huth, Bill**  
**Martin, Greg**  
Department of Marketing  
and Economics, University  
of West Florida

## **DIVING DEMAND FOR LARGE SHIP ARTIFICIAL REEFS**

The research develops both an economic impact analysis and travel cost model to provide the first estimate of demand for the world's largest artificial reef (USS Oriskany) and its total contribution to the regional economy. We also provide policy-based analysis that measures the value to divers from creating a "multiple ship reefing area" as opposed to single-site destinations. Florida has the most active and diverse artificial reef program in the U.S. Florida's 8,426 miles of tidal coastline have more than 2,000 documented public artificial reefs, including 400 plus submerged vessels along 1,200 miles of Gulf of Mexico and Atlantic Ocean shoreline. Given the extensive implementation of an artificial reef system around the entire state of Florida and its continued development it is important to accurately monitor the economic value that the reef system produces for the state and its citizens, yet the economic impact of artificial reefs is not well understood due to limited research. The USS Oriskany is a retired Essex Class attack aircraft carrier that was successfully reefed on May 17, 2006, in the Gulf of Mexico, approximately 24 miles off the coast of Pensacola. Despite early concerns about her sinking, the vessel sits upright in a north-south direction, in 212 feet of water, with a length of 910 feet. It was the first time a vessel of this size had been deliberately sunk to become an artificial reef. Its location and attraction as the world's largest artificial reef makes the Oriskany an exceptional destination for divers throughout the U.S. and internationally. The research measures the demand for diving the Oriskany and its contribution to the regional economy through a web-based contingent behavior survey of individuals known to have visited the region to dive the artificial reef. We also address an important policy issue associated with the U.S. Maritime Administration (MARAD). At present, MARAD has a number of out-of-service military ships of various types that are being considered for use as artificial reefs in a variety of locations in U.S. coastal waters. There are various scenarios under consideration for locating these ships as the reefing program progresses over the next several years. One possibility is to create a "single ship" distribution involving the use of one ship in one location to create a single artificial reef diving destination. Another possibility is to create a "multiple ship reefing area" by combining two or more ships in one location to create a multiple artificial reef diving destination. We measure the value of creating a "multiple ship reefing area" by sinking a Spruance Class Destroyer in the permit area with the Oriskany. Using the web-based survey, we provide respondents with a description of the destroyer and its hypothetical location to the Oriskany. In estimation, using the travel cost framework, we measure demand for diving the bundled good of both the Oriskany and the destroyer, providing MARAD with an estimate of the value of the "bundled good" policy approach as opposed to a single ship distribution.

**Morgan, Ash  
Huth, Bill  
Martin, Greg**  
Department of Marketing  
and Economics, University  
of West Florida

#### **OYSTER DEMAND ADJUSTMENTS TO ALTERNATIVE CONSUMER EDUCATION PROCESSES IN RESPONSE TO *Vibrio vulnificus*.**

We use contingent behavior analysis to study the negative welfare effects of *Vibrio vulnificus* (*Vibrio v.*) on oyster demand and to determine the most effective marketplace information tactics to educate consumers and reduce the perceived risk associated with *Vibrio v.* in oysters, thus mitigating consumer welfare losses and potentially increasing oyster demand. The oyster industry is a vital resource and a multi-million dollar industry in the United States. Florida and the Gulf Coast in general possess some of the most valuable U.S. oyster resources; however, the Gulf of Mexico coastal water climate also supports recurring *Vibrio vulnificus* (*Vibrio v.*) issues that raise oyster product safety and quality concerns among the nation's fishermen, aquaculture farms, processors, exporters, retailers, restaurants, and consumers. *Vibrio v.* is a gram-negative bacterium found naturally in warm, brackish, coastal waters, such as the Gulf of Mexico. Filter-feeding shellfish, such as oysters, concentrate *Vibrio v.* in their tissues. Consumption of *Vibrio v.*-contaminated raw oysters by individuals with certain health conditions can cause life threatening illnesses, the most common of which is acute septicemia or blood poisoning. Those most at risk are individuals that suffer from health conditions such as liver disease, iron overload disease, diabetes, cancer, or a weakened immune system. In some instances *Vibrio v.*-related illness can lead to death; however, reported incidences of *Vibrio v.*-related illnesses are infrequent. Oyster consumers' understanding of *Vibrio v.* risk and its impact on consumer marketplace behavior is a major concern for the oyster industry and relevant state and federal agencies. Misconceptions about how to reduce the risk of *Vibrio v.* infection from oyster consumption are widespread. That and FDA mandates have resulted in the development and implementation of educational and outreach programs to better inform consumers about the risks associated with *Vibrio v.* and research associated with the efforts has become a priority for state and federal regulatory agencies and industry stakeholders. The research uses a unique two-stage web-based contingent behavior design. In stage one, respondents are contacted via telephone and asked a series of questions designed to provide pre-treatment baseline data for oyster product consumption experience, attitudes, and preferences, and relevant demographic data. In stage two, respondents are directed to a website where they are provided with a hypothetical press release regarding a recent *Vibrio v.*-related death and a color brochure reassuring the consumer of the safety of oyster consumption and the negligible risks associated with *vibrio v.* We estimate a set of demand-difference models based on individual responses to contingent behavior questions regarding oyster consumption in the presence of *Vibrio v.* and with a positive information treatment provided about health risks. The web-based design also allows the positive information treatment to vary by source (specifically, the Interstate Shellfish Sanitary Conference (ISSC), a fictitious brand identify such as the "The American *Vibrio* Association," and a control group). Varying the positive information treatment by source, we examine and quantify the effects of different information sources in a product safety educational information treatment in mitigating aggregate consumer welfare losses.

**Norris-Raynbird, Carla**  
Department of Social  
Relations & Services  
Bemidji State University

#### **EXPLORING PARISH COASTAL ZONE MANAGEMENT CAPACITY WITHIN THE CONTEXT OF LOCAL COASTAL PROGRAMS**

Social research specifically aimed at evaluating the efficacy of coastal zone management programs at the parish (county) level in building local capacities is meager. This paper addresses the issue of local capacity in coastal zone management (CZM) by examining parish participation in Louisiana's Local Coastal Program (LCP), knowledge of coastal issues, and conceptualization of the interface of the Local Coastal Program and coastal issues. Research conducted in the nineteen coastal zone parishes in 2005 just prior to Katrina utilized survey, interview, and observation methods to produce individual level data on local decision-makers and implementers (parish officials, CZM administrators and advisory panel members). The analyses show that coastal hazards vulnerability is highly salient to both LCP and non-LCP respondents, but the translation of hazard impacts to economic vulnerabilities, such as infrastructure damage, property loss and business interruption, is far weaker for respondents from non-LCP parishes. Among non-LCP respondents, emergent themes are a lack of urgency to become involved in coastal zone management and a failed cost-benefit perception. Participation in educational and socialization processes that work toward the building of institutional capacity in coastal zone management is much higher for LCP respondents than that of non-LCP respondents, however knowledge and engagement in coastal zone issues is shown to be lacking specifically among parish government officials from both LCP and non-LCP parishes. Most LCP respondents agreed that the LCP facilitated their parish having 'a say' in state CZM permitting matters and that public involvement in coastal zone matters had increased as a result of their LCP. A major theme that emerges from the interviews is the disjunction between the regulatory and restorative mandates of coastal zone management in Louisiana. Findings indicate that the Local Coastal Program is relatively effective at building local regulatory capacity, but that this focus may be over-narrow given the complex vulnerabilities of coastal Louisiana. Further, the incoherencies between regulatory LCP mandates and CZM restoration mandates from the lead agency, all but ensures a conflictive local arena right at the point of policy implementation.

**Parrillo, Jordan  
Ehler, Rod**  
National Marine Sanctuary  
Program  
National Ocean Service  
NOAA

#### **THE ROLE OF SOCIOECONOMIC ANALYSIS AT THUNDER BAY NATIONAL MARINE SANCTUARY AND AS A PART OF MICHIGAN SEA GRANT'S NORTHEAST MICHIGAN INTEGRATED ASSESSMENT**

Vital to the mission of NOAA's National Marine Sanctuary Program (NMSPP), is the integration of social science considerations into the management of coastal resources. Sanctuary resources are scarce commodities that are under pressure from a variety of sources. Users have commercial, recreational and cultural motivations for making use of marine resources, and those who manage these resources require information with which they can balance uses with resource protection. This information may include descriptive information such as who the users are, the extent of their use, and how much of their income, if any, is dependent upon sanctuary resources. It is a

common procedure in the NMSP to initialize or update a previous socioeconomic assessment of a NMS study area when the site is preparing for its required 5 year management plan review (MPR) process. In addition to a full socioeconomic characterization of the area, data gaps are addressed and recommendations are made on where to invest money for primary data collection (i.e. visitor surveys, recreational fishermen logs, etc.). Another important role of socioeconomic analysis is determining how the user's behavior will be altered with potential policy changes (i.e. implementation of marine reserves), and estimating the socioeconomic impact of that change. In April of 2006, the Thunder Bay National Marine Sanctuary (TBNMS) began the early stages of its MPR process. To support this effort, a full socioeconomic assessment of the local region was initiated. The first steps included meeting with local officials and decision makers in the three county (Alpena, Alcona, and Presque Isle) study area approximately represented by TBNMS. These meetings provided the socioeconomic team with all the available resources to evaluate the social and economic importance of the sanctuary waters. The NMSP prides itself on the many partnerships it holds and the collaborative nature of the work being done. Opportunities are sought after that involve community interaction or that overlap with local development issues and other regional priorities. In the case of TBNMS, the timing was ideal for collaboration with a Northeast Michigan Integrated Assessment (NEMIA) working group led by Michigan Sea Grant and comprised of local stakeholders, tourism officials, policy makers, and state and federal land managers. The working group was created to address the issues of sustainable tourism development and coastal access in northeast Michigan. The integrated assessment included input from four technical teams, (socioeconomic, ecological, cultural, and planning/zoning), and the collaborative, multi-disciplinary, holistic approach to resource conservation made it an ideal project for the NMSP to become involved in. The NEMIA working group is currently in the process of prioritizing potential policy options for the future of sustainable tourism development in NE Michigan. For each of the potential policy options the socioeconomic team will be analyzing the implications to the region. The final product of this effort will be a paper and a presentation to the NEMIA working group on the information that has been gathered, the methods used, the future information needed, and a plan for collecting further socioeconomic monitoring data (i.e. visitor surveys).

**Paudel, Krishna**  
Center for Natural Resource  
Economics & Policy,  
Louisiana State University  
Agricultural Center  
**Bhattarai, Keshav**  
University of Central  
Missouri

#### **A GIS BASED ECONOMIC MODEL FOR OPTIMAL USE OF BROILER LITTER AS CROP NUTRIENTS IN LOUISIANA**

Broiler production contributes significantly to the agricultural revenue in the majority of southern states in the USA. This is no exception in Louisiana where more than billion dollars in revenue are generated every year from broiler production. Broiler production is a unique operation compared to other livestock industries. First, it is a vertically integrated industry where farmers are merely contractors. Second, Farmers own broiler house and provide labor and management where as an integrator provides medicines, feed and chicks. Third, the responsibilities for waste management rest, unfortunately, completely on broiler producers creating a unique scenario uncommon to many crop production contractual agreements, in latter where every thing (input/output) is proportionately divided. One of the common uses for broiler litter by farmers in these broiler production states has been to apply it on land as crop nutrients. The transportation and use of broiler litter from production facilities to crop land costs money, therefore, breakeven distance depends on nutrient content in litter as well as litter hauling, loading, and spreading costs. In addition to the cost factor, litter cannot be applied just any where because of unique crop needs and environmental restrictions associated with litter use. Therefore, it is imperative to combine survey information about broiler litter use to a GIS model to develop a suitable optimization model. This study advances previous studies by embracing a comprehensive approach in litter transportation and use based on spatial characteristics of land. The optimization model is developed based on those farmers who indicated they sell their broiler litter. Results indicated limited transferability of broiler litter given the cost structures used in the study. Alternative uses of broiler litter may be required to overcome broiler litter related water pollution problem in a concentrated broiler production region.

**Petrolia, Daniel R.**  
Dept. of Agricultural  
Economics, Mississippi State  
University  
**Caffey, Rex H.**  
Center for Natural Resource  
Economics & Policy,  
Louisiana State University

#### **ECONOMIC ASSESSMENT OF RAPID LAND-BUILDING TECHNOLOGIES FOR COASTAL RESTORATION**

Prior to the 2005 hurricane season, coastal restoration efforts, namely those proposed and implemented through the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), focused almost solely on improvement of the ecological services provided by coastal ecosystems. However, there has been a call to better incorporate hurricane protection measures into ongoing and proposed coastal restoration programs. Incorporation of human-focused benefits could fundamentally alter the benefit-cost ratio of coastal restoration. Because such benefits can include reduced risk to human life and infrastructure, the net value of a given restoration measure may change considerably relative to what it was assumed to be prior to the 2005 hurricane season. In light of this shift in emphasis toward human-focused benefits, a more aggressive policy is emerging that could result in the increased use of those restoration technologies with the potential to build land rapidly. To some extent, the movement towards a more aggressive restoration response is indicative of the recognition that time is a major limiting factor in our ability to address coastal land loss. Loss of coastal land and ecological services due to factors such as relative sea level rise and nutrient/sediment starvation is a process that takes place over the course of many years, whereas damages due to a significant hurricane event take place overnight. Thus, in an effort to protect against the next major hurricane, the time necessary to complete a restoration project becomes increasingly important. Consequently, projects with a shorter restoration trajectory may be preferred to alternatives that produce somewhat similar results over a more prolonged period of time. For this reason, rapid land-building projects are increasingly compared to more natural approaches to coastal restoration. The purpose of the present work is but the first step in an aggressive effort to re-evaluate the economics of coastal restoration technologies. A conceptual model was developed to analyze the impact of uncertainty on the expected units of restored land from alternative

restoration policies which differ in terms of restoration trajectories. In each time period, land is expected to be restored according to the particular restoration policy. There is a probability that a significant weather event would completely decimate existing land mass and restoration efforts with it. This probability can be mitigated, however, through restoration. Furthermore, the expected land restored in any given period depends upon there not having been an event take place in any prior period. Thus, the expected quantity of land restored in a given period is determined by the cumulative probability of no event occurring up to that period. The choice of restoration policy becomes critical because land restored today serves to reduce the probability of land loss occurring, not only in the current period, but every period thereafter. Thus, the key result of the model is that policies that yield faster restoration trajectories reduce future risk; and even if the difference in trajectory is relatively small, the associated risk effects can be large, translating into substantial differences in expected restoration.

**Pine, John C.**  
Department of  
Environmental Studies and  
the Department of  
Geography and  
Anthropology, Louisiana  
State University

#### **COASTAL COMMUNITY RESILIENCY TO HAZARDS**

This presentation examines a process for classifying the status, exposure and recovery of physical, economic, socio-cultural, and ecological capital to natural and human-caused hazards for communities of the Gulf of Mexico region. The process integrates quantitative and qualitative methods using spatial and non-spatial data to identify indicators for community resilience to natural and human caused hazards. Resilience indices are drawn from: i) physical capital, ii) economic capital, iii) socio-cultural capital, and iv) ecological capital. The methodology used in this study is based on a conceptual framework that assesses and enhances the resilience of communities. Resilience is reflected in how quickly and how thoroughly a community recovers from a disaster. The pace and quality of recover are, moreover, closely linked to the initial damage suffered in the disaster, the ability of the system to weather this damage, and the actions taken to respond to it. These dimensions of resilience are referred to as "rapidity," "robustness," "redundancy," and "resourcefulness." The resiliency framework allows a community to define each measure of resilience in the context of four specific domains: technical, organizational, social and economic. Data for this study is being provided through the LSU GIS Clearinghouse established with support from FEMA following Hurricanes Katrina and Rita. Community outreach and education are critical in the effective implementation of the resilience indices and will be explained in the presentation. The research team is composed of faculty from University at Buffalo, University of British Columbia, and Louisiana State University's Hurricane Center, and staff from ImageCat, Inc. The project is supported with funding from the Coastal Services Center, NOAA.

**Posadas, Benedict C.**  
Mississippi State University,  
Coastal Research &  
Extension Center  
**Posadas, Ruth A.**  
**Perret, William S.**  
Mississippi Department of  
Marine Resources

#### **ECONOMIC DAMAGES OF HURRICANE KATRINA TO MISSISSIPPI COMMERCIAL AND RECREATIONAL FISHING INDUSTRIES**

An economic assessment of the commercial and recreational fisheries was undertaken in Mississippi from November 2005 to February 2006 to determine the level of damage sustained as a result of Hurricane Katrina. The devastation by this hurricane has created an urgent and compelling need to complete damage assessment in the affected areas in as short a period as possible. The assessment of the impacts of the natural catastrophic event on the state commercial and recreational fisheries and charter boat industries covered the following resident boats/vessels and facilities: commercial seafood processors (69 plants) and dealers (141 houses), Commercial fishing fleet (1,030 vessels/boats), Livebait dealers (30 houses), Marinas (37 facilities), For hire charter boats (100 vessels/boats), Land-based support facilities (5 facilities). Data were collected from survey questionnaires mailed to all resident boats/vessels and facilities licensed in the state of Mississippi. In addition, personal interviews with fishermen and site visits of facilities were conducted in four coastal locations by personnel of the Mississippi Department of Marine Resources-Office of Marine Fisheries (DMR) and the Mississippi State University-Coastal Research and Extension Center (MSU). A total of 510 interviews with resident Mississippi commercial fishermen were completed, representing an average response rate (ARR) of 49.6%. Eighty interviews with seafood processing plants (32), seafood dealers (43) and land-based support facilities (5) were completed (ARR=37.2%). Forty-two charter boat operators participated in the mail survey and personal interviews (ARR=42%). All of the 37 marinas in the three coastal counties when Hurricane Katrina landed were damaged. A sample of 10 marinas responded to the survey (ARR=of 27%). Eleven livebait dealers out of the 30 listed responded to the survey (ARR=36.7%). All of the livebait dealers were damaged. The tasks involved in estimating the economic damages had been extremely difficult and very time-consuming. Majority of the operators and/or owners of the boats/vessels and facilities, however, had been extremely cooperative in providing the economic information required in conducting a fairly exhaustive assessment. The results of the assessment indicated massive devastation of all the sectors included in the survey. This information on hurricane damages had been transmitted to local, state and federal agencies responsible for managing, regulating and assisting these industries. The primary short-term needs would include the removal of debris in fishing grounds and waterways, rebuilding of docking, repair, fuel and ice facilities, and creation of storm shelters for boats/vessels in safe inland waters. The future of these industries would depend on the timing and magnitude of the response of these agencies and the private sector to the devastation.

**Ranaivomanana, Lala**  
ENSAR Rennes and IHSM  
Toliara

#### **IDENTIFICATIONS OF THE CONDITIONS FOR THE APPROPRIATION BY THE POPULATION OF AN INTEGRATED MANAGEMENT OF THE ECOSYSTEMS: CASE OF THE TOLIARA'S LARGE REEF**

In view of the assumption that the sustainable management of the ecosystem is dependent on the positive participation of the neighboring population, the purpose of our research is to make out the conditions of appropriation of the sustainable development methods within the communities involved in this management

issues. The problems of Toliara's Large Reef that we can sum up to a state of alarming ecosystem damage to which significant anthropic pressures and a practical inexistence of "valid" answers are related, put the stakes in the core of the population's ability. In fact, to cope with poverty, accepted through both normative and qualitative indices, the population can but adopt a "defensive" strategy with the benefit of the viability of resources (natural wealth) and the "human" development (human resource). In order to identify the conditions shaped by "social variable" in a perspective of setting up a principle of sustainable development within the neighboring communities, our method is founded on socio-system analysis, the objective of which is to identify key parameters verifying the socio-system evolution with a prospective viewpoint where "variables" and "stakeholders" are taken into account. The structural analysis mentions that the socio-system evolution effectively depends on changes observed within the variable "Human resource" and "State Policy". However, the influence reallocation is conveyed through two relay variables : the "natural wealth" and the income" of the population. The adoption of an evolutionary strategy by the population, shaping the ecosystem sustainable management thus functions above all with the population's reinforcement of his capacity of choice. The strategic analysis of the stakeholder's role indicates that the "Social structure", "the State", "the donors" and to a lower extent the "the elected officials" constitute the entrance points to the system for any introduction of innovation. These actors have the necessary means to make this system evolving. However, the opening scope of the system is keeping up with 'the fishermen communities" and "the project development designers". As the most implied actors in the system, if their objectives are not achieved, the role remains static. In order to enable us to appreciate the socio-system permeability with respect to the understanding of introduction of sustainable natural resources management, the key elements of the determinism of the socio-system highlighted all along the analysis of the system were confronted with the realities, from the point of view of fixed theory. Actually, it was observed a mobilization approving development projects in so far as the objectives of the implementing agencies in the management of their assignment met the population's need, and the respect of social structures, according to the importance of its influence balance, contributed effectively to the appropriation of the created value. On the other hand, as far as projects aiming at "conservation" are concerned, the strategy of implementing agencies is to set up a local association (a dialogue structure) as a doorway. The importance of the State was so explicit that the rural response was reduced to a simple participation. The social structure not being mobilized, the importance of dialogue structure was not sufficient to bring about automatically the mechanism of appropriation. The outcome of the research especially attests itself the approach and methodology that strengthen sociology and anthropology for the promotion of science in the comprehension of the system.

**Richardson, Robert B.**  
Department of Community,  
Agriculture, Recreation and  
Resource Studies (CARRS)  
Michigan State University

#### **ASSESSING ECONOMIC VULNERABILITY TO CLIMATE CHANGE: A CONCEPTUAL FRAMEWORK FOR DEVELOPING COUNTRIES**

Changes in climate are expected to significantly affect the national economies of developing countries, particularly those with an economic dependence on coastal resources. Fisheries and tourism are important sectors for many economies of many developing countries, and the potential economic vulnerability to climate change is of interest. In the developing country context, economic vulnerability may be realized through impacts to industry revenues, tax revenues, foreign exchange earnings, and adaptation costs, all of which affect GDP. Warmer sea water is associated with coral bleaching and mortality, and may affect fisheries productivity as well as tourists' perceptions of the quality of coral reef resources for underwater recreation activities. Rising sea levels threaten the viability of coastal land, natural resources, and development. Greater frequency and intensity of tropical cyclones increase the vulnerability of physical infrastructure and capital to storm damage. This paper proposes a conceptual framework for the assessment of the economic vulnerability to climate change for coastal economies. Economic vulnerability is considered at both the macroeconomic and sector levels, with an emphasis on adaptive capacity in developing countries. Macroeconomic vulnerability may be exacerbated by high levels of economic integration and a dependence on a narrow range of exports for economic growth. Sector vulnerability is related to coastal hazards and a dependence on imports for production. The conceptual framework is based on an economic model of production and consumption. The conceptual framework has implications for training and outreach for industry professionals and policy makers and for the identification of future research and development priorities at the national and regional scales. The conceptual framework for vulnerability assessment will also contribute to the prioritization of adaptation measures to moderate the negative consequences of climate change.

**Salaudeen, T. Tayo**  
**Thomas, Michael H.**  
College of Engineering  
Sciences, Technology and  
Agriculture  
Florida A&M University  
**Harding, David**  
Florida Fish and Wildlife  
Conservation Commission

#### **ECONOMIC IMPACT OF TROPICAL SODA APPLE ON CATTLE PRODUCTION IN FLORIDA**

Tropical Soda Apple (TSA) is an invasive exotic weed from South America that is presently spreading across Florida's commercial pasture land and afflicting the state's beef producers. In a recent statewide survey of cattle producers, the authors have found that TSA is ranked as the most common pasture weed they face. Moreover, in the central and southern regions of the state over 80% of the survey respondents report having TSA on their ranches and over 65% declare it a major pest problem. While the level of actual pasture infestation is relatively low, ranging from about 9% to 12% coverage (for south and central portions of the state respectively), the potential is there for continued spread in the northern and panhandle portions of Florida. Perhaps most telling is the reoccurring economic loss that can be attributed to TSA. To control the weed, ranchers are forced to chemically and/or mechanically treat significant areas of their pastures. To accomplish meaningful management, the average rancher spends approximately \$25 and \$19 per acre in chemical and mechanical control respectively. When these figures are applied regional to all commercial pastureland, the economic impact to cattle producers

and their supporting industries is significant. In the panhandle and northern region of Florida these losses are estimated to range from \$170,000 to \$1.2 million per year. In South Florida the losses are estimated to range from \$140,000 to \$2.6 million annually. The largest impact is in Central Florida, with an economic impact ranging from \$6.1 to \$11.6 annually. With TSA's continued spread, one would expect these losses to grow, particularly in the northern portions of the state. With a statewide economic impact ranging from approximately \$6.5 million to \$16 million annually, TSA is a major concern for Floridians and others in the Southeastern United States. Yet, this research only considers the impact to beef cattle producers. Furthermore, there is evidence that TSA is affecting lands other than commercial pastures. For example, state parks and wildlife areas have reported TSA encroachment, with likely injurious effects on native flora and fauna. Methods of widespread and cost effective control would likely have economic benefits that extend beyond commercial cattle producers.

**Stratis, Nick**

Florida Department of  
Environmental Protection  
Florida State University  
**Thomas, Michael H.**  
College of Engineering  
Sciences, Technology and  
Agriculture  
Florida A&M University

**FINANCIAL MARKETS FOR ENVIRONMENTAL ASSURANCE BONDS: COULD THEY WORK?**

Environmental assurance bonds (EABs) have long been considered a possible solution to better control negative environmental externalities. Beginning with the early works of Robert Solow (1971) and later refinements by Bohm (1981), Perrings (1989) and Constanza and Perrings (1990), EABs provide a means of internalizing the negative externality associated with actions posing an environmental risk. In their most basic form, EABs should establish a "system" to indemnify harmed third parties by paying a fee to cover the cost of a harmful externality resulting from an agent's risky actions (Costanza and Perrings, 1990). EABs have served this purpose well in various activities, such as mining and reclamation. In spite of their success, environmental assurance bonds are not used as financial instruments so they are not traded in financial markets as US Treasury bills or bonds might be. Shogren, Herriges and Govindasamy (1993) state that one condition needed for an effective EAB is for a relatively "small number of identifiable parties" involved in the transactions, suggesting EABs are not conducive to markets. Yet, the institution of a market for environmental assurance bonds might introduce efficiencies, and also serve another useful purpose - the revelation of society's willingness to pay to prevent the negative environmental externality from occurring. Functioning markets can reveal the value of the good or service being traded; under what conditions could a market for assurance bonds do the same? Our preliminary research establishes an informal description of the EAB financial market by identifying the participants including the agent introducing the negative environmental externality, the EAB broker and investor, and the role of an oversight agency. A more formal model, identifying the objective functions and incentives of the participants is planned.

**Thomas, Michael H.**

College of Engineering  
Sciences, Technology and  
Agriculture  
Florida A&M University

**Letson, David**

University of Miami/RSMAS

**Mahoney, Edward**

Recreational Marine  
Research Center

Michigan State University

**Hanson, Terrill R.**

Department of Agricultural  
Economics

Mississippi State University

**EVACUATE OR NOT TO EVACUATE, THAT IS THE QUESTION: A REVIEW OF THE HURRICANE EVACUATION CHOICES FOR RESIDENTS OF SEVERAL URBAN COMMUNITIES**

While economic losses to property from hurricanes are staggering, households face an additional disutility from an approaching hurricane: the objectionable experience and uncertainty associated with intense and violent weather. The decision to evacuate or not to evacuate is determined by households' evacuation costs, perceived chances of being "struck", risk preferences and their comprehension of forecast attributes such as wind strength, rainfall intensity, projected landfall, storm surge and others. Improving the predictive power of hurricane forecasting models would improve the information critical to households considering an evacuation and likely provide marginal benefits to these households. For example, by narrowing the projected hurricane track, the numbers of unnecessary evacuees could be reduced, generating social surplus. Using a web-based digital format, a comprehensive household survey will elicit historic hurricane evacuation decisions in several urban centers, including the Miami/Dade County area in Florida and communities along the Gulf Coast of the United States. In addition to documenting the decision making process, survey participants will detail their evacuation destination, decision making criteria and expenditures. They will also be asked to evaluate their decision ex post and comment on the contribution of hurricane forecasting attributes and media in their decision making process. The panel structure of our sample will allow us to control for fixed effects and to test for temporal phenomena such as forecast improvements and forecast fatigue. In addition to an overarching view of evacuations, the marginal value of various hurricane forecasting attributes will be estimated. Using actual costs incurred during evacuations, including travel expenses, lodging costs, and the opportunity cost of time, a travel-cost, random utility model approach will be used to evaluate the importance of pathway tracking, storm intensity, source of storm information, social-demographics among other related factors, in a household's evacuation choice. Furthermore, coefficients of elasticity will be estimated to gage the relative importance of forecast attributes and levels of precision in effecting household evacuation decisions. Other exogenous characteristics such as home construction, socio-demographics and proximity to coastline will also be used to help model the evacuation choice.

**Thomas, Scott**

Stetson Engineers, Inc.

**A SURVEY OF COLLABORATIVE PRACTICES BY NATURAL RESOURCE MANAGERS ON MILITARY LANDS**

The U.S. Department of Defense and at least 17 other federal agencies have adopted ecosystem management as a guiding philosophy for natural resource management. A key element of ecosystem management is collaborative partnering at the watershed or eco-regional scale. Managers at federal installations face many of the same opportunities and constraints as their peers at state, local, and private forests, parks, and wildlife reserves. How well federal land managers collaborate is important to state and local governments, environmental groups, researchers, and citizens who seek partnering opportunities. The collaborative approach of military managers is especially important since military lands include significant bays, estuaries, and headwaters and serve as habitat

for more threatened and endangered species than the lands of any other federal agency. This research operationalized definitions for the elements of collaborative partnering and surveyed natural resource managers at 74 military bases nation-wide. The survey revealed that most military installations are indeed partnering; however, some aspects of partnering are less widely practiced than others. The neglected elements represent opportunities for enriching the dialog between installation natural resource managers and regional stakeholders, reducing conflict, and improving the quality of environmental decision-making.

**Thornton, Kent W.**  
FTN Associates, Ltd.

#### **SOFT SCIENCES AND THE HARD REALITY OF COASTAL ZONE RESTORATION AND MANAGEMENT**

Few would question that coastal zone restoration and management requires input from multiple disciplines, such as hydrologists, wetland scientists, estuarine ecologists, engineers, and coastal modelers. Yet, management of coastal zones and their associated watersheds is fundamentally social in nature. Humans are part of, not apart from, coastal ecosystems. Socioeconomic input is essential if coastal zone restoration and management activities are to be policy-relevant and successful. Several of our recent studies (*Framework for sustainable water resources management for the U.S.*; *Integration of ecological and socioeconomic indicators for estuaries and watersheds of the Atlantic Slope*; *State water issues and options*) have re-enforced the hard reality that engineers and scientists need input from the "soft" sciences to resolve many of the current and future issues in coastal zone restoration and management. For example, understanding the mental models not only of individual land-owners, regulators, managers, and decision-makers, but also of local communities and cultures, is critical if management practices are to be implemented and sustained. Social surveys can help identify these mental models as well as determine which models are knowledge-based versus perception-based. Social marketing approaches can subsequently be developed and used to change mental models and behaviors from perception to factually based. Developing and using suites of ecological indicators that can be economically and socially valued and directly related to risk assessment and management endpoints permit more informed decisions. In addition, economic tools, such as Frontier analysis, are available for integrating these social, economic, and environmental indicators to determine the quality of life in local communities. Frontier analyses can determine not only the best attainable quality of life in a community, but also compare the quality of life among communities. Because water is essential for life, activities in any sector – environmental, social, or economic – can either directly or indirectly affect the quality of life. Increased social capital can result in increased economic capital and natural resource assets. This paper will discuss the integration of environmental, social, and economic sectors, the benefits that accrue from these interactions, and why interdisciplinary projects are mandatory, not optional, for effective coastal zone restoration and management.

**Whitehead, John**  
Appalachian State University  
**Herstine, Jim**  
**Dumas, Chris**  
University of North Carolina  
Wilmington USA

#### **DETERMINATION OF THE ECONOMIC BENEFITS AND ECONOMIC IMPACTS OF RECREATION BOATING ON THE ATLANTIC INTRACOASTAL WATERWAY**

The U.S. Congress authorized the Atlantic Intracoastal Waterway (AIWW) in 1919. The purpose of this sheltered passageway was to provide the commercial shipping industry with a safer alternative to navigation in the open Atlantic Ocean. Recreational use of the AIWW by private boaters, both as a route to ocean inlets and as a final recreation destination, has grown tremendously since construction of the AIWW. The U.S. Army Corps of Engineers is responsible for maintenance and operational dredging of the AIWW. Federal funding for maintenance and operational dredging of the AIWW is disappearing causing numerous concerns for those entities that rely upon the AIWW for navigation and their livelihood. The USACE does not track recreational economic values when determining the need for maintenance dredging of the AIWW. Diverse interests in North Carolina (NC) formed a partnership to fund an economic study of the value of recreational boating along the AIWW in NC. The underlying purpose of the study was to gather data that would assess the economic effects of continued maintenance dredging of the AIWW. The economic study began in June 2005 and concluded in November 2005. Surveys were administered in thirteen (13) locations in NC along the AIWW. Approximately 1,200 complete and usable surveys were obtained. The major results are as follows: The average "willingness to pay" for the permit that would fund the dredging program to maintain the AIWW in NC at 12 feet is \$90 for NC residents and \$99 for non-residents of NC. An estimate of the aggregate annual benefits of the AIWW dredging policy permit is \$18,360,000 based upon NC resident boaters and \$1,440,000 based upon non-NC resident boaters. Average expenditures per trip for NC resident boaters were \$1,430 for the northern coastal region, \$726 for the central coastal region, and \$565 for the southern coastal region. Average expenditures per trip for non-NC resident boaters were \$11,464 for the northern coastal region, \$10,549 for the central coastal region and \$12,036 for the southern coastal region. Baseline navigability conditions in the AIWW support recreational boater trips generating \$257,000,000 annually in economic output within NC, over 4,000 jobs and \$124,000,000 in wages/salaries, \$35,600,000 in Federal taxes/fees, and \$21,400,000 in state and local taxes/fees. The estimated state-wide annual economic impacts of reduced AIWW navigability due to reductions in the numbers of boater trips are losses of \$103,000,000 in economic output, 1,623 jobs and \$50,000,000 in wages/salaries, \$14,000,000 in Federal tax revenues, and \$8,600,000 in state/local tax revenues.

**Wilkins, Jim**  
Legal Advisory Service  
Louisiana Sea Grant Legal  
Program and LSU Center for  
Natural Resource Economics  
& Policy

#### **HISTORY OF COASTAL RESTORATION AND OYSTER LEASING**

The concept of coastal restoration began early in the 20th century with attempts to restore coastal salinity regimes affected by flood control projects for the benefit of fisheries resources particularly oysters. The long lead time of several decades in approving and implementing river diversion projects such as Caernarvon and Davis Pond resulted in the oyster industry adapting to the altered habitat. and eventually opposing the intentional changes in



**Keithly, Walter, Jr.**  
LSU Center for Natural  
Resource Economics &  
Policy

salinity. Damage to oyster leases from the state and federal Caernarvon freshwater diversion project along with the Louisiana oyster leasing system that affords a quasi ownership right in leased public water bottoms, recognized by both federal and state courts, provided a basis for lawsuits alleging taking of private property. Judgments in district courts in Plaquemine and St. Bernard parishes awarded the oyster farmer plaintiffs combined damages of 2.3 billion dollars, threatening to derail large-scale coastal restoration efforts and pitted two important coastal resource issues against each other. The state placed a moratorium on the issuance of new oyster leases and the US Army Corps of Engineers expressed concern that it could not proceed with large scale coastal restoration projects unless it was protected from exposure to liability for oyster damages. The Louisiana Supreme Court overturned the judgments of the lower courts and the Louisiana Legislature amended state law to establish the supremacy of coastal restoration over oyster farming for the greater good of the state. Hurricanes Katrina and Rita devastated coastal Louisiana, partially due to deteriorated wetlands, bringing the issue to a head. However, the oyster industry's historic place in Louisiana culture and its considerable political influence mandated that some form of redress be available for those oyster farmers injured by coastal restoration projects. Through a long series of negotiations the state established a regulatory program for compensating oyster farmers for their losses caused by coastal restoration activities. Compensation is based on the fair market value concept used in federal takings law and provides a consistent and predictable remedy that can be figured into the planning process for coastal restoration costs and allowing the state to lift several restrictions on oyster leases.

**Wilson, Matthew A.**  
School of Business  
Administration and The  
Gund Institute for Ecological  
Economics

**Ung, Poh Boon**  
Triangle Economic Research,  
an ARCADIS Company

### **ACCOUNTING FOR ECOSYSTEM GOODS AND SERVICES IN COASTAL ESTUARIES**

Coastal estuaries provide a host of goods and services that contribute to human well-being. Some of these services include climate regulation, flood protection, water supply, waste treatment, and recreational opportunities. Given increasing population and development pressures, planners and decision makers must carefully evaluate the tradeoffs between competing uses of the coastal environment and the services provided by healthy, functioning ecosystems. For example, should we restore certain wetlands? Or should they be converted for agricultural use? Or drained and stabilized for urban development instead? What is the value of these wetlands? What is the opportunity cost of developing these wetlands? These are important, competing questions. Indeed, it is important to understand the different ecosystem goods and services that will be affected by restoration efforts and/or coastal development/management and also how these goods and services create value for different members of society (Farber et al 2006). Our presentation focuses on developing an accurate definition and classification of ecosystem goods and services. This framework is based upon a modified version of the newly standardized system developed in the United Nations sponsored Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2003) which we adapt to a previously developed typology of ecosystem goods (DeGroot et al 2002, Farber et al 2006). The framework identifies four major categories of ecosystem goods and services: provisioning, regulating, supporting and cultural. Within each of these categories are various benefits. For example, coastal estuaries provide natural resources and raw materials that include water supply (e.g., provision of potable water and water purification, provision for irrigation and industrial uses), food (e.g., fishing, hunting, crops) and medicinal and plant disease resources (e.g., medicinal and pest control chemicals obtained from estuarine dependent species). We emphasize the importance of developing a rigorous understanding of the many ecosystem goods and services provided by these complex systems to thoroughly evaluate the different benefits they provide. An accurate definition and classification of these services is an essential first step in their economic valuation. Conversely, assessing these services and goods are fundamental to evaluating trade-offs from restoration. An important consideration when assessing restoration efforts should be to evaluate the anticipated changes in total economic value (quantitatively and qualitatively) which depends on the change in service flows provided and the economic value of those services.

## PARTICIPANTS

(As of May 11, 2007)

Name	Organization	Phone	Email
Almodvar, Lillian	USACE, Institute for Water Resources	703-428-6021	lillian.almodvar@usace.army.mil
Armbruster, Walter	Farm Foundation	630-571-9393	walt@farmfoundation.org
Ator, Donald W.	ARCADIS	225-292-1004	dator@arcadis-us.com
Balletto, John H.	ARCADIS BBL, Inc.	609 320 0113	john.balletto@arcadis-us.com
Banerjee, Swagata "Ban"	Delta Research and Extension Center	662-686-3298	g_horse2000@yahoo.com
Bin, Okmyung	Economics	252-328-6820	bino@ecu.edu
Blancher, Don	Toxicological & Environmental Associates	251-219-4161	dblancher@teainconline.com
Boethel, David J	Louisiana Agricultural Experiment Station	225-578-4181	dboethel@agcenter.lsu.edu
Bogren, Rick	LSU AgCenter Communications	225-578-5839	rbogren@agcenter.lsu.edu
Bommarito, Cheryl L	Earth Search, Inc.	9042514100	cbomm@bellsouth.net
Boudreaux, Becky L	NOAA Gulf Coast Services Center	(228) 688-1715	becky.boudreaux@noaa.gov
Bourriaque, Ryan	Louisiana State University	225-578-3202	rbourr1@lsu.edu
Brassieur, C. Ray	Dept. of Sociology & Anthropology	337-482-1260	brassieur@louisiana.edu
Buras, Honora	LDNR/Coastal Restoration Division	225-342-4103	honora.buras@la.gov
Caffey, Karen	Louisiana State University	225-931-9732	kcaffey@cox.net
Caffey, Rex H.	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2393	rcaffey@agctr.lsu.edu
Cancienne, Joe	Tetra Tech	225.383.1780	joe.cancienne@tetrattech.com
Chambers, Jim L.	School of Renewable Natural Resources, LSU	225-578-4222	jchamb@lsu.edu
Chintawar, Sachin	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-4326	schint1@lsu.edu
Clairain, Ellis "Buddy"	Moffatt and Nichol	6016880025	eclairain@moffattnichol.com
Coreil, Paul D.	LSU AgCenter	225-578-1938	pcoreil@agctr.lsu.edu
Cramer, Gail	Department of Agricultural Economics and Agribusiness, LSU	225-578-3282	gcramer@agcenter.lsu.edu
Davis, Donald Wayne	La Applied Oil Spill R&D Program	225-578-3481	don.lsu.davis@gmail.com
Davis, Mark	Institute on Water Resources Law and Policy, Tulane University	504-865-5982	msdavis@tulane.edu

Davison, Todd	NOAA Gulf Coast Services Center	770-486-0028	todd.davison@noaa.gov
DeBaie, Lisa	Environment Canada	(902) 426-8879	lisa.debaie@ec.gc.ca
Deдах, Cheikhna	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2377	couldd1@lsu.edu
Deshotels, Michele	CPRA (Louisiana Department of Transportation & Development)	225-242-4506	micheledeshotels@dotd.la.gov
Devkota, Nirmala -	Department of Agricultural Economics and Agribusiness- LSU CNREP	2255782728	ndevko1@lsu.edu
Diop, Hamady	Louisiana Sea Grant College Program LSU CNREP	225-578-6312	hdiop1@lsu.edu
Doley, Chris	NOAA/NMFS/Habitat Restoration	301-713-0174	chris.doley@noaa.gov
DuCote, Gregory J.	LA Dept of Natural Resources	225.342.5052	gregory.ducote@la.gov
Duet, Cynthia	Arcadis	225.292.1004	cduet@arcadis-us.com
Dunn, Michael Allen	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-0344	mdunn@agcenter.lsu.edu
Emmer, Rod E.	Louisiana Sea Grant	225-578-9394	remmer@lsu.edu
Erlambang, Tanza	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-378-7268	terlambang2@hotmail.com
Etheredge, Yarrow	Toxicological & Environmental Associates	504-710-5559	yetheredge@teainconline.com
Ethridge, Beverly J.	USEPA	214 665 2151	ethridge.beverly@epa.gov
Evans, Anne	Texas A&M University-Corpus Christi	361-825-2063	anne.evans@tamucc.edu
Evans, Garen	Mississippi State University/Agricultural Economics Department	662-325-1796	gevans@ext.msstate.edu
Fannin, Matthew	Department of Agricultural Economics and Agribusiness	2255780346	mfannin@agcenter.lsu.edu
Felton, Kristin E.	Warnell School of Forestry and Natural Resources	706-742-8662	feltonk@warnell.uga.edu
Ford, Mark A.	Coalition to Restore Coastal Louisiana	225-767-4181	mford@crcl.org
Gaude, Rusty	LA Sea Grant	504-392-2448	agaude@agcenter.lsu.edu
Glavovic, Bruce Christopher	Massey University	+ 64-6-3569099	b.glavovic@massey.ac.nz
Goodin, Dean	Tetra Tech, Inc.	225.383.1780	dean.goodin@tetrattech.com
Goodin, Krista	HNTB Corporation	225-368-2826	kgoodin@hntb.com
Gramling, Bob	University of Louisiana at Lafayette	337 482 5375	gramling@louisiana.edu
Grandy, Greg	Louisiana Department of Natural Resources	2253426412	gregory.grandy@la.gov
Haase, Bren	Louisiana Department of Natural Resources	225-342-1475	bren.haase@la.gov

Hall, Larry	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2728	lhall2@lsu.edu
Hanson, Terry	Mississippi State University	662-325-2750	trh28@agecon.msstate.edu
Harding, Dave	FWRI	7278968626 3016	harry.fasciano@myfwc.com
Hart, Zac	I.M. Systems Group Inc., NOAA Coastal Services Center, Human Dimensions Program	843-740-1175	zac.hart@noaa.gov
Henderson, James	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2758	jhend19@lsu.edu
Henning, Steven A.	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2718	shenning@lsu.edu
Henry, Mark	Clemson University	864 656 5774	mhenry@clemson.edu
Hindsley, Paul	East Carolina University	252 328 5718	prh0902@ecu.edu
Hird, Jonathan	Moffatt & Nichol	225 927 7793	jhird@moffattnichol.com
Hitter, Heidi E.	Coastal Wetland Planning, Protection & Restoration Act	3372668626	heidi_hitter@usgs.gov
Hoffpauir, Helen	Louisiana Department of Natural Resources	225-342-9420	helen.hoffpauir@la.gov
Holland, Michael	US Army Corps of Engineers Jacksonville District	904-232-1972	Michael.C.Holland@saj02.usace.army.mil
Holland, Michael	US Army Corps of Engineers	904-232-1972	michael.c.holland@saj02.usace.army.mil
Holloway, Herb	La Dept of Wildlife & Fisheries	225-765-2605	hholloway@wlf.louisiana.gov
Hosking, Adam	Halcrow, Inc.	813-876-6800	mmaldonado@hpa.com
Hunter, Amy	Toxicological & Environmental Associates	251-219-4161	ahunter@teainconline.com
Huth, Bill	University of West Florida	8504742826	whuth@uwf.edu
Isaacs, Jack C.	Louisiana Wildlife & Fisheries	(225) 763-3562	jisaacs@wlf.louisiana.gov
Jenkins, Pam	University of New Orleans	504-491-1321	pjenkins@uno.edu
Jenkins, William	Louisiana State University	225-578-3214	sramire@lsu.edu
Johnson, Jay A.	Loyola Univ New Orleans	504.864.7939	johnson@loyno.edu
Kaplowitz, Michael	Michigan State University	517-355-0101	kaplowit@msu.edu
Kaplowitz, Michael	Michigan State University	517-355-0101	kaplowit@msu.edu
Kazmierczak, Richard F.	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2712	richkazmierczak@cox.net
Keithly, Walter R.	Louisiana State University	225-578-6296	walterk@lsu.edu
Killeen, Timothy Patrick	La. Dept. of Natural Resources	504 280-4062	timk@dnr.state.la.us

Kron, Roy	Louisiana Sea Grant	225-578-6564	rkron@lsu.edu
Landreneau, Dwight	LSU AgCenter, LCES	225/578-2391	dlandreneau@agctr.lsu.edu
Landry, Craig	Dept. of Economics, East Carolina University	252-328-6383	landryc@ecu.edu
Landry, Heidi	Louisiana State University- Agricultural Economics	225-578-8579	hlandr7@lsu.edu
Lane, Robert R.	School of the Coast and Environment, LSU	2257734467	rlane@lsu.edu
Laska, Shirley	University of New Orleans	504-280-1254	slaska@uno.edu
Leitz, Jeremy David	Texas Parks and Wildlife Department-Coastal Fisheries	512-389-4333	jeremy.leitz@tpwd.state.tx.us
Letson, David	University of Miami/RSMAS/Marine Affairs	305-421-4083	dletson@rsmas.miami.edu
Liffmann, Mike M.	Louisiana Sea Grant College Program	225.578.6290	mikelif@lsu.edu
Lin, Shanshan	University of Georgia	706-542-0767	jmullen@agecon.uga.edu
Loomis, David	Human Dimensions of Marine and Coastal Ecosystems, UMASS	413-545-6641	loomis@forwild.umass.edu
Lupi, Frank	Michigan State University	5174323883	lupi@msu.edu
Mack, Sarah	Sewerage and Water Board of New Orleans	504-799-9908	smack@swbno.org
MacNair, Doug	Triangle Economic Research, an ARCADIS Company	919-415-2265	doug.macnair@arcadis-us.com
Mark, Tyler B.	Department of Agricultural Economics and Agribusiness	859-398-0116	tmark1@lsu.edu
Marks, Brian	University of Arizona	(520)626-8922	bmarks1@email.arizona.edu
Matekole, Augustus N.	Department of Agricultural Economics and Agribusiness, LSU CNREP	2255788579	amatek1@lsu.edu
McTigue, Teresa	NOAA Center for Coastal Monitoring and Assessment	301-713-3028 x141	terry.mctigue@noaa.gov
Miller, Craig A.	Warnell School of Forestry and Natural Resources	706-583-8930	craigm@warnell.uge.edu
Morehead, Sally	Mission-Aransas National Estuarine Research Reserve	361-749-6771	sallym@utmsi.utexas.edu
Morgan, Ash	UWF	850-474-2708	amorgan@uwf.edu
Myles, Albert	MSU-Agricultural Economics	(662)325-1794	albertm@extension.msstate.edu
Nepal, Sukirti	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2728	snepal2@lsu.edu
Nieland, David Louis	LA Sea Grant College Program	225-578-6373	dniela@lsu.edu
Niu, Huizhen Jane	Department of Agricultural Economics and Agribusiness	(225)578-3268	hniu@agcenter.lsu.edu
Norris-Raynbird, Carla E.	Bemidji State University	218-755-2828	cnorrisraynbird@bemidjistate.edu

Ogunyinka, Ebenezer O.	LA Dept of Wildlife & Fisheries	(225) 763-3957	eogunyinka@wlf.louisiana.gov
Palmer, Greg H.	C. H. Fenstermaker	2253446701	kmatherne@fenstermaker.com
Paudel, Krishna P.	Department of Agricultural Economics and Agribusiness, LSU CNREP	225 578 7363	kpaudel@agcenter.lsu.edu
Perret, William Stanley	Mississippi Dept. Marine Resources	228 523-4082	corky.perret@dmr.ms.gov
Peterson, Kristina J.	University of New Orleans, CHART	304-266-2517	krajeskipeterson@msn.com
Petrolia, Daniel R.	Mississippi State University, Dept. of Agricultural Economics	662-325-2888	petrolia@agecon.msstate.edu
Pine, John C.	Disaster Science & Management, LSU	225 578-1075	jpine@lsu.edu
Posadas, Benedict	Miss. State Univ./CREC	228-388-4710	benp@ext.msstate.edu
Poudel, Pawan	Department of Agricultural Economics and Agribusiness, LSU CNREP	225 578 4326	ppoude1@lsu.edu
Powdrill, Michele	State of Alaska Dept. of Natural Resources/OPMP	907-465-3541	grace_gonzales@dnr.state.ak.us
Price, Justin	LA Dept. of Natural Resources	225-342-1076	justin.price@la.gov
Ran, Tao	Department of Agricultural Economics and Agribusiness, LSU CNREP	225-578-2595	tran1@lsu.edu
Rawls, John	Earth Search, Inc.	9042514100	rawls@earth-search.com
Rhinehart, Kirk	Coastal Restoration Division/Department of Natural Resources	225-342-2179	kirk.rhinehart@la.gov
Richardson, Bill	LSU AgCenter	225-578-4161	brichardson@agcenter.lsu.edu
Richardson, Robert	Michigan State University	(517)-355-9533	rbr@msu.edu
Salaudeen, Tajudeen Tayo	CESTA	(850) 599-3729	tayo1deen@yahoo.com
Schexnayder, Mark	LSU AgCenter/Louisiana Sea Grant	504 838-1170	mschexnayder@agcenter.lsu.edu
Schiavinato, Lisa C.	North Carolina Sea Grant	225-802-8441	lsjurist@gmail.com
Schleifstein, Mark	The New Orleans Times-Picayune	504-826-3327	mschleifstein@timespicayune.com
Shackelford, Jason Keith	ENCOS	225-241-5892	jkshackelford@hotmail.com
Sutherlin, Kristin Leigh	Tetra Tech	402-933-1345	kristin.sutherlin@tetrattech.com
Thibodeaux., Cassie	IAP World Services	(337)266-8615	judith_haydel@usgs.gov
Thomas, Michael	Florida A&M University	850 599-3729	michaelthomas@nettally.com
Thomas, Scott	Stetson Engineers Inc	228-342-0239	scottt@stetsonengineers.com
Thornton, Kent	FTN Associates, Ltd.	501-225-7779	kwt@ftn-assoc.com

Thornton, Kent W.	FTN Associates	225-766-0586	kwt@ftn-assoc.com
Ung, Poh Boon	Triangle Economic Research, ARCADIS Company	610-337-7601 (ext 20)	poh-boon.ung@arcadis-us.com
Van Heerden, Ivor	LSU Hurricane Center	225-773-3684	exnatalia@aol.com
Vandersteen, Buck	Louisiana Forestry Association	318-443-2558	lfa@laforestry.com
Waits, Betsy D.	Blue Cliff College	318-452-3551	bill.waits@la.usda.gov
Waits, Bill	NRCS/USDA	318-473-7686	bill.waits@la.usda.gov
Ward, John	NOAA Fisheries	301-713-9507	John.M.Ward@NOAA.gov
Westra, John	CNREP	225-578-2721	jwestra@agcenter.lsu.edu
Whitehead, John	Department of Economics	828-262-6121	whiteheadjc@appstate.edu
Wilkins, Jim	Louisiana Sea Grant	5785936	jwilkins@lsu.edu
Willson, Tina	Department of Agricultural Economics and Agribusiness, LSU CNREP	225 578-2377	twills2@lsu.edu
Wilson, Chuck	La Sea Grant	2255786283	cwilson@lsu.edu
Wilson, Scott	USGS National Wetland Research Center	337-266-8644	scott_wilson@usgs.gov
Wilson, Scott	USGS	337-266-8513	scott_wilson@usgs.gov
Wold, Amy	The Advocate	225-388-0320	awold@theadvocate.com
Zobrist, Erik	NOAA/NMFS/ Habitat conservation	301 713-0174x188	gary.barone@noaa.gov



[www.cnrep.lsu.edu](http://www.cnrep.lsu.edu)