

Conference Program/Abstracts

CNREP 2013

Challenges of Natural Resource Economics & Policy



4th National Forum on Socioeconomic Research in Coastal Systems

March 24-26

New Orleans

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About the Cover: The image is an original origami art piece folded from a single dollar bill by the origami artist Won Park. Won can be reached at orundorumagi11@yahoo.co, and more of his creations can be seen online at <http://orundorumagi11.deviantart.com>. Photographed by Richard F. Kazmierczak, Jr.

Welcome!

Thank you for joining us for *CNREP 2013: Challenges of Natural Resource Economics and Policy: The Fourth National Forum on Socioeconomic Research in Coastal Systems*. When we last met in 2010, New Orleans was the epicenter of media frenzy, as the world's attention was focused on the largest maritime oil spill in history. In the three years since, an unprecedented amount of funding has been applied towards better understanding the biophysical processes associated with a major spill. Going forward, the RESTORE Act legislation will generate the single largest influx of coastal impact mitigation funding in history. But, if the past is any indication, precious little of the Act's research budget will be targeted towards objective, science-based investigation of socioeconomic impacts.

For an event that has become known as the "greatest economic disaster in the history of Gulf," relatively little institutional resources have been devoted to spill-related social science research. Instead, socioeconomic assessments have been relegated to opaque calculations that occur within the federal negotiation and litigation processes. For these reasons and others, your contribution to this forum constitutes what may ultimately be one of the few public records of coastal socioeconomic research in this area. Your willingness to publicly discuss methodologies related to natural resource economics, commercial impacts and linkages, and the human dimensions of coastal policy is to be applauded.

As you look through the program, you'll see a heavy emphasis on the market and nonmarket valuation of various ecosystem services. That's no accident. A central theme of this year's forum, ecosystem service valuation (ESV), has become one of the most demanded analyses of our time. Through the collective expertise represented at this forum, we have an opportunity to weigh-in on the status and challenges of ESV in a time when billions of dollars in disaster recovery funding will be directed towards the U.S. Gulf Coast. We encourage you to participate and contribute to the sessions as we jointly seek to identify opportunities for improved resource conservation and management through integration with our colleagues in the biophysical sciences. By sharing our current research and outreach expertise, and using the forum to once again organize for future collaboration, we can raise the profile of coastal socioeconomic research in the region, the nation, and the world.

We're confident that you will enjoy the CNREP 2013 Forum, that you will find it to be an amenity-rich and professionally rewarding experience. Our sincere hope is that at you will take from this meeting a better understanding of the important economic and policy issues of our day. Once again, we welcome you to New Orleans, and we extend to you our best wishes for a productive and enjoyable conference.

Sincerely,



Rex H. Caffey
CNREP 2013 Conference Co-Chair



Richard F. Kazmierczak, Jr.
CNREP 2013 Conference Co-Chair

Conference Organizers

Conference Co-Chairs

Rex Caffey, Ph.D., Professor and Director, Center for Natural Resource Economics & Policy (CNREP), Department of Agricultural Economics & Agribusiness, Louisiana State University Agricultural Center and Louisiana Sea Grant

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James G. Wilkins, J.D., Director, Louisiana Sea Grant Law and Policy Program, Center for Natural Resource Economics & Policy (CNREP)

About the Center

The Center for Natural Resource Economics & Policy (CNREP), established in January 2004, is a cooperative of environmental economists engaged in research and extension programs that contribute to the management and sustainability of natural resources. The Center fosters the interaction of socioeconomic professionals to address natural resource and environmental challenges in Louisiana and the southern United States. Center faculty members maintain active projects in six primary focus areas, including the bioeconomics of energy use, wetland valuation and economic linkages, economic management of fisheries, human dimensions of wildlife habitat conservation, economics of forest management and product development, and socioeconomic of land and water policy.

To learn more about CNREP go to: www.cnrep.lsu.edu

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(<http://lacoast.gov/new/default.aspx>)

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Barataria-Terrebonne National Estuary Program
(<http://www.btnep.org>)

Special Thanks

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

William B. Richardson, Chancellor, LSU Agricultural Center

Robert Twilley, Executive Director, Louisiana Sea Grant College Program

Paul Coreil, Extension Director and Associate Vice Chancellor, LSU Agricultural Center

John Russin, Experiment Station Director and Associate Vice Chancellor, LSU Agricultural Center

Gail Cramer, Professor and Head, LSU Department of Agricultural Economics & Agribusiness

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Featured Plenary Speakers (Monday, March 25th)

Ecosystem Services and Their Role in Coastal Management and Policy

Edward Maltby

Dr. Edward Maltby is Professor Emeritus of Wetland Science, Water and Ecosystem Management at the University of Liverpool, UK. During the past 40 years, Maltby has gained an international reputation for developing innovative policy instruments focused on the management and conservation of water resources and wetland ecosystems. He played a key role in the creation and implementation of the Ecosystem Approach for the Global Convention on Biological Diversity; the United Kingdom's National Ecosystem Assessment; contributed to development of the Ramsar Convention's Wise Use Concept; and developed horizontal guidance for wetlands under the European Unions' Water Framework Directive. During 2011-12, Maltby held the Laborde Endowed Chair in Research Innovation for the Louisiana Sea Grant College Program at Louisiana State University in Baton Rouge. Dr. Maltby's presentation will focus on integration of biophysical and socioeconomic sciences for the measurement, valuation, and implementation of ecosystem services in public policy.

Edward B. Barbier

Dr. Edward Barbier is the John S. Bugas Professor of Economics, Department of Economics and Finance, University of Wyoming. His main expertise is natural resource and development economics and the interface between economics and ecology. He has served as a consultant and policy analyst for a variety of national, international and non-governmental agencies, including many UN organizations, the OECD and the World Bank. He has authored over 200 peer-reviewed journal articles and book chapters, written or edited 21 books, and published in popular journals. His books include *Blueprint for a Green Economy* (with David Pearce and Anil Markandya, 1989), *Natural Resources and Economic Development* (2005), *A Global Green New Deal* (2010), *Scarcity and Frontiers: How Economies Have Developed Through Natural Resource Exploitation* (2011), *Capitalizing on Nature: Ecosystems as Natural Assets* (2011) and *A New Blueprint for a Green Economy* (with Anil Markandya, 2012). During 2010-11, Barbier served on the Science and Engineering Board overseeing "Louisiana's Comprehensive Master Plan for a Sustainable Coast", by the Louisiana Office of Coastal Protection and Restoration. Dr. Barbier's presentation will address the progress and challenges in valuing ecosystem services for coastal wetland protection and restoration.

Featured Lunch Speakers

Monday, March 25th

Contingent Valuation: From Dubious to Hopeless?

John C. Whitehead

John Whitehead is professor of economics and department chair at Appalachian State University. He received his PhD in 1990 from the University of Kentucky with a dissertation focused on valuing wetlands. Whitehead has authored over 100 journal articles and book chapters and co-edited (with Tim Haab and Ju-Chin Huang) the 2011 book *Preference Data for Environmental Evaluation: Combining Revealed and Stated Approaches*. He is an Associate Editor for *Marine Resource Economics* and the *Journal of Environmental Management* and a member of the Scientific and Statistical Committee of the South Atlantic Fisheries Management Council, currently chairing the Socioeconomic Sub-Panel. Previously he served on the Board of Directors of the Association of Environmental and Resource Economics and as president of the Socioeconomic Section of the American Fisheries Society. Whitehead has been writing at the Environmental Economics blog (<http://www.env-econ.net>) since 2005. In 2008, he received the Distinguished Economist Award from the Kentucky Economic Association and the inaugural Player with the Best Attitude certificate in the Appstate NoonTime Faculty-Staff Basketball Game.

Tuesday, March 26th

Insights Into Water Planning Policy and the Vision for Louisiana's "Water Economy"

Senator Gerald Long

Louisiana State Senator Gerald Long (Winnfield) is chairman of the Senate Natural Resources Committee and sits on the Agriculture, Forestry, Aquaculture and Rural Development Committee, Insurance Committee, Retirement Committee, is an interim member of the Finance Committee, and serves on the Joint Legislative Committee on the Budget. Sen. Long has a keen awareness of the importance of Louisiana's water resources to the economic and environmental well being of the state, especially as the nation moves forward into what many believe will be a much more competitive pursuit of scarce water supplies. In 2011, he authored a bill establishing the Ground Water Management Advisory Task Force within the Louisiana Department of Natural Resources to develop a comprehensive ground water management program and is a member of that body. In 2012, Long sponsored legislation that requires greater oversight for out-of-state water sales.

CNREP 2013 Conference Agenda

Sunday, March 24, 2013	
1:00 pm to 5:30 pm Esplanade	Registration Desk Open
1:00 pm to 5:30 pm Esplanade	Speaker Resource Room Open
3:00 pm to 5:30 pm Evangeline A & B	Poster/Exhibit Set-Up
6:00 pm to 9:00 pm Bourbon Balcony Suite 2175	CNREP 2013 Opening Reception and Conference Social Be sure to join us on Sunday evening, March 24th for the CNREP 2013 Opening Reception and Conference Social. This event will be an opportunity to socialize with other participants while enjoying a variety of hors d'oeuvres and complimentary beverages. The reception will take place in the Royal Sonesta's premier balcony suite overlooking Bourbon Street. This reception is sponsored by the LSU Center for Natural Resource Economics & Policy.
Monday, March 25, 2013	
7:00 am to 5:30 pm Esplanade	Registration Desk Open
7:00 am to 5:30 pm Esplanade	Speaker Resource Room Open
7:00 am to 12:00 pm Evangeline A & B	Poster/Display Set-Up
7:00 am to 8:30 am Foyer	Breakfast Buffet
8:30 am to 10:15 am South Ballroom	CNREP 2013 Plenary Session 8:30 Welcome and Opening Announcements Rex H. Caffey (Director, LSU Center for Natural Resource Economics & Policy) Gail L. Cramer (Professor and Head, Department of Agricultural Economics and Agribusiness, LSU Agricultural Center) Robert Twilley (Executive Director, Louisiana Sea Grant College Program) 8:45 The Wetland Paradigm Shift in Response to Changing Societal Priorities Over a Global to Local Spectrum: The Opportunities and Challenges to Link Natural Sciences, Socioeconomics and Policy Edward Maltby (Professor Emeritus of Wetland Science, Water & Ecosystem Management, University of Liverpool, United Kingdom) 9:30 Progress and Challenges in Valuing Ecosystem Services for Coastal Wetland Protection and Restoration Edward B. Barbier (John S. Bugas Professor of Economics, Department of Economics and Finance, University of Wyoming)

<p>10:15 am to 10:30 am Foyer</p>	<p>Coffee Break</p>
<p>Monday, March 25, 2013 10:30am to 12:00pm Bourbon</p> <p>Moderator: Rex H. Caffey CNREP, Louisiana State University Agricultural Center Louisiana Sea Grant</p>	<p><i>The Technical and Political Economics of Dredging and Dredged Material Use</i></p> <p>The Political Economy of Sedimentation, Dredging and Upstream Remediation in 46 of Ohio State Park Lakes, Fred J. Hitzhusen (The Ohio State University)</p> <p>Developing Policies and Practices for the Beneficial Reuse of Dredged Material in Coastal Mississippi, George Ramseur (Mississippi Department of Marine Resources)</p> <p>A Cost-Benefit Analysis of Ecosystem Service Flows From Coastal Land-Building Methods, Rex H. Caffey, Hua Wang (Louisiana Sea Grant, CNREP, Louisiana State University Agricultural Center) and Daniel R. Petrolia (Mississippi State University)</p> <p>Cost Considerations for Large Scale Beneficial Use Projects, Bill Hanson (Vice President, U.S. Business Development, Great Lakes Dredge & Dock Company)</p>
<p>Monday, March 25, 2013 10:30am to 12:00pm Royal Conti</p> <p>Moderator: Lisa Wainger University of Maryland Center for Environmental Studies</p>	<p><i>Valuing Ecosystem Goods and Services</i></p> <p>Hedonic Property Prices and Coastal Beach Width, Craig E. Landry, Thomas Allen (East Carolina University)</p> <p>Efforts to Value Ecosystem Services Associated with an Innovative Application of Stream and Wetland Restoration in Green Infrastructure, Joe Berg (Biohabitats, Inc.)</p> <p>A Valuation of Wetlands in Southern Louisiana: Using Meta-Analysis and GIS to Improve the Validity of Benefit Transfers, Luke Boutwell, John Westra (CNREP, Louisiana State University Agricultural Center)</p>
<p>Monday, March 25, 2013 10:30am to 12:00pm Regal Suite</p> <p>Moderator: Lauren Land Louisiana Sea Grant</p>	<p><i>Sustainability of Ecosystem Services for Human Welfare</i></p> <p>Human Well-Being and Implications for Restoration Policy, Lauren Land (Louisiana Sea Grant)</p> <p>From Golf Course to Saltmarsh: Perceived Changes in Ecosystem Services Linked to Human Well-Being from the Noisette Creek Saltmarsh Restoration in North Charleston, SC, Robert L. Crimian (College of Charleston)</p> <p>The Dollars and Sense of Louisiana Coastal Restoration, Susan Testroet-Bergeron (Coastal Wetlands, Planning Protection, and Restoration Act)</p> <p>Learning to Value Heritage, Tradition and Culture in 'A Place That Doesn't Matter': People Are the Key to the Solution, Don Davis (Louisiana State University) and Carl Brasseaux (University of Louisiana-Lafayette)</p>
<p>Monday, March 25, 2013 10:30am to 12:00pm Evangeline C</p> <p>Moderator: Alex Miller Gulf States Marine Fisheries Commission</p>	<p><i>Issues in Marine Resource Economics</i></p> <p>Institutional Dimensions of Resilience in Fisheries Management, Syma Ebbin (Connecticut Sea Grant, University of Connecticut - Avery Point)</p> <p>Climate Change and Fisher Behavior in the Bering Sea Pollock Trawl and Pacific Cod Longline Fisheries, Alan Haynie and Lisa Pfeiffer (NOAA Fisheries)</p> <p>The Economics of Harmful Algal Blooms: Potential Research in the Gulf of Mexico, Charles M. Adams and Sherry L. Larkin (University of Florida)</p> <p>Economic Viability of Harvestable Nutrient Filters for Water Quality Improvement and Energy Production, Nathan G. F. Reaver, Jeffrey R. Beegle, Anne T. Doerr, Zachary A. Reaver, Brandon W. Clarke (University of Toledo), and Kristen M. Woodling (Miami University Institute for the Environment and Sustainability)</p>

<p>Monday, March 25, 2013 12:00pm to 1:30pm South Ballroom</p>	<p>Lunch - John C. Whitehead, Professor of Economics, Appalachian State University <i>Contingent Valuation: From Dubious to Hopeless?</i></p>
<p>Monday, March 25, 2013 1:30pm to 3:00pm Bourbon</p> <p>Moderator: Matthew Fannin CNREP and Louisiana Center for Rural Initiatives (LCRI), Louisiana State University Agricultural Center</p>	<p><i>Assessing Economic Impacts</i></p> <p>Economic Impact Assessment Methods Across the Sea Grant Network: Successes and Challenges, Kate Farrow, Kristen Grant, Paul Anderson and Beth Bisson (Maine Sea Grant)</p> <p>Useful Strategies for Linking Effects of Coastal and Ocean Resource Uses to Regional Economies, Charles S. Colgan (University of Southern Maine), and Judith T. Kildow (Monterey Institute of International Studies)</p> <p>Shooting in the Dark? Assessing Costs and Benefits of Proposed Coal and LNG Port Expansion Near the Great Barrier Reef, Lyuba Zarsky and Whitney Anderson (Monterey Institute of International Studies)</p>
<p>Monday, March 25, 2013 1:30pm to 3:00pm Royal Conti</p> <p>Moderator: Luke Boutwell CNREP, Louisiana State University Agricultural Center</p>	<p><i>Valuing Ecosystem Goods and Services</i></p> <p>The Value of Ecosystem Services Provided by Oyster Reefs, Black Mangroves, and Salt Marshes in the Gulf of Mexico, Matthew G. Interis, Daniel R. Petrolia (Mississippi State University)</p> <p>America's Wetland? A National Survey of Willingness to Pay for Restoration of Louisiana's Coastal Wetlands, Daniel R. Petrolia, Matthew G. Interis (Mississippi State University)</p> <p>Yes Votes, No Votes, and Non-Votes for Proposed Coastal Restoration in Louisiana, Joonghyun Hwang, Daniel R. Petrolia and Matthew G. Interis (Mississippi State University)</p> <p>Empirical Testing of Strategic Voting and its Implications for Choice Experiment, Chang Xu, Matthew G. Interis, Daniel R. Petrolia, Kalyn T. Coatney (Mississippi State University)</p>
<p>Monday, March 25, 2013 1:30pm to 3:00pm Regal Suite</p> <p>Moderator: Denise Reed The Water Institute of the Gulf</p>	<p><i>Using Ecosystem Services in Coastal Restoration and Protection Decisions</i></p> <p>Experts will reflect on the issues involved in using ecosystem service values to help guide restoration and protection decision, bringing experiences from within Louisiana and elsewhere to bear in charting a path forward to better integrating ecosystem services into decision making for coastal systems. The panel will consist of:</p> <p>Edward B. Barbier, University of Wyoming</p> <p>Nick Burger, RAND Corporation</p> <p>Ernst Peebles, The Water Institute of the Gulf</p> <p>Karim Belhadjali, Louisiana Coastal Protection and Restoration Authority</p>

<p>Monday, March 25, 2013 1:30pm to 3:00pm Evangeline C</p> <p>Moderator: Stephen H. Sempier Mississippi-Alabama Sea Grant Consortium</p>	<p><i>Assessing Sustainability and Resilience</i></p> <p>Changing Capacities: Local Coastal Zone Management, Perceptions of Vulnerabilities and Mitigation Strategies in Coastal Louisiana, Carla Norris-Raynbird (Bemidji State University)</p> <p>Identifying and Implementing Hydrological Restoration Opportunities in the Gulf of Mexico through a Federal/University Partnership, Stephen H. Sempier (Mississippi-Alabama Sea Grant Consortium), Jamie Schubert (NOAA Restoration Center), Karl Havens (Florida Sea Grant), Pamela Plotkin (Texas Sea Grant), LaDon Swann (Mississippi-Alabama Sea Grant Consortium), Robert Twilley (Louisiana Sea Grant)</p> <p>Metrics for Assessing Defense Energy Resilience, Dave Kerner (The Tauri Group, LLC) and Scott Thomas (Stetson Engineers Inc.)</p> <p>A Meta-Analysis to Evaluate Property Value Co-Benefits of Using Environmental Site Design for Stormwater Runoff Reduction, Marisa Mazzotta (U.S. EPA, Atlantic Ecology Division), Elena Besedin and Paul Laskorski (Abt Associates)</p>
<p>3:00pm to 3:30pm Foyer</p>	<p>Coffee Break</p>
<p>Monday, March 25, 2013 3:30pm to 5:00pm Bourbon</p> <p>Moderator: Alan Haynie NOAA Fisheries</p>	<p><i>Analysis of Commercial and Recreational Fisheries</i></p> <p>A Comparative Analysis of the Multi-Mode Chesapeake Bay Menhaden Survey, John C. Whitehead, Todd K. Hartman (Appalachian State University), James E. Kirkley (deceased), Kenneth E. McConnell (University of Maryland), and Tanga McDaniel (Appalachian State University)</p> <p>Gender and Angler Participation in Louisiana Recreational Fishing, Ebenezer O. Ogunyinka and Jack C. Isaacs (Louisiana Department of Wildlife and Fisheries, CNREP)</p> <p>Engagement in Fisheries Governance: Two Case Studies of Individuals & Organizations in New Zealand and the U.S. Gulf of Mexico, Matthew Freeman (Mississippi State University, CNREP) and Tracy Yandle (Emory University)</p> <p>Robust Ecosystem-Based Management of the Chesapeake Bay Blue Crab Fishery, Richard T. Woodward, Pei Huang (Texas A&M University), Micheal Wilberg, John Wiedenmann (University of Maryland), and David Tomberlin (NOAA Fisheries)</p>
<p>Monday, March 25, 2013 3:30pm to 5:00pm Royal Conti</p> <p>Moderator: Michelle Savolainen CNREP, Louisiana State University Agricultural Center</p>	<p><i>Valuing Ecosystem Goods and Services</i></p> <p>Ecosystem Services and Their Valuation: Moving Past the Stovepipes, David K. Loomis, Shona K. Paterson and Mary E. Allen (East Carolina University)</p> <p>Saving the Baltic Sea Against What? Linus Hasselström (Enveco Ltd.), Cecilia Håkansson (KTH Royal Institute of Technology), Heini Ahtiainen, Janne Artell (MTT Agrifood Research Finland), Ragnar Elmgren (Stockholm University)</p> <p>Valuation of the Rio Paraiba do Sul Mangrove Ecosystem – State of Rio de Janeiro, Brazil, Carlos Eduardo de Rezende and Layra Passareli (Universidade Estadual do Norte Fluminense), and James R. Kahn (Washington and Lee University)</p> <p>An Economic Analysis of River Restoration: A Dam Removal Case On Lake Erie’s South Shoreline and Generalizations, Sarah Kruse (Oregon State University) and Fred J. Hitzhusen (The Ohio State University)</p>

<p>Monday, March 25, 2013 3:30pm to 5:00pm Regal Suite</p> <p>Moderator: Don Davis & Carl Brasseaux Louisiana Sea Grant</p>	<p><i>Human Dimensions of Coastal Management</i></p> <p>Social Construction of a Disaster (BP Horizon Oil Disaster): Media Accounts and Community Impacts, Bob Gramling (University of Southwestern Louisiana), Shirley Laska (University of New Orleans), JoAnne Derouen, George Wooddell (University of Louisiana at Lafayette), Pamela Jenkins and Monica Farris (University of New Orleans).</p> <p>Waterfront Landowners and Coastal Protection: Understanding Decision-Making and the Implications for Social and Ecological Resilience, Steven B. Scyphers (Dauphin Island Sea Lab), J. Steven Picou (University of South Alabama), Sean P. Powers (Dauphin Island Sea Lab)</p> <p>Social and Experiential Impacts of Driving on the Beach: Human Dimensions of ORV Use at Cape Lookout National Seashore, Hans Vogelsong (East Carolina University)</p>
<p>Monday, March 25, 2013 5:00pm to 6:30pm Evangeline A & B</p>	<p>Poster Viewing/Social Enjoy a complimentary beverage or two while viewing the CNREP 2013 posters during the manned poster session.</p>
<p>Monday, March 25, 2013 6:30pm to 8:30pm Fleur de Lis Suite</p>	<p>CNREP 2013 Dinner-Social The Royal Sonesta Hotel banquet facilities have been reserved for the CNREP 2013 Dinner-Social to be held on Monday night, March 25th, from 6:30 to 8:30pm. The banquet will feature an expansive seafood buffet. Tickets for the banquet are \$40 per person while space exists (there is a limit of 80 seats).</p>
<p>Tuesday, March 26, 2013</p>	
<p>7:00 am to 3:00 pm Esplanade</p>	<p>Registration Desk Open</p>
<p>7:00 am to 3:00 pm Esplanade</p>	<p>Speaker Resource Room Open</p>
<p>7:00 am to 8:30 am Foyer</p>	<p>Continental Breakfast</p>
<p>Tuesday, March 26, 2013 8:30am to 10:00am Bourbon</p> <p>Moderator: Walter Keithly CNREP, Louisiana State University</p>	<p><i>Analysis of Commercial Fisheries</i></p> <p>The Economic Status and Performance of the Gulf of Mexico Seafood Processing Industry in 2009, Alex Miller (Gulf States Marine Fisheries Commission) and Jack C. Isaacs (Louisiana Department of Wildlife and Fisheries, CNREP)</p> <p>Changes in Market Structure in Relation to Increasing Imports: The Gulf of Mexico Shrimp Processing Sector, Walter R. Keithly, Jr. (CNREP, Louisiana State University), Michael Travis (NOAA Fisheries), and Hua Wang (CNREP, Louisiana State University Agricultural Center)</p> <p>The Economic Status and Performance of the Gulf of Mexico Crab Processing Industry in 2009, Jack C. Isaacs (Louisiana Department of Wildlife and Fisheries, CNREP) and Alex Miller (Gulf States Marine Fisheries Commission)</p> <p>A Source Differentiated Mixed Demand Model for Shrimp: An Analysis of the Influence of U.S. Imports by Source on the Gulf of Mexico Dockside Price, Maryam Taberastani (Louisiana State University Agricultural Center)</p>

<p>Tuesday, March 26, 2013 8:30am to 10:00am Royal Conti</p> <p>Moderator: Melissa Daigle Louisiana Sea Grant Law & Policy Program/CNREP</p>	<p><i>Issues in the Analysis of Coastal Vulnerability</i></p> <p>Forecasting Structure Development in Coastal Louisiana, Joseph Berlin (URS Corporation)</p> <p>Ocean Roads: Where Erosion Pushes Coastlines Into Coastal Communities, To What Extent Are Local Governments Responsible for Maintaining Access and Resources for Seaside Property Owners? Jennifer Maybery (Louisiana Sea Grant)</p> <p>Risk Preferences and Perceptions: Factors That Increase Flood Insurance Uptake and Coverage Levels, Christopher M. Sparks and Craig E. Landry (East Carolina University), Daniel R. Petrolia and Keith H. Coble (Mississippi State University)</p> <p>Recent and Future Changes to the National Flood Insurance Program, Melissa Daigle (Louisiana Sea Grant Law & Policy Program)</p>
<p>Tuesday, March 26, 2013 8:30am to 10:00am Regal Suite</p> <p>Moderator: Benedict Posadas Mississippi State University</p>	<p><i>Issues in the Analysis of Storm Damage</i></p> <p>National Weather Service's Operations and Advances to Improve Sustainable Coast Protection, Gina M. Tillis-Nash (National Weather Service's Lower Mississippi River Forecast Center)</p> <p>Decisions to Stay or Leave the Commercial and Recreational Fishing Fleets Following Natural Disasters, Benedict C. Posadas (Mississippi State University)</p> <p>A Model of Endogenous Hurricane Risk: Coordinating Mitigation and Evacuation, David Letson (University of Miami/RSMAS)</p> <p>Economic and Social Implications of Natural and Man-Made Disasters in Coastal Louisiana and Improvements in Hurricane and Storm Damage Risk Reduction System (HSDRRS) in the Last 50 Years, Malay Ghose Hajra, Gregory Mattson II, and Kimberly Vaughn Landry (University of New Orleans)</p>
<p>Tuesday, March 26, 2013 8:30am to 10:00am Evangeline C</p> <p>Moderator: Krishna Paudel CNREP, Louisiana State University Agricultural Center</p>	<p><i>The Economics of Water Use</i></p> <p>Stock and Flow Pollutants and Environmental Kuznets Curve Relationships in Water Pollution, Mahesh Pandit and Krishna P. Paudel (CNREP, Louisiana State University Agricultural Center)</p> <p>Combating Water Shortages in Irrigation through Innovative Forecasting of Irrigation Water Demand, Swagata "Ban" Banerjee (University of Wisconsin-Platteville) and Babatunde A. Obembe (Alabama A&M University)</p> <p>Economic Issues Related to Groundwater Use in Louisiana, Krishna P. Paudel (CNREP, Louisiana State University Agricultural Center) and Frank Tsai (Louisiana State University)</p>
<p>10:00am to 10:30am Foyer, Evangeline A & B</p>	<p>Coffee Break and Poster/Exhibit Removal</p>
<p>Tuesday, March 26, 2013 10:30am to 12:00pm Bourbon</p> <p>Moderator: Matt Freeman Mississippi State University</p>	<p><i>Analysis of Commercial Fisheries</i></p> <p>Consumer Preference for Branded Gulf of Mexico Oysters, Daniel R. Petrolia (Mississippi State University) and William Walton (Auburn University)</p> <p>Gulf Seafood Trace: A Robust Electronic Traceability Program for the U.S. Gulf of Mexico Seafood Industry, Alex Miller (Gulf States Marine Fisheries Commission) and Malinda Kelley (GCR, Inc.)</p> <p>Factors Influencing At-Home Seafood Consumption and Sustainability of Other Protein Sources for Seafood, Huabo Wang (CNREP, Louisiana State University Agricultural Center) and Walter Keithly (CNREP, Louisiana State University)</p>

<p>Tuesday, March 26, 2013 10:30am to 12:00pm Royal Conti</p> <p>Moderator: Lauren Land Louisiana Sea Grant</p>	<p><i>Issues in Ecosystem Management</i></p> <p>Innovative Watershed Projects: Cure For Gulf Hypoxia? R. Eugene Turner (Louisiana State University) and Doug Daigle (Lower Mississippi River Sub-Basin Committee)</p> <p>Linking the Effects of Conservation Investments in the Mississippi River Basin to Areal Extent of Northern Gulf of Mexico Hypoxia: Baseline and Scenario Assessment, S. S. Rabotyagov (University of Washington), C. L. Kling, P. W. Gassman, T. Campbell (Iowa State University), M. White, J. Arnold, J. Atwood, L. Norfleet (ARS USDA), N. N. Rabalais (LUMCON), and R. Eugene Turner (Louisiana State University)</p> <p>Opportunities For Enhancing the Cost-Efficiency of TMDLs: Chesapeake Bay Case Study, Lisa A. Wainger (University of Maryland Center for Environmental Science)</p>
<p>Tuesday, March 26, 2013 10:30am to 12:00pm Regal Suite</p> <p>Moderator: Jim Wilkins Louisiana Sea Grant Law & Policy Program</p>	<p><i>The Legal and Regulatory Aspects of Water Policy</i></p> <p>Invited presentations in this session will focus on current legal disputes and future policy considerations. The session will stimulate a dialog on how we value water, how we protect it, and how it can be shared.</p> <p>A New Twist on Intrastate Water Disputes: The Compact Angle – Tarrant Regional Water District v. Herrmann, Ryan M. Seidemann (Louisiana Department of Justice)</p> <p>Case Studies of Water Scarcity and Impacts on Policy and the Value of Water, Matt Lindburg (Brown and Caldwell)</p> <p>Square Pegs, Round Holes: The Disconnect Between New Water Realities and Current Water Management, Mark Davis (Tulane Law School)</p>
<p>Tuesday, March 26, 2013 10:30am to 12:00pm Evangeline C</p> <p>Moderator: James Henderson CNREP, Mississippi State University</p>	<p><i>Carbon Credit Markets and Climate Change</i></p> <p>Guidance on the Nation’s First Certified Wetland Carbon Credit Methodology, Sarah K. Mack (Tierra Resources LLC), Robert R. Lane, John W. Day (Louisiana State University), and Nick Martin (Winrock International – American Carbon Registry)</p> <p>Application of the First Certified Methodology For Wetland Carbon Credits to a Wetland Municipal Effluent Assimilation System in Luling, Louisiana, Sarah K. Mack (Tierra Resources LLC), Robert R. Lane and John W. Day (Louisiana State University)</p> <p>Addressing the Assumption of Carbon Neutrality: Analysis of the Northern Forest, Shana M. McDermott (University of New Mexico) and Richard B. Howarth (Dartmouth College)</p> <p>How To Fix the Ugly and Inconvenient Truths About CO2 Emissions, Sun Joseph Chang (Louisiana State University Agricultural Center)</p>
<p>Tuesday, March 26, 2013 12:00pm to 1:30pm Fleur de Lis Suite</p>	<p>Lunch - Louisiana State Senator Gerald Long <i>Insights Into Water Planning Policy and the Vision for Louisiana’s “Water Economy”</i></p>
<p>Tuesday, March 26, 2013 1:30pm to 3:00pm Bourbon</p> <p>Moderator: Huabo Wang CNREP, Louisiana State University Agricultural Center</p>	<p><i>Analysis of Commercial Fisheries</i></p> <p>Public Preferences For Near-Shore Marine Ecosystem Management in New Zealand, Sophal Chhun (University of Otago)</p> <p>Network Analysis of the Gulf of Mexico Red Snapper IFQ Program, Andrew Ropicki and Sherry L. Larkin (University of Florida)</p> <p>FishSET: A Spatial Economics Toolbox to Better Incorporate Fisher Behavior Into Fisheries Management, Alan Haynie (NOAA Fisheries)</p>

<p>Tuesday, March 26, 2013 1:30pm to 3:00pm Royal Conti</p> <p>Moderator: John Westra, CNREP, Louisiana State University Agricultural Center</p>	<p><i>Recreational and Resource Economics</i></p> <p>Visitor's Economic Value of Cape Hatteras National Seashore, Craig E. Landry, Alyson R. Lewis and Hans Vogelsong (East Carolina University)</p> <p>Estimating a Recreational Demand Model Using Aggregate Data On Visitation Rates to Outdoor Recreation Sites, Stephen C. Newbold and D. Matthew Massey (US EPA)</p> <p>A Survey of Semi-parametric Methods Used in Environmental Kuznets Curve Analysis, Mahesh Pandit and Krishna P. Paudel (CNREP, Louisiana State University Agricultural Center)</p> <p>An Econometric Analysis of Softwood Saw-Timber Stumpage Markets in Louisiana, Rajan Parajuli and Sun Joseph Chang (Louisiana State University Agricultural Center)</p>
<p>Tuesday, March 26, 2013 1:30pm to 3:00pm Regal Suite</p> <p>Moderator: Wes Harrison, Jr. CNREP, Louisiana State University Agricultural Center</p>	<p><i>Economic and Social Impacts of the Deepwater Horizon Oil Spill</i></p> <p>Economic Impacts of the Deepwater Horizon Oil Spill to the Mississippi Seafood, and Commerical and Recreational Fishing Sectors, Benedict Posadas (Mississippi State University)</p> <p>Effects of the 2010 BP Oil Spill on Perceptions, Attitudes and Behavior of Consumers for Gulf-Sourced Seafood, R. Wes Harrison, Jr. (CNREP, Louisiana State University Agricultural Center) and Dennis Degeneffe (Consumer Centric Solutions)</p> <p>Valuing the Impacts of the Deepwater Horizon Oil Spill on Recreational Anglers in the Southeastern United States, Sergio Alvarez and Sherry L. Larkin (University of Florida), Tim Haab (Ohio State University), and John C. Whitehead (Appalachian State University)</p> <p>Effects of the Deepwater Horizon Oil Spill on Ecosystem Services: The Final Report from the National Research Council, David Yoskowitz (Harte Research Institute, Texas A&M University)</p>
<p>3:00pm to 3:30pm Foyer</p>	<p>Coffee Break</p>
<p>Tuesday, March 26, 2013 3:30pm to 5:00pm Regal Suite</p> <p>Moderator: Rex Caffey CNREP, Louisiana State University Agricultural Center</p>	<p>Closing Special Session - Direction and Funding of Socioeconomic Research in the Gulf of Mexico</p> <p>Coastal and marine-based planning, management, and restoration depends on the public availability of objective, science-based research in socioeconomic and biophysical fields. Recent experience, however, suggests that litigation and regulatory procedures following man-made environmental damage are often structured to prevent timely, publicly available socioeconomic research from being generated. This special closing session will examine ways that this critical public-good information can be incentivized, both in terms of developing baseline information and to have a more transparent valuation process for future damage scenarios</p>
<p>Tuesday, March 26, 2013 6:00 pm Bourbon Balcony Suite 2175</p>	<p>CNREP 2013 Closing Reception</p>

Posters

Conserving Water Through Robust Irrigation Water Demand Forecasting

Swagata "Ban" Banerjee (University of Wisconsin-Platteville) and Babatunde A. Obembe (Alabama A&M University)

Estimated Economic Loss to Producers of Row Crops in Louisiana Resulting from the 2011 Mississippi River Flood

Luke Boutwell, John Westra (CNREP, Louisiana State University Agricultural Center) and Maurice Wolcott (Louisiana State University Agricultural Center)

Resilience through Restoration: How the Emerging Restoration Economy Offers New and Expanded Opportunities for Gulf Coast Businesses and Communities

Jeffrey Buchanan, Mary Babic (Oxfam America) and Avalyn Taylor (The Nature Conservancy)

Status and Potential of Direct Marketing of Seafood in Coastal Louisiana

Jill Christoferson, Rex Caffey (CNREP, Louisiana State University Agricultural Center) and Thomas Hymel (Louisiana Sea Grant)

Cost-Benefit Analysis of CMSP in Long Island Sound

Jennifer Clinton and Robert Pomeroy (University of Connecticut)

"Loving It to Death:" Evaluating Urbanization Impacts in the Lowcountry, South Carolina for Future Planning

Jennifer Cormany, Brad Terrell and Annette Watson (College of Charleston)

Economic Contribution of Mississippi's Forest Products Industry over Time

Ram P. Dahal, Ian A. Munn and James E. Henderson (Mississippi State University)

Into the Abyss of Louisiana's Gulfward Boundary

Kellyn Elmer (Louisiana Sea Grant Law & Policy Program)

Fracking and Local Water Issues

Gaëlle Forget and Adrian Stull (Louisiana Sea Grant Law & Policy Program)

Groundwater/Surface Water Exchange: Hydraulic Gradient Mapping Along a Shallow Lake Shore

Andrew Fullhart (Bemidji State University)

Assessing the Efficiency of Alternative Best Management Practices to Reduce Nonpoint Source Pollution in the Broiler Production Region of Louisiana

Bryan Gotshall, Krishna Paudel and Huizhen Niu (CNREP, Louisiana State University Agricultural Center)

Reasonable Reclamation: A Logical Limit on Coastal Restoration

Michael Heier (Louisiana Sea Grant Law & Policy Program)

Economic Importance of Forestry and Forest Products to Mississippi Counties: A Publication Series to Help the Forestry Community Educate Local Elected Officials and the Public

James E. Henderson and Ian A. Munn (Mississippi State University)

Resilience of Fishers to Rapid Development: a PGIS Study of Water Quality and Coastal Livelihoods in Mount Pleasant, South Carolina

Josh Hoke and Annette Watson (College of Charleston)

An Analysis of Offshore Wind Development: A Non-Market, Stated Preference Approach to Quantitatively Measure Perceptions and Estimate WTP in Three Lake Michigan Regions

Lauren Knapp (University of Michigan) and Craig Landry (East Carolina University)

Role of Uncertainty in Queen Bee Technology Adoption: The Case of VSH Queens

Julie Leiby and John Westra (CNREP, Louisiana State University Agricultural Center)

Labeled vs. Unlabeled Choice Experiments for Valuing Great Lakes Beach Characteristics

Frank Lupi, Scott A. Weicksel, Michael D. Kaplowitz and Min Chen (Michigan State University)

Guidance for the Use of Restoration of Degraded Deltaic Wetlands of the Mississippi Delta ACR Modular Methodology

Sarah K. Mack (Tierra Resources LLC), Robert R. Lane and John W. Day (Louisiana State University), Nick Martin (Winrock International – American Carbon Registry)

Engineering Characterization and Beneficial Use of Dredged Sediments used in Louisiana Marsh Creation and Coastal Restoration Projects

Gregory Mattson, II and Malay Ghose Hajra (University of New Orleans)

The Vulnerabilities of the Gullah/Geechee Peoples in the Sea Islands, South Carolina

Sarah Meyers, Nicole Machuca and Annette Watson (College of Charleston)

Developing Strategies for Valuing Ecosystem Services on Coastal Properties Along the U.S. Gulf of Mexico

Michelle A. Savolainen (CNREP, Louisiana State University Agricultural Center and Louisiana Sea Grant)
and Richard F. Kazmierczak, Jr. (CNREP, Louisiana State University Agricultural Center)

Two Years Later: The Deepwater Horizon Disaster from the Perspective of Fishers

Steven B. Scyphers (University of South Alabama and Northeastern University), Sean P. Powers (University of South Alabama)

Estimating the Value of Harvest Rights in the Louisiana Oyster Fishery: An Examination of Various Socioeconomic Indicators

Jason Shackelford (SWCA Environmental Consultants)

A Geovisualization-Based Scenario Planning Framework for Climate Change Adaptation in Small, Natural Resource Dependent, Coastal Communities

Jordan W. Smith and Erin Seekamp (North Carolina State University)

Economic Valuation of Marine Biodiversity in the Gulf of Mexico

Stephanie Stefanski, Yale University and Jay Shimshack (Tulane University)

Maryland Farmers and Tree Farmers Attitudes toward a Payment for Ecosystem Services Program

Bob Tjaden, Seth Wechsler and Adan Martinez-Cruz (University of Maryland), Richard Pritzlaff (Biophilia Foundation)

Scaling Hurricane Impacts on Wetland Restoration Project through GIS

Hua Wang, Huizhen Niu and Rex H. Caffey (Louisiana State University Agricultural Center)

Abstracts

Adams, Charles M.
Sherry L. Larkin
University of Florida

The Economics of Harmful Algal Blooms: Potential Research in the Gulf of Mexico

Red tide events in Florida and other harmful algal blooms (HABs) around the world are a continuing source of negative consequences, particularly for marine-based coastal communities and impacted industry sectors. Such HAB events have been shown to disrupt use patterns for general tourism, seafood sales, commercial fishing, beach-going activities, boat fishing, and other water proximate forms of business. In addition, HABs can impact human health and result in medical expenses and lost wages. Thus, HAB events are a disruption of the normal natural ecosystem with economic ramifications for associated human activities.

The economic ramifications are diverse. Sometimes these costs are directly observable, such as market-related losses including reductions in expenditures or sales, or an increase in medical costs or lost wages. These costs can also be manifested as intangible losses from being forced to change a recreational itinerary or lost passive use values (i.e., losses experienced by non-users caring that the marine environment is polluted). The magnitude of both types of these costs is directly related to the duration, intensity, seasonality and spatial distribution of a given HAB event. Each event may impact a local community in a different manner due to a wide range of such factors. As a result, the economic consequences of a given HAB event are difficult to predict and challenging to measure. Factors such as HAB duration and geographic distribution will determine the data needed to describe the impact on local businesses. Such data may be locally available (as a secondary source) on a given level of spatial and temporal resolution but useful only if that resolution matches that required to describe the impact of the HAB. The methodology necessary to collect requisite primary data for both market and non-market assessments maybe dictated by a host of factors that may vary due to the characteristics of the local community, mix of business sectors, environmental features, etc. Thus, multiple approaches are necessary to measure the economic consequences of a given HAB event, including those resulting from impacts on businesses, human health, recreation, and passive use values.

This paper summarizes the science of HABs, previous HAB economic research, and then provides a forum for interested agency and academic representatives to discuss the various methodologies, data needs, quantitative methods and other issues that might be most appropriately utilized and applied toward future HAB events in the Gulf of Mexico. In particular, the Gulf of Mexico Alliance (GOMA) wants advice on how to better identify, document, and quantify the comprehensive economic effects of HABs in the Gulf of Mexico. This paper is intended to update researchers on what studies have been conducted, identify research gaps, and attract new researchers and research ideas for potential studies. Such studies are critically needed to communicate to state, regional and federal decision-makers the importance of sustaining budgets for existing programs that mitigate HAB impacts, determining the efficient allocation of public resources; and of supporting Federal research programs that are enhancing regional capacities for HAB monitoring, forecasting, and control.

Alvarez, Sergio
Sherry L. Larkin
University of Florida
Tim Haab
The Ohio State University
John C. Whitehead
Appalachian State University

Valuing the Impacts of the Deepwater Horizon Spill on Recreational Anglers in the Southeastern United States

At an estimated 205 million gallons, the Deepwater Horizon (DWH) spill is the largest oil spill in the history of the United States. During nearly three months of active discharge, oil reached the coasts of Louisiana, Mississippi, Alabama, and Florida, resulting in large scale fishery closures. Many recreational anglers who planned visits to the Gulf Coast likely canceled, rescheduled, or changed their trip location to areas that were not affected. The Oil Pollution Act of 1990 allows resource trustees to claim and recover losses on behalf of the public and to use the recovered funds in restoration activities. Recoverable damages include the cost of primary restoration and interim losses that encompass passive and direct use values, such as recreation.

In this paper, we use data from the Marine Recreational Information Program (MRIP) to develop a series of random utility models of the choices made by marine anglers in the Southeastern United States. Specifically, we model anglers' choice of the location and timing of their fishing trips by defining ten discrete regions and six discrete seasons. We use angler behavior in 2009 as a pre-spill baseline and compare it to behavior in 2010 to infer changes as a result of the DWH spill. Behavioral models for three distinct groups of anglers—shore-based, for-hire, and private boat fishers—are developed. Model results are used to infer substitution patterns across different trip attributes and to estimate the monetary compensation that would make anglers whole. Our results suggest that the DWH spill was in fact perceived as a negative attribute of fishing trips and anglers avoided affected locations. We also examine substitution for trip attributes like site

popularity, expected catch, seasonality, and the number of access points in the chosen region. The most conservative estimates of monetary compensation indicate that the per trip willingness-to-pay for prevention of the DWH spill has a mean of \$27 for shore-based anglers, \$34 for anglers in the for-hire sector, and \$2 for anglers using private boats. The magnitude of compensation measures differs according to the strength of anglers' aversion to the oil spill and to travel to high cost regions. The total compensation, accounting for all marine recreational fishing trips that took place in the Southeastern United States in 2010, is in the range of \$422-661 million, centered at \$540 million.

Banerjee, Swagata "Ban"

University of Wisconsin -
Platteville

Babatunde A. Obembe
Alabama A&M University

Combating Water Shortages in Irrigation through Innovative Forecasting of Irrigation Water Demand

Natural causes such as droughts, non-natural causes such as competing uses (domestic and industrial, animal and crop), and government policies limit the supply of water for agriculture in general and irrigating crops in particular. This has been a serious problem in the southern and southeastern United States in recent years. Under such reduced water supply scenarios, existing physical models reduce irrigation proportionally among crops in the farmer's portfolio, disregarding temporal changes in economic and/or institutional conditions. Hence, changes in crop mix due to expectations about risks and returns are ignored. A method is developed that considers those changes and accounts for economic substitution and expansion effects embedded in an econometric model. Acreage forecasts emerging from such a model are combined with (multiplied by) water use data by crop, thus incorporating the inherent water-requiring potential of crops to determine water demand by crop. Forecasting studies based on this method in Georgia and Alabama (for surface water in the Alabama-Coosa-Tallapoosa (ACT) and Apalachicola-Chattahoochee-Flint (ACF) River Basin region) demonstrate the relative strength of econometric modeling vis-à-vis physical methods. Results from a study using this method for Mississippi (for ground water in the Mississippi River Valley Alluvial Aquifer in the region immediate east of the Mississippi River) verify the robustness of those findings. Results from policy-induced simulation scenarios indicate water savings of 19%-27% using the innovative method developed. Though better irrigation water demand forecasting in crop production was the objective of this pilot project, conservation of a valuable natural resource (water) has turned out to be a key consequence. Furthermore, the method developed herein will allow policymakers to more accurately calibrate acreage reduction programs to meet targeted levels for reductions in irrigation water use.

Banerjee, Swagata "Ban"

University of Wisconsin -
Platteville

Babatunde A. Obembe
Alabama A&M University

Conserving Water Through Robust Irrigation Water Demand Forecasting

With drought conditions on the rise, policymakers and farmers are interested in combating water shortages through forecasting irrigation water demand. The goal of this study is to 1) develop a method of precisely forecasting agricultural water demand in Alabama, Georgia, and Mississippi for irrigating major crops such as corn, cotton, soybeans, rice, and peanuts, and 2) to compare and contrast results among the three states. A model is proposed that incorporates both crop specific acreage and crop specific rates of water usage. This study presents acreage forecasts using a supply response land allocation model to estimate irrigation water demand one year ahead. These forecasts are then combined with crop and region-specific Blaney-Criddle (BC) coefficients of net irrigation water requirements (in AL and GA) or relevant water use data (in MS). The land allocation model is based on portfolio analysis that combines measures of risk and returns, but also allows for agronomic and other influences. Policy implications will be achieved by using simulation scenarios.

Two economic methods 1) a simple statistical method and 2) an alternative method using futures prices and a modified weighted average of past yields are employed to generate prices and yield expectations. The better of the two methods, based on the "root mean square error" criterion, is used in the supply response model to generate measures of risk and returns. The differential use model is used to analyze efforts such as the Georgia program to conserve agricultural water use by taking bids from farmers to reduce irrigated acreage. Results from this analysis show that forecasting studies in Georgia and Alabama (for surface water in the Alabama-Coosa-Tallapoosa (ACT) and Apalachicola-Chattahoochee-Flint (ACF) River Basin region) demonstrate the relative strength of econometric modeling vis-à-vis physical methods. Results for Mississippi (for ground water in the Mississippi River Valley Alluvial Aquifer in the region immediate east of the Mississippi River) verify the robustness of those findings. Results from policy-induced simulation scenarios indicate water savings of 19%-27% using the innovative method developed.

Berg, Joe

Biohabitats, Inc.

Efforts to Value Ecosystem Services Associated with an Innovative Application of Stream and Wetland Restoration in Green Infrastructure

Many zero, 1st and 2nd order channels have been degraded by urban runoff. These are the numerically dominant systems draining to our coastal waters. Part of the cause for this degradation is our management of stormwater runoff from our developed surfaces. With the aging and failure of this imperfect drainage infrastructure, society is looking at updating and improving how we manage our water resources and associated infrastructure. The innovative use of stream and wetland restoration techniques, applied with a focus towards enhancing/restoring ecosystem function and delivery of services, suggests we can make significant positive contributions to the quality and quantity of our coastal resources, improve the quality of

life in our local coastal communities, and put in place a more sustainable plan for water resource management using these techniques as part of an integrated green infrastructure.

Monitoring work by the University of Maryland focused on a number of these projects and demonstrates storm water quantity benefits (e.g., reduction in peak discharge and increased Time of Concentration) as well as water quality benefits (e.g., reduction of Total Suspended Sediments and Total Nitrogen). Generally, this ecological engineering approach costs a fraction of the standard engineering approach (i.e., drop structures, pipe, concrete outfalls). The implications for this approach for coastal restoration and protection are numerous. This approach has been adopted by the State of Maryland in their July 2011 Draft document titled "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for NPDES Stormwater Permits. In this document, this approach was adopted as a best management practice with TSS, TP, and TN removal efficiencies of 90%, 60%, and 50%, respectively.

Perhaps more importantly, the regeneration of habitat provides for better fish and wildlife resources, contributes to floodplain wetland restoration, reduced peak discharges and flooding risk in downstream areas, as well as a more attractive habitat and aesthetic for humans. When applied as a green infrastructure technique, this approach to storm water collection and conveyance and stream restoration can reduce operation and maintenance costs for urban, suburban, and rural infrastructure. Several efforts to document financial values of these ecosystem services have been undertaken, focusing on the reduced cost of construction materials and processes, comparable values of water treatment, stream and wetland restoration credit values, cost reduction in long term O&M, etc. These valuation efforts have had positive results, including attracting grant funding, increasing awards in competitive solicitations, and increasing adoption by municipalities. However, as with other attempts to assign economic values to ecosystem services, we have not been able to do justice to poorly monetized inherent values (e.g., natural heritage values) and recognize that when contrasted with better monetized but inherently less valuable commodities (e.g., oil and gas), it is difficult to justify long-term sustainable conservation actions.

Berlin, Joseph
URS Corporation

Forecasting Structure Development in Coastal Louisiana

Forecasts of the future structure inventory are necessary for estimating the benefits of federal flood risk management projects, as the primary benefits of these projects are flood damages avoided. The life cycle of federal flood projects is 50 years and the structure inventory of the project study area, both residential and commercial, is generally expected to change significantly during that timeframe. Structure inventories and forecasts were recently conducted for much of coastal Louisiana, specifically for the Donaldsonville to the Gulf Project, the Morganza to the Gulf Project and the Larose to Golden Meadow Project.

Structure forecasts were developed based upon projected population growth and employment growth by parish. The exact location of future structures was forecasted based upon the current location of structures and development trends. The size and configuration of new structures was forecasted to estimate the value of future structures. Key inputs to estimating flood damages avoided were structure values, value of structure contents, structure elevation, and structure location. The forecast of residential structures was based upon population growth for each parish and the forecast of commercial structures was based upon employment growth for each parish. The HEC-FDA software used to estimate flood damages avoided is based upon three residential categories (single family, mobile home, and multi-family with less than four units) and seven commercial categories (retail, wholesale, service, office, multi-family, restaurant, and government) of structures. The proportion of residential structures in each category was not forecasted to change. The development of future commercial structures was considered to be dependent upon employment growth in relevant employment categories. For example future retail structures were forecasted based upon future retail employment. Building permit data was used to forecast the elevation and location of future structures.

Louisiana has seen slow growth for the past 30 years, relative to the U.S. economy, and most economic forecasts expect continued slow growth during the next ten years. Therefore the forecast of new structures in the study areas was lower than the national average. The forecasted new structures are expected to be located in urban areas, near industrial development. Several structure development trends are evident that will impact the configuration of federal projects. Although coastal Louisiana is primarily rural, new structure development is concentrated in larger urban areas, such as Houma, rather than small towns and outlying areas. New residential development is built at higher elevations, to meet elevation requirements for flood insurance, and therefore less flood-prone. These structure development trends favor federal projects that protect the most densely populated areas over continuous levee systems that protect the entire coastline.

Boutwell, Luke
John V. Westra
Louisiana State University
Agricultural Center

A Valuation of Wetlands in Southern Louisiana: Using Meta-Analysis and GIS to Improve the Validity of Benefit Transfers

For policy makers, regulators and natural resource managers the resources necessary for original empirical resource valuations are often unavailable. A common alternative to intensive valuation studies is the practice of benefit transfer or the use of an empirical value estimate or estimates from a previous study or

studies for application in a similar context. In order to reduce the error inherent in applying values from one parcel of land to another, researchers commonly use meta-analysis, or the "study of studies", to provide a more rigorous and statistically valid value estimate for use in a benefit transfer. In the practice of benefit transfer, much emphasis has been placed on improving the validity of values for transfer, but fewer studies have focused on the appropriate application of the established estimates. In this study, a model obtained through meta-regression analysis of wetland valuation studies is used to bolster the validity of the actual transfer of value (the value of wetlands for the provision of water quality) by ensuring that values are applied to land according to specific physical and socio-economic characteristics of the land and the theoretical economic constructs which are to be estimated. To reduce the burden on resource management practitioners, the data used is publicly accessible data from agencies such as the United States Geologic Survey and the United States Census Bureau. Values are applied, according to the meta-regression, in a geographic information system (GIS) so that the output data is interactive, relatively easy to understand and easy to alter through time.

Buchanan, Jeffrey
Mary Babic
Oxfam America
Avalyn Taylor
The Nature Conservancy

Resilience through Restoration: How the Emerging Restoration Economy Offers New and Expanded Opportunities for Gulf Coast Businesses and Communities

The Nature Conservancy and Oxfam America have launched a new partnership in the Gulf of Mexico, recognizing that in this region, the health of both the economy and the wider Gulf communities are inextricably linked to the health of the environment. A 2012 report released by our organizations, *Rebuilding Our Economy, Restoring Our Environment*, examines the connections between social and community resiliency, economic growth, and environmental restoration of the Gulf Coast. The report concludes with the recognition that the impending allocation of penalty funds from the Deepwater Horizon oil spill, there is a remarkable opportunity to strengthen the Gulf's traditional industries and spur emerging markets centered on environmental restoration, while simultaneously promoting new and better opportunities for the region's workforce.

The report profiles several case studies, which demonstrate that focusing restoration on reducing community vulnerability makes good economic sense. It includes a recent study that shows enormous potential exists for creating a better skilled workforce and providing new economic opportunities for coastal residents through coastal restoration projects. It also highlights an economic study of proposed oyster reef projects in Alabama with potential to generate numerous economic benefits such as direct job creation, indirect job creation resulting from increased fish harvests, and other economic benefits, including improved water quality and mitigation of future damages from storms and flooding.

Caffey, Rex H.
Hua Wang
Louisiana State University
Agricultural Center
Daniel R. Petrolia
Mississippi State University

A Cost-Benefit Analysis of Ecosystem Service Flows from Coastal Land-Building Methods

Coastal restoration in Louisiana is increasingly characterized by the use of rapid land building techniques that rely on mechanical dredges and sediment conveyance pipelines for the purposes of coastal marsh creation (MC). To some extent, this aggressive approach is indicative of a growing recognition that time is a major limiting factor in addressing land loss in coastal Louisiana. Yet the advantages of rapid restoration can be offset by apparent high costs and low functionality when compared to more natural methods such as fresh water/sediment diversions (DIV). Such comparisons are central to a growing economic and ideological debate between advocates of these two methods, a debate typically defined by a narrow interpretation of costs and benefits. Objective and comprehensive economic assessments are needed to help identify combinations of project types that provide the most efficient and sustainable provision of ecological services. The goal of this study was to develop a comparative economic assessment of MC and DIV methods for coastal land building. Specific objectives included: 1) estimating generic models of costs and benefits by technology 2) conducting sensitivity analyses with varying degrees of risk and, 3) performing case-studies to illustrate economic trade-offs between and within technologies.

Data were collected for 146 authorized projects and project bids submitted to the Coastal Wetland Planning Protection and Restoration Act, the Coastal Impact Assistance Program, and the Louisiana Coastal Area Comprehensive Ecosystem Study. Projected acreage was used to construct generic restoration trajectories by technology and generic cost models were developed via regression analysis using technology-specific estimates for marsh creation projects (MC, n=69) and diversions (DIV1, n=25). An exogenous model of diversion benefits (DIV2) was utilized to capture a wider suite of nutrient and sediment contributions at specific flow rates. Generic models were incorporated into a net present valuation framework to examine the relative importance of specific project attributes. Average parameter values were used to establish baseline benefit-cost projections. Sensitivity analysis was conducted with a single, user-specified parameter which varied across its known range and solving for the break-even ecosystem service value (\$/acre/year) in which the B:C ratio was equal to 1.0. Risk assessments were developed through an expected valuation construct incorporating data on hurricane landfall probability and measures of social risk. Comparative economic results were developed for 16 simulated projects in the upper and lower basins of Plaquemine Parish, Louisiana.

As expected, unit costs were found to decrease with increases in project time and scale, and increase at higher discount rates, regardless of restoration method. Additional factors, such as mobilization and demobilization of dredging equipment, access dredging costs, and the distance between sediment borrow site and project site, served to significantly increase the unit costs of MC projects. Through break-even analysis, MC project costs are found to exceed DIV2 and DIV1 costs at time periods of 25 and 35 years, pumping distances of 10 and 20 miles, and target scales of 4,000 and 10,000 acres, respectively. These intersection points increase substantially with the incorporation of method-specific and location-specific risks. The repercussions of these risks will be presented in detail, with specific policy implications for addressing limiting factors (physical and socioeconomic) by project type.

Chang, Sun Joseph
Louisiana State University
Agricultural Center

How to Fix the Ugly and Inconvenient Truths About CO2 Emissions

This paper brings forth a solution to the problem of carbon dioxide emission/climate change using economic incentives and assuming that equal per capita carbon dioxide emission is the goal. As such, countries with excess per capita carbon dioxide emissions above that of the global average must pay for the privilege to pollute. Instead of cap and trade on total carbon dioxide emissions, the proposed solution first calculates the difference between the trade-adjusted per capita carbon dioxide emissions of a country and the global per capita average. Excess or slack carbon dioxide emissions of a country are determined by multiplying that difference by its population. Countries with per capita carbon dioxide emissions above the global average would pay into a special Carbon Fund, for the excess carbon dioxide emissions of the country. Countries with per capita carbon dioxide emissions below the global average, on the other hand, would earn money from the Carbon Fund, based on the slack carbon dioxide emissions of the country. At any price for a ton of carbon dioxide emission, the proposed system creates a shared vision to lower the total global total carbon dioxide emissions. Excess emission countries have incentives to reduce their carbon dioxide emissions to lower their payments. Slack countries also have incentives to lower or control their emissions, if they want to keep earning money in the future. As a dynamic system, the price set for carbon dioxide emission every year would depend on how quickly the total global carbon dioxide emissions are being reduced through conservation efforts and technical innovations. Once the price is set, every country will know exactly how much it would either pay into or earn from the Carbon Fund, sparing rich countries of haggling over how much each country will pay and poor countries over how much each country will earn. Finally, the price set for per ton of excess carbon dioxide emissions will provide a clear indication of how seriously developed countries regard the carbon dioxide emission problem.

Chhun, Sophal
University of Otago

Public Preferences for Near-Shore Marine Ecosystem Management in New Zealand

There is considerable interest in establishing 'Customary Management Areas' to provide for Māori co-management and marine reserves to restore declining biodiversity and fisheries in New Zealand. Implementation of these management systems has often been vigorously opposed and supported by recreational and commercial fishers and sections of the larger public. This presentation will report the results of a choice experiment conducted to better understand public preferences and values of four major near-shore marine ecosystem attributes affected by Customary Management Areas, marine reserves and current fisheries management regimes. One thousand and fifty-five respondents from throughout New Zealand participated in the online choice experiment survey using '1000Minds' modeling software to trade-off ecosystem outcomes. The choice model revealed that relative values (in both monetary and non-monetary terms) of the ecosystem attributes varied a lot with demographic, socio-economic and personal factors. Scenarios development identified that the combination of marine reserves and Customary Management Areas was most preferred by New Zealanders. This suggests that the Biosphere Reserve model is a way forward for near-shore marine ecosystem management in New Zealand. Choice experiments and other ecological economic tools have considerable and, as yet, untapped value for optimizing cross-cultural, biodiversity, recreational and commercial outcomes when allocation of public spaces (like near-shore marine ecosystems) are contested and acrimonious.

Christoferson, Jill
Rex H. Caffey
Louisiana State University and
Agricultural Center
Thomas Hymel
Louisiana Sea Grant

Status and Potential of Direct Marketing of Seafood in Coastal Louisiana

During the last three decades the commercial fishing sectors in the northern Gulf of Mexico have experienced a number of hardships, which have contributed to declining profit margins and a reduction in the number of fishermen and overall production for some commodities. In an effort to revitalize the local fishing economy, Louisiana Direct was designed as an outlet for Louisiana commercial fishermen to communicate directly with the public and facilitate direct sales interactions – primarily for shrimp. The Louisiana Direct program is based on the Delcambre Direct model, which was piloted in 2009 and has been relatively successful over the last few years. Both programs employ web based technology that profile member-fishers on a community-based electronic clearinghouse that contains contact information, photos, and vessel-specific messages regarding incoming catches, arrival times, and price. Interested consumers contact the fishermen directly and travel to the port of their choice to purchase fresh, high quality seafood directly from the boat. Additionally the fishermen receive a higher price for their fresh premium product than they would dockside.

While Louisiana Direct and its port-based programs have been well received by both producers and consumers, there are a variety of underlying economic questions that need to be addressed to ensure the longevity and viability of the program. A more formal assessment of costs and earnings is required to analyze the potential for increased revenue against the additional time, labor, opportunity costs and volume constraints associated with direct marketing channels. This poster presents a conceptual framework for examining these questions and outlines the general rationale and methodology for an upcoming economic assessment of the status and potential of direct marketing models for Louisiana seafood.

Clinton, Jennifer
Robert Pomeroy
University of Connecticut

Cost-Benefit Analysis of CMSP in Long Island Sound

Coastal and marine spatial planning (CMSP) emerged as a useful tool in marine governance over the past decade, ameliorating inter-sectorial conflict and folding conservation goals into state, regional, and national marine management plans. The Nature Conservancy and Connecticut Sea Grant recently began a conversation on information-driven, stakeholder-centric CMSP for Long Island Sound, consistent with the 2009 US National Ocean Plan. Situated between Connecticut and New York, the Sound is shared between the two states and two regional councils (NROC and MARCO), making broad cooperation among stakeholders and governing bodies critical for the success of the plan.

As a precursor to CMSP in LIS, a benefit cost analysis will be undertaken in order to better understand the economic effects of implementing this form of ecosystem-based management. The primary sectors to be analyzed include finfishing, shellfishing, and recreational boating, some of the major stakeholder sectors in the Sound. This study will report on the costs and benefits to be studied. A literature review indicates that costs may include those incurred due to compliance, monitoring, enforcement, and stakeholder outreach. Benefits may include increased biodiversity, reduced inter-sectorial conflict, and reduced uncertainty for investors engaging in a multitude of ocean uses. The structure of the benefit-cost analysis will be presented and policy implications of the study discussed.

Colgan, Charles S.
University of Southern Maine
Judith T. Kildow
Monterey Institute of
International Studies

Useful Strategies for Linking Effects of Coastal and Ocean Resource Uses to Regional Economies

This paper discusses implications of ocean and coastal resource use for regional economies from two perspectives. The first perspective is the role of coastal and ocean resources in shaping regional economies in the U.S. ocean and Great Lakes region based on the National Ocean Economics Program (NOEP) datasets of employment, wages and output. This includes tracking effects of the Great Recession in coastal areas. The second perspective provides a global view of what other nations have learned about regional effects of uses of coastal and ocean resources in their own economies from compiling similar data.

Economics provides a theoretically and methodologically consistent approach to answering a fundamental question underlying any management decision: whether "we" are better off taking some action, or are alternatives available which leave us "better" off. Unfortunately, answering these questions has two major limitations: time consuming and expensive data collection; thoughtful explanations needed for decision makers and publics without economic training. Until thirty years ago, no one understood the magnitude of potential effects of changes in the oceans and along the coasts, because the ocean-dependent economy had rarely been scrutinized or estimated separately from the national economy. Now we know that poorly understood and unprecedented environmental and economic changes underway will significantly affect life in the sea as well as on land. We need tools to manage natural resources for a sustainable ocean/coastal and national economy. Development of a data series for both the ocean and coastal economies offers numerous possibilities for dimensionalizing economic activity related to use of ocean resources and economic impacts felt locally, regionally, and nationally over time.

Measurement of economic activity associated with the oceans is an evolving research field that supports coastal and ocean management actions. Early studies addressed the contribution of the oceans to national GDP by estimating the value of "ocean-dependent" economic activities in both production and service sectors. Several studies have also included non-market indicators giving estimates of environmental and other values not included in GDP. The U.S. approach reported here relies on utilizing existing regional economic measurements from the Bureau of Labor Statistics and Bureau of Economic Analysis in order to create a spatially and temporally consistent data series for the U.S. Experience in other countries 1) measuring the magnitude of use of ocean resources in their ocean economy and 2) comparing and contrasting underlying methodologies and the use of different national economic data series will be examined. Areas where measurement of economic activity requires additional development, such as energy, fisheries, and tourism & recreation will also be discussed. Better measurement of regional economic activity associated with the ocean is a necessary precursor to understanding relationships between the ocean economy and regional economies, and the creation of more effective tools for making decisions and taking actions that affect economies, resources, and the marine environment.

Cormany, Jennifer
Brad Terrell
Annette Watson
College of Charleston

"Loving It to Death:" Evaluating Urbanization Impacts in the Lowcountry, South Carolina for Future Planning

Charleston County, South Carolina, is one of the most rapidly growing coastal areas in the United States. A 2001 study conducted by Clemson University and the Coastal Conservation League of South Carolina used ArcGIS to model urban growth in Charleston County. According to the model, the urbanized area surrounding metropolitan Charleston grew 256 percent from 1973 to 1994. The authors project an additional growth in urbanized area of 247 percent by 2030. Urbanization and population growth in this area can be mainly attributed to "amenity migration," an influx of new residents attracted to the cultural and natural amenities that Charleston County has to offer. However, the unique landscape and amenities that endear residents and draw people to Charleston County are vulnerable to degradation should expansion continue without careful planning. Local governments, NGOs, residents, and academics have articulated a need to participate in collaborative planning efforts that will allow for population growth while maintaining quality of life and environmental integrity. This mixed methods project draws on both qualitative and quantitative methods to articulate the needs and desires of both historic residents of the Lowcountry, as well as its newcomers. Using the method of participatory GIS (PGIS), we will depict the needs and local knowledge of historic residents of Charleston County, including the mapping of key sites of access to coastal resources. Then using "Q-Method," which organizes stakeholder beliefs via a factor analysis, we will articulate the particular visions that both long-term residents and newcomers share about the Lowcountry. These methods of engaging with stakeholders will allow us to contribute to current planning efforts for a better future for all coastal residents, none of whom want to "love it to death."

Crimian, Robert L.
College of Charleston

From Golf Course to Saltmarsh: Perceived Changes in Ecosystem Services Linked to Human Well-Being from the Noisette Creek Saltmarsh Restoration in North Charleston, SC

The purpose of this study is to determine community perceptions of changes in ecosystem services from the restoration of Noisette Creek saltmarsh in North Charleston, South Carolina and to explore the potential benefits the restoration may have on well-being in nearby communities. This first restoration project on Noisette Creek is to restore the former Navy Officer's Club golf course site to its original saltmarsh state. The project entails activities needed to restore the site's hydrologic regime, expand the area of marsh, accelerate natural recovery of wetland vegetation, encourage faunal diversity, and improve wetland functioning. Ecosystem services are human benefits from resources and processes that are supplied by natural ecosystems. The restoration project expects to enhance services including water filtration and recreation opportunities. These services have been shown to directly affect human well-being in the people using these services. Well-being in this study is defined as a state of health or sufficiency in environmental, social, and economic aspects of life.

North Charleston, and the surrounding Noisette Creek community, has historically served as an industrial hub for the entire Charleston region. Additionally, the 1996 closing of the Charleston Navy Base left the Noisette area of North Charleston with unmanaged, industrial land. Low-income residents populate some of the areas along the Creek, so the impacts of such heavy industrialization give rise to not only environmental degradation but also environmental justice issues. The socio-economic conditions of local people and their relationship with natural resources, perception of natural resource management, and attitudes about conservation are crucial to consider when planning and conducting restoration or conservation of natural resources. To determine these perceptions and potential benefits of the restoration so as to better advise future restoration plans, three focus groups of different Noisette Creek stakeholders were conducted in the fall of 2012 to qualitatively determine community perceptions of restoration and the role of Noisette Creek in influencing human well-being within the community. Groups were derived from three samples: Noisette "leaders", residents living north of the Creek and residents living south of the Creek. Analysis of the content was used to develop statements for a q sort activity. The sample for the Q-method will be derived from workers and residents of the Noisette area and will roughly be divided between residents north and south of the creek. Up to fifty people will be asked to sort statements to quantitatively gauge community perceptions of restoration and how restoring Noisette Creek could affect human well-being. Secondary data is being collected to create social, economic, and health indicators to measure current levels of well-being in the study area. The focus group and Q-method data will be analyzed to determine how communities perceive the present condition and the future condition of Noisette Creek. Together with the socioeconomic indicators, this information will be used to evaluate current levels of well-being in North Charleston and assess whether the restoration of Noisette Creek saltmarsh will benefit the creek's ecosystem services and human well-being.

Dahal, Ram P.
Ian A. Munn
James E. Henderson
Mississippi State University

Economic Contribution of Mississippi's Forest Products Industry Over Time

Monitoring the economic contribution of the forest products industry is very important as it provides baseline information for planners and policy makers. Any changes that occur to forest product sectors through time will have larger impacts on state, regional, and national economies. Thus, time series analysis and documentation of economic data are helpful in addressing critical economic issues pertaining to the forest products industry and in understanding important industry trends. With the advent of Impact

Analysis for Planning (IMPLAN), an input output modeling system that is updated annually, it has been much easier to model the economic impact of forest industries and observe changes in these sectors over time. This study uses IMPLAN to estimate the economic impact of the forest industry in Mississippi. Forests covering approximately 65% of total land area of the Mississippi are one of the major contributors to the state economy. Over the past decade, Mississippi's forest industries have experienced significant contractions. Examining the economic impact of the forest industry over this time period provides insights into how those changes have impacted the Mississippi economy and how the forest products industry's contribution has changed over time. The proposed analysis will update baseline economic information on the contribution of the forest products industry to the Mississippi economy, and the results of this analysis will be useful to planners and policy makers concerned with strengthening the economic health of these sectors.

Daigle, Melissa
Louisiana Sea Grant Law &
Policy Program

Recent and Future Changes to the National Flood Insurance Program

In the aftermath of Hurricane Sandy, the National Flood Insurance Program (NFIP) faces a huge amount of claims in those areas hardest hit; some estimates show that Hurricane Sandy could cost the NFIP up to \$7 billion in claims. While recent changes to the NFIP allow for increases in premiums paid by vacation homeowners and by owners of repetitive loss property, some critics call for further changes to be made. The Flood Insurance Rate Maps (FIRMs) do not reflect accurate risks, which can lead to development (or redevelopment) in hazardous areas. While the Community Rating System (CRS) encourages local community action to reduce flood risk through reduction in flood insurance rates, only a small percentage of communities actually participate.

This presentation will look at the Flood Insurance Reform Act of 2012, highlighting the changes that will have the greatest impact on coastal communities. One of these is the consideration of climate change effects into floodplain mapping. It will also examine some of the suggested future changes to the NFIP. Because of the way the NFIP is currently formatted, the risks (and costs) are spread out across the community. One proposed change is to charge a higher premium on homes located directly on the coast than those homes that are located further inland; this presentation will address the legality and potential benefits and drawbacks of such a system. This change would go further than the new measures for repetitive loss property, since it would target all property located directly on the coast regardless of past claims. The presentation will look at recent changes to the Community Rating System and explore how this program can encourage communities to build and develop in a more resilient way, which can lead to less economic hardship faced by the community when impacted by a storm. Finally, the presentation will briefly discuss the newly published "Louisiana Homeowners' Handbook to Prepare for Natural Hazards" as a new tool available to residents of coastal Louisiana.

Davis, Don
Louisiana State University
Carl Brasseau
University of Louisiana -
Lafayette

Learning to Value Heritage, Tradition and Culture in 'A Place That Doesn't Matter': People Are the Key to the Solution.

The South Louisiana coastal plain has witnessed two extinction events since 1699. The first—extending from 1699 to approximately 1915—was zoological, evidenced by the disappearance of numerous species indigenous to the area. The second—presently unfolding—is cultural, as the cultural landscape begins to implode in the wake of physical and economic changes wrought by Hurricanes Katrina, Rita, Gustav, Ike, and Isaac, the BP oil spill disaster, and the flood of 2011. In their presentations, Davis and Brasseaux will focus on the second watershed event. Utilizing a PowerPoint presentation incorporating hundreds of rare images drawn from repositories on both sides of the Atlantic, they will examine the occupation and development of the coastal wetlands, the subsequent emergence of unique regional cultures, and the threats posed to that way of life by recent natural and man-made catastrophes that have tested the very limits of the legendary resiliency of the coastal populations – a population that has faced grave environmental challenges for more than two centuries. Natural and man-made tragedies, compounded from confusing and contradictory national policies that do not always reflect realities on the ground, are particularly noteworthy. Additional short-term results, with long-term impacts often do not include the importance and viability of traditional ecological knowledge, which should not be ignored, but embraced by policy makers. The common thread will be the importance of ecosystem services, which has evolved into an important model in linking the functioning of ecosystems to human welfare, particularly the often misunderstood and ignored elements of culture. In the end, Louisiana's near sea level wetlands can continue to function as a "working coast" only when the people living there become part of the solution.

Davis, Mark
Tulane Law School

Square Pegs, Round Holes: The Disconnect Between New Water Realities and Current Water Management

Until relatively recently under Euro-American traditions water has been treated as a public thing or a commons with few centralized points of management or prioritized uses. Growing populations and expanding industrialization have propelled a shift toward more intensive water management, a trend that greatly accelerated over the past 100 years or so. The resulting administrative structures and priorities were largely driven by the desire to foster growth and largely assumed that water could be commanded to

serve that growth and the environmental and cultural costs, when they were acknowledged at all, could be effectively managed. The resulting sprawl of cities and the development and “reclamation” of wetlands and arid areas has produced unprecedented prosperity and production but there is increasing evidence that that growth, prosperity, and production will not be sustainable, at least with significant changes to way water resources are managed and most importantly to the underlying assumption that water in the future will be as available as it has been in the past.

De Rezende, Carlos Eduardo

Layra Passareli
Universidade Estadual do Norte Fluminense

James Randal Kahn
Washington and Lee University

Valuation of the Paraíba do Sul Mangrove Ecosystem— State of Rio de Janeiro, Brazil

Mangroves are important for the environment and human population because they have a key role as a base for coastal food chains, protect and establish the coast by controlling erosion, harbor many animal species, and are a source of wood, plants and food resources. However, mangroves are particularly sensitive to environmental degradation. The Paraíba do Sul River (PSR) mangrove, located in the State of Rio de Janeiro has lost 20% of its area between the years 1986 and 2001. The change is occurring in both the quantity and quality on the mangrove area, which affects the level of goods and services provided by this ecosystem. Here, we examine the relationship between the welfare of the population in the area and the environmental quality of the mangrove, by aiming to evaluate the willingness to pay (WTP) or volunteer to work of the population, in exchange for improvements in the ecosystem. To do this, we used a choice modeling exercise in a survey of the population. For the choice experiment, we first defined the different levels and components of restoration, which describe the environmental quality. Ecological services and esthetics aspects of the mangrove ecosystem were used to describe the environmental quality for the different levels of restoration such as: complete, moderate and minimal. Secondly, the attributes (restoration level, time, price and volunteer service) were determined and combined to create choice sets for the survey. The research was carried out in the towns of São João da Barra and São Francisco do Itabapoana, State of Rio de Janeiro, Brazil. Ultimately, 320 interviews will be conducted, and analyzed with Statistical Package for Social Science (SPSS). Here, we present some preliminary results (n=177). We show that 73% of the interviewed people knew about the PSR mangrove, 93% of them believe that its main function is to be a source of fish and crabs to human population and 66% believe that its main ecological function is to sustain these animal populations. When asked about the condition of the mangrove, 70% claim that there are environmental issues, pointing out the pollution (46%) and the tree cutting (27%) as the main problems affecting the mangrove. Concerning the restoration levels: 34% of people opted for Status Quo; 24% for minimal restoration level, 22% for the moderate and 20% for complete restoration. The results are still being analyzed, and a probability function will be estimated and the population marginal willingness to pay for the mangrove restoration will ultimately be calculated. In conclusion, the initial results obtained show that the population has interest in restoring the mangrove in this region and recognize the ecological and economic relevance on this ecosystem.

Ebbin, Syma
Connecticut Sea Grant

Institutional Dimensions of Resilience in Fisheries Management

Vulnerability and resilience form opposing ends of a range defining the ability or inability of a system to undergo change and cope with perturbations, to retain control of function and structure and to resist collapse. The capacity for resilience of human-natural systems is related to the existence and capabilities of social institutions. Insights into the institutional dimensions of vulnerability and resilience in coupled human/natural systems will be discussed. Focus on the institutional attributes and interactions that enhance resilience in changeable and dynamic systems in coastal and marine areas will be covered with respect to several case studies from the Pacific Northwest that involve the management of Pacific salmon (*Oncorhynchus spp.*).

Elmer, Kellyn
Louisiana Sea Grant Law & Policy Program

Into the Abyss of Louisiana’s Gulfward Boundary

Until 1937 and the realization of the potential for exorbitant oil revenues, it was well accepted that coastal states had title to the waters and lands underneath their respective shorelines. However, when the federal government realized it stood to gain vast amounts of revenues from the areas, it began to assert ownership over the lands. Thus, the tidelands controversy was born.

The Supreme Court case *U.S. v. California* effectively limited the holding in *Pollard v. Hagan*. *Pollard* held that the states had title in ALL navigable waters within their boundaries. California held the federal government had the paramount rights and title to the lands and waters beyond the shorelines of the state. In the case *United States v. Louisiana* (1950) the Supreme Court kept with the California rationale, finding the federal government had title to the lands beyond the ordinary low water mark of the Louisiana shoreline. As these and other similar decisions were highly contentious, the legislature worked feverishly on a compromise. The compromise came with the passage of the Submerged Lands Act. The Submerged Lands Act gave the states title to the lands within a three-mile belt surrounding their shorelines; however, the gulf-states were given the opportunity to prove title to a boundary of three nautical miles (approx. 10.35 mile) by presenting historical evidence that it was the state’s intention to assert ownership over three nautical miles.

In a series of cases ending in 1975, the Supreme Court held Louisiana only had title to a three-mile belt rather than a three nautical mile belt, and Louisiana's gulfward boundary was set three miles from an established baseline. Despite the years of litigation and Supreme Court decisions, in 2011 the Louisiana Legislature passed Act No. 336 that asserts Louisiana has full sovereignty out to three nautical miles. The Louisiana Wildlife and Fisheries took this authority and declared in its May and June 2012 minutes that it will now regulate out to three nautical miles and will consider three nautical miles to be the Louisiana gulfward boundary. My poster will examine the potential consequences of the extended boundary taking into consideration federal potential. These consequences include a moratorium on fishing in all of Louisiana's coastal waters, military force, and liability.

Farrow, Kate
Kristen Grant
Paul Anderson
Beth Bisson
Maine Sea Grant

Economic Impact Assessment Methods Across the Sea Grant Network: Successes and Challenges

As publically funded institutions, Sea Grant programs invest in projects through research, education, and outreach, which are selected, developed, and delivered for the purpose of providing a service to the public. In recent times, it has become critically important to be able to evaluate the economic impacts resulting from these types of investments. However, because Sea Grant programs often work with long-range goals and toward improvements in social and ecological conditions, it is difficult to report the economic impacts of such work in credible and meaningful ways. In 2012, Maine Sea Grant compiled an inventory of the economic assessment methods currently in use across the Sea Grant network. The goal of this project was to help the entire network to better articulate its impacts in the terms sought by funders and by Congress. In general, the inventory reveals that, while most reported economic impacts require little in the way of money and time, their generation does require an awareness of how such impacts may be occurring as the result of any particular Sea Grant project, and accordingly, an understanding of how to obtain the relevant and requisite data. Additionally, the inventory reveals that market impacts number far greater than nonmarket impacts among reported impacts. Given that so many of the impacts of Sea Grant programming are conceivably nonmarket in nature, it is important for the network to improve its capacity to develop reliable, if conservative, estimates of the value of these nonmarket impacts. We examine several Maine Sea Grant projects as they characterize the types of challenges faced by Sea Grant programs across the network. Using these case studies, we provide examples of difficulties related to conceptualizing impacts, lack of available data, and reporting issues. Finally, we offer possible solutions to these challenges.

Fracking and Local Water Issues

As conventional sources of gas and oil become less productive while energy prices are increasing, production companies are developing creative extraction methods and using new technologies. Much of the gas and oil extraction is occurring through an increasingly popular method called hydraulic fracturing, wherein fluids are pumped at high pressure underground to force out oil or natural gas. The process, also known as fracking, uses a mixture of water and additives at high pressure to create fractures in underground rock formations in order to facilitate the production of oil or natural gas from a low-permeability formation. Between 2005 and 2010 the shale-gas industry in the United States grew by 45% a year. In 2012, it represents 24% of the country's overall gas production. Hydraulic fracturing makes the United States the world's largest oil producer and an energy leader. However, hydraulic fracturing creates a lot of controversy. The Haynesville Shale is a good example. It is estimated to contain around 250 trillion cubic feet of natural gas, the equivalent of a decade's worth of North American consumption. The development of natural gas in North America like Haynesville Shale has many supporters, including energy companies, private landowners, and public authorities in rural areas because of large economic benefits. The development of Haynesville from 2010 to 2104 is expected to inject \$61 billion of business sales in Louisiana economy. Haynesville Shale relies entirely on hydraulic fracturing stimulation technology. The companies are using the same aquifer that supplies water for domestic use for landowners. Many groundwater aquifers in the area have been facing decreasing water level for years. The enormous amount of water required by hydraulic fracturation could dry the already fragile aquifers. Moreover, hydraulic fracturing can lead to contamination of groundwater as a result of spills, faulty well construction, and disposal into underground injection wells. The strain that heavy-volume surface and groundwater withdrawals of freshwater used in the fracking process may be placing on water resources is one of the main concerns. The wastewater associated with shale gas extraction can contain high levels of total dissolved solids, fracturing fluid additives, metals, and naturally occurring radioactive materials. Many municipal water treatment plants are not designed to remove these contaminants. There are some alternatives available to replace water in fracking operations: the use of liquid petroleum gas (or "LPG") gel to replace water and the use of carbon dioxide or nitrogen foam, which uses merely 10% of the water needed for traditional fracking. This poster will examine the legal issues surrounding the role of economics and policy in allocating water resources between human and environmental needs and the role of energy industries and policy in relation to local water and communities.

Forget, Gaëlle
LSU Law Center
Adrian Stull
Louisiana Sea Grant Law &
Policy Program

Freeman, Matthew
Mississippi State University
CNREP
Tracy Yandle
Emory University

Engagement in Fisheries Governance: Two Case Studies of Individuals & Organizations in New Zealand and the U.S. Gulf of Mexico

Much of the focus of fishery economics research is one-directional: focusing on how government and government regulation impacts fishers. As a result, there is little emphasis is on the other direction: how and why fishers are involved in the regulatory process. Related research in political science and anthropology shows that resource users are capable of developing institutions to govern resource use and prevent overharvesting. However, the question of what motivates individuals' decisions on whether and how intensively to participate in fisheries management activities remain unanswered beyond the anecdotal level.

We use results from two complementary surveys of radically different fisheries (recreational charter fishing in the U.S. Gulf Coast and commercial rock lobster fishing in New Zealand) to identify potential commonalities in fishers' motivations. We employ a cumulative logit model with the respondent's level of participation (measured through the degree to which fishers in each fishery participate in various management activities available to them) as the dependent variable. Independent variables include education level, fishing in the EEZ, tenure, commitment, voice, and condition. For the independent variables, tenure denotes the number of years the respondent has spent in that fishery; commitment denotes whether the respondent expects to be in the fishery three years. Voice and condition refer to questions that had a five point scale; from strongly agree to strongly disagree. This data-driven analysis of case studies provides a better understanding of the regulatory process for resource management from the perspective of the regulated fishers. While involvement by fishers in the regulatory process should result in better compliance, we also acknowledge in the ensuing discussion whether the process leaves itself vulnerable to capture by special interests or includes a more democratic approach and transparency.

Fullhart, Andrew
Bemidji State University

Groundwater/Surface Water Exchange: Hydraulic Gradient Mapping Along a Shallow Lake Shore

This study in progress is presented in poster form to document temporal and spatial changes in hydraulic gradient across a shallow lake bottom during an extended drought. The primary focus is on the confining layer of lake mud, which is an important interface for groundwater/surface water exchange, and an important factor in a water budget for any lake, especially because of its larger extent compared to shoreline area. The lake is in the north central, Minnesota region, located down gradient of a USGS research field station where a terrestrial crude oil spill took place. Hence, a secondary goal is to help create a more complete picture of the potential impact of surface water contamination.

Piezometers, or two or more wells with openings at different depths, are used, and designed to facilitate the calculation of hydraulic gradient. The result is determination of net upward or downward flow into/out of the lake (positive: upward and negative: downward). A portable multi-parameter tool is also used to collect basic water chemistry measurements for surface water and groundwater samples at each point. Factors include the medium into which the wells are emplaced (confining lake mud versus the sandy substrate), the distance to shore, shoreline topography, weather conditions, and precipitation. Based on gradients alone, it would appear unlikely that contamination would enter the lake except through the sandy shoreline. The confining layer shows magnitudes as low as -0.218 with an overall average for all points of -0.029—consistent with the dramatic lake stage decrease, and evaporative conditions. In conclusion, this study works to further the understanding of groundwater/surface water exchange in surface water bodies as a factor of climate, and will provide insight into proper management of shallow lakes in drought conditions.

Gotshall, Bryan
Krishna P. Paudel
Louisiana State University
Agricultural Center

Assessing the Efficiency of Alternative Best Management Practices to Reduce Nonpoint Source Pollution in the Broiler Production Region of Louisiana

Best management practices are capable of reducing nonpoint source pollution emanating from agriculture. In many Southern states with concentrated broiler production, lack of sufficient land for broiler litter disposal causes continuous applications of manure on the same land resulting in nutrient leaching and runoff and sediment pollution. To reduce these pollutants, several best management practices have been recommended, specific to crops and regions, by the United State Department of Agriculture/Natural Resource Conservation Service (NRCS). These recommendations were made in concert with the state department of environmental quality, land grant universities and the state NRCS office. Research is needed on what specific best management practices to adopt/encourage at the watershed level so that the maximum amount of nutrient and sediment reduction can occur at the minimum cost. Our objective in this study is to develop a GIS based biophysical simulation model that minimizes the cost of reducing nonpoint pollution in a given watershed so that the waterway meets its designed use.

ArcView Generalized Watershed Loading Function (AVGWLF) is used to identify the eight best management practices reducing water pollution in watersheds encompassing 11 broiler production counties in Louisiana. Data needed for ArcView Generalized Watershed Loading Function (AVGWLF) was collected from various

sources. Information on crop and poultry production was obtained from state agriculture statistics. Information on soil characteristics, rainfall and pollution sources were obtained from the state meteorology department and the state department of environmental quality. Information on animal density and septic systems were gathered from government censuses and information on land use and watershed data was gathered from the LA GIS CD (developed by LSU).

We considered eight different best management practices and their abilities to reduce nitrogen, phosphorus and sediment pollution. These eight best management practices were cover crops, conservation tillage, conservation plans, agricultural to forest conversion, agricultural to wetland conversion, nutrient management, grazing land management, and sediment basin. Several combinations of BMPs and their adoption on different fractions of total land in watershed were simulated to identify the amount of nitrogen, phosphorus and sediment pollutants. Once the amount of pollutants from each combination of BMPs was obtained, the optimal combination of BMPs for the given area was determined by using a nondominated sorting genetic algorithm. There were multiple objectives considered in the study: nitrogen, phosphorus, sediment and cost reductions. Priority was given to nitrogen pollution reduction, phosphorus pollution reduction and sediment reduction in that order. Preliminary results indicated that implementation of best management practices identified by the optimization model provides 50% less pollutants compared to what is currently being promoted and adopted in the watershed. Policy making agencies should consider implementing the efficiency of alternative BMP combinations and promoting only those practices which help meet designated water use at the minimum cost. Such solutions will be welfare maximizing and provide the first-best solution.

Gramling, Bob
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Social Construction of a Disaster (BP Horizon Oil Disaster): Media Accounts and Community Impacts

This research draws on the social problems literature that proposes environmental problems are not simply "discovered," rather they are social constructs. The extent to which and manner in which a particular event, process or condition, such as the BPHOD, comes to be defined as a problem by the public at large is the research question of this study. Did the media accounts including 'claims making' by the organization actors form the basis of the social construction? Or did mediating factors at the community level challenge the emerging global media definition? While natural disasters often lead to the emergence of a "therapeutic community" with an outpouring of both official and spontaneous assistance to residents that reduces impacts and enhances recovery, technological disasters tend to be followed by the emergence of corrosive communities, often characterized by litigation, charges, and counter charges where the effect is often to blame the victims, to divide the community, and to delay or to prevent the start of recovery. Alternative theoretical perspectives posit that distinct competing positions (frames) could emerge in coastal communities supporting, for example, the oil or fishing sectors. Finally, it is possible that communities, because of their historical relationships rather than a precipitating event, could come to support the interests of either oil or commercial fisheries or both at the same time. Under this scenario, neither corrosive communities nor definitive competing frames may arise. What all of these possibilities suggest is that local vested interests, including economic interests, or long established economic and social relationships, may mediate the acceptance of the social construction process.

Content analysis was conducted on emerging media accounts using major networks, newspapers, and other national sources including testimony to Congress. Concurrently respondents from six communities in coastal Louisiana were selected for the study, three were 'oiled' and three while having been impacted were not in proximity to the coastal oil distribution. The survey instrument operationalized the concepts from the 'competing theories' so that each could be tested. Surveys were hand distributed to as many as 200 permanent households (depending on the size of the communities) one year after the event. We found no support for the corrosive hypothesis. This is a theoretical perspective that came out of the Exxon Valdez oil spill, which was followed for 20 years. Thus, our findings may be due to the fact that the contentious and litigious nature of the potential conflict in communities and families had not had time to manifest itself after one year. We did find support for the thesis that framing is occurring among those employed in fisheries but not those employed in the oil industry. Similarly we found moderate support for the idea that association within the fishing community influence respondents' interpretation of the event.

Ghose Hajra, Malay
Gregory Mattson, II
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Economic and Social Implications of Natural and Man-Made Disasters in Coastal Louisiana and Improvements in Hurricane and Storm Damage Risk Reduction System (HSDRRS) in the Last 50 Years

Coastal property development, losses of barrier islands, oil and groundwater extraction, coastal subsidence, and other factors have resulted in many challenges to coastal areas of Louisiana including human safety and economic health. The existence and improvements of flood protection and storm risk reduction systems surrounding New Orleans and coastal Louisiana parishes evolved over a period of several hundred years. This complicated and elaborate system includes the construction and periodic elevation of earthen levees along the banks of the Mississippi river, excavation of drainage canals throughout the metropolitan areas, construction of pump stations at strategic locations throughout the region, as well as building of floodwalls

and sector gates to minimize the effects of natural disasters. Restoring the marshes through deposition of dredged material from adjoining navigation canals and the Mississippi river bed and subsequent reestablishment of emergent wetland vegetation will help to protect the back levees from accumulated damage due to elevated water levels and storm surge forces. This will also create a sustainable coastal environment to bolster vital economic, social, and recreational opportunities for thousands of Louisianans.

This presentation summarizes the major storm events reaching the coastal areas of Louisiana in the last fifty years. General characteristics of each storm event, changes in Louisiana's coastline, and the economic and social implications of these storms will be compared. This presentation will also summarize the planning and development of major flood protection and storm reduction systems in coastal Louisiana in the last fifty years. A timeline will be provided to compare the construction of multiple hurricane protection systems and their effects on minimizing the damages from future storms. Additionally, an overview of multiple coastal restoration efforts by sediment diversion and growth of wetland vegetation will also be presented.

Harrison, R. Wes, Jr.
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Agricultural Center
Dennis Degeneffe
Consumer Centric Solutions

Effects of the 2010 BP Oil Spill on Perceptions, Attitudes and Behavior of Consumers for Gulf-Sourced Seafood

The authors will present a compilation of results from four national surveys conducted since the 2010 BP Oil Spill. Each survey elicited information regarding consumer attitudes, perceptions and behavior associated with gulf seafood since the 2010 BP Oil Spill. The baseline survey tracked consumer attitudes on a weekly basis beginning in May 2010 and running through October 2010. Three subsequent surveys were administered in December 2010, April 2011, and April 2012. Results show that most seafood consumers have not changed their consumption behavior regarding Gulf seafood. The most recent survey results show that 71% of seafood consumers say they have not changed their behavior regarding gulf seafood. However, some seafood consumers have changed. As of April 2012, 29% of seafood consumers say they have changed their seafood consumption as a result of the 2010 oil spill. Of the 29% of consumers who stated they have changed their consumption behavior two years after the spill, 22% have shifted away from either all gulf seafood, or certain types of gulf seafood. Moreover, "Frequent Seafood Eaters" (those who eat seafood once a week or more) and "Most Frequent Seafood Eaters" (those who eat seafood more than once a week) are more likely to be among the 22% tending to avoid all or certain varieties of seafood from the Gulf. They are also more likely to switch to other sources for their seafood, such as Alaska, Atlantic, Pacific, fresh water species, or imported seafood. General concern regarding the spill's effect on seafood safety remains at about 70% when seafood consumers are reminded about the spill, which represents little change since the December 2010 survey. Hence, even though 70% express "concern", only about 29% of seafood consumers have "changed" behavior. These results are generally consistent with two other studies commissioned independently by the Gulf Coast Business Council and Gulf Seafood Marketing Coalition.

Hasselström, Linus
Enveco Ltd.
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Saving the Baltic Sea Against What?

The Baltic Sea in Northern Europe is one of the world's largest semi-enclosed bodies of brackish water. Nine countries surround the sea: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden, with the adult population in these countries exceeding 230 million people. The Baltic is heavily eutrophied and the marine environment has been high on the political agendas during the last decades. One of the more large-scale agreements is the HELCOM Baltic Sea Action Plan, in which the nine countries have jointly negotiated nutrient reduction targets. Further, EU directives such as the Water Framework Directive and the Marine Strategy Framework Directive put formal requirements on the countries to take actions to achieve "Good Environmental Status (GES)" in coastal and marine waters. Visible effects of eutrophication on the marine environment are, for example, decreased water transparency, decrease of bladder wrack stands (*Fucus vesiculosus*), heavy growth of filamentous macro algae, oxygen deficiency in sea bottoms and blooms of blue-green algae (i.e. cyanobacteria). These effects accumulate over time and affect the functioning of the entire marine ecosystem as well as the provisioning of ecosystem services to the citizens of the littoral states.

Fulfillment of the nutrient reduction targets is yet far away and will be costly. Inaction is also costly. Recently, the BalticSTERN research network conducted a contingent valuation study on the benefits of reaching the targets. The survey was conducted simultaneously in all nine Baltic littoral countries in the fall of 2011, reaching 10500 respondents in total. This is to our knowledge the largest international CV study ever on the marine environment. The results of this study showed that the aggregate willingness to pay for meeting the BSAP targets is approximately 4 000 million Euros per year.

The public support for actions that achieve nutrient load reductions is thus likely to be high. However, the term nutrient load reduction is more complex than it may seem at first glance. In this paper, we use the BalticSUN data to investigate the public's preferences concerning four of the involved decision-dimensions, all debated in different policy and research contexts: First, the roles of nitrogen vs. phosphorus reductions for different eutrophication effects; second, the roles of actions targeting the coastal environment vs. actions targeting the environment in the open sea; third, the role of time – when do improvements occur given various actions to reduce nutrient loads, and; fourth, the north vs. south perspective of the Baltic Sea. We argue that the public's preferences concerning these four perspectives should be guiding policy.

Society's resources available to combat eutrophication are limited and should be allocated in a way that maximizes welfare. Thus, the right priorities should be made in order to target the adverse effects to ecosystem services that are the 'worst' from a socioeconomic perspective.

Haynie, Alan
Lisa Pfeiffer
NOAA Fisheries - Alaska

Climate Change and Fisher Behavior in the Bering Sea Pollock Trawl and Pacific Cod Longline Fisheries

The two largest volume commercial fisheries in the US Bering Sea are the pollock and Pacific cod fisheries. In this paper, we build upon work that independently examined the impact of climate change on the pollock and Pacific cod fisheries. We examine how both fisheries have adjusted to economic and environmental variation since 2000. For pollock, the mean location of winter fishing has varied little in warm and cold years, but there has been a northward shift in summer pollock biomass and fishing. This shift is related to the colder than average climate conditions in the latter part of the decade. For Pacific cod, the timing and location of winter fishing has shifted dramatically since 2000. This shift is related to the extent of seasonal sea ice and the timing of its descent and retreat. The summer Pacific cod fishery also shifted to the north, although the timing of the season remained constant. Climate affects relative spatial catch-per-unit-effort (CPUE) in both fisheries by causing a cold pool (water less than 2°C that persists into the summer) that sub-arctic species such as pollock and Pacific cod avoid. Understanding the relationship between fishing location, climate variables, and economic factors is essential in predicting the effects of future warming on the pollock and Pacific cod fisheries. We discuss key differences in our understanding of fisher behavior, climate conditions, and spatial changes in fish abundance in the two fisheries. This work is part of the Best-BSIERP Ecosystem Partnership.

Haynie, Alan C.
NOAA Fisheries - Alaska

FishSET: A Spatial Economics Toolbox to Better incorporate Fisher Behavior into Fisheries Management

Since the 1980s, fisheries economists have modeled the factors that influence fishers' spatial and participation choices and to understand the trade-offs of fishing in different locations. This knowledge can improve predictions of how fishers will respond to the creation of marine reserves, to changes in market conditions, or to management actions such as the implementation of catch share programs. NOAA Fisheries and partners are developing the Spatial Economics Toolbox for Fisheries (FishSET). The aim of FishSET is to join the best scientific data and tools to evaluate the trade-offs that are central to fisheries management. FishSET will improve the information available for NOAA Fisheries' core initiatives such as coastal and marine spatial planning and integrated ecosystem assessments and allow research from this well-developed field of fisheries economics to be incorporated directly into the fisheries management process.

In this talk, we provide an overview of the modeling approach, details of project implementation, and a preview of the FishSET software. An initial step of the project is the development of best practices and tools to improve data organization. A second core component is the development of estimation routines that enable comparisons of state-of-the-art fisher location choice models. FishSET will enable new models to be more easily and robustly tested and applied when the advances lead to improved predictions of fisher behavior. FishSET efficiently organizes statistical code so that leading innovators can build on each other's work and methods can be widely available to economists and managers. Implementing pilot projects in different regions will ensure that the data challenges confronting modelers are confronted at the onset of the project and also provide insight into how economic and fisheries data requirements for effective management may vary across different types of fisheries.

Heier, Michael
Louisiana Sea Grant Law &
Policy Program

Restoration v. Reclamation: Resolving a Constitutional Conflict

In a region plagued by retreating wetlands, sea level rise, and coastal erosion, there is a present need to protect the land we have and reclaim that which we have lost. Louisiana law extends to owners of waterfront property a right to reclaim land lost beneath encroaching waters by rebuilding that land at their own expense. Unfortunately, this right of reclamation represents a source of potential conflict as often as it serves as a means to restore Louisiana's vanishing coast. The greatest conflict may arise in situations where the state wishes to engage in a coastal restoration effort adjacent to privately held land. Land reclaimed by the state is treated as being owned by the state; and the state is prohibited from gratuitously disposing of state property. Additionally, landowners may assert that this action by the state infringes on their rights in reclaimable land, effectively blocking state action. Therefore, two potential barriers to successfully implementing restoration projects exist in the prohibition against state donations and the obstacle of private owners' rights. This poster presents possible resolutions to the conflict to the advantage of both the state and private landowners.

Henderson, James E.
Ian A. Munn
Mississippi State University

Economic Importance of Forestry and Forest Products to Mississippi Counties: A Publication Series to Help the Forestry Community Educate Local Elected Officials and the Public

Forestry is a 10.4 billion dollar industry in Mississippi, and in 2010 forestry related employment accounted for 4.2% of all jobs in Mississippi. While the economic contribution of forestry at the state level is well

documented, information on the importance of forestry to Mississippi counties was previously not readily available. A new publication series reports the economic impact of Mississippi's forestry and forest product sectors by county. Given the recent economic decline and hardships faced by many in the forestry community there are numerous efforts at the county level to promote forestry and educate the public on the economic importance of forestry and forest products to the county economy.

County level economic input-output analyses were conducted using IMPLAN software and data. This approach estimates how spending by one sector of the economy generates activity across other sectors. As goods and services are purchased from supporting sectors in the local economy by forestry and forest products industry this generates economic activity for these supporting sectors. Also, the employees of both the forestry and forest products industries and their supporting sectors also buy and spend in the local economy. Quantifying the total amount of economic activity allows for a greater appreciation of the importance of forestry and forest products to a county's economy. The publication series has proven to be useful to local forestry communities seeking support from state and local governments and in demonstrating how actions damaging to forestry or forest products can result in harm to the local economy. A new publication series used to educate the public and local governments was produced that demonstrates the economic contribution of forestry and forest products to Mississippi's forested counties.

Hitzhusen, Fred J.
The Ohio State University

The Political Economy of Sedimentation, Dredging and Upstream Remediation in 46 of Ohio State Park Lakes

This paper starts with a brief overview of a long-standing domestic and developing country research program by resource economists at OSU on soil erosion and sedimentation from agriculture and coal surface mining. This research effort has included monetizing impacts on downstream receptors (e.g., lakes, harbors, hydroelectric reservoirs and water treatment plants) and comparing the benefits and costs of dredging and other mitigation strategies. The remainder of the paper focuses on agricultural soil erosion and resulting sedimentation of 46 Ohio state park lakes including: (1) economic impacts on recreational boating, (travel cost) and lakeside residential property values, (hedonic pricing) (2) benefit cost analysis of dredging and other sediment removal and reduction strategies and (3) utilizing a combination of physical/natural, economic and political variables to explain the location and intensity of state park lake dredging activity.

The methods and results of the foregoing empirical models are first discussed in the context of recommendations for dredging and other sedimentation reduction strategies in Ohio state park lakes. Examples of key findings and policy implications include: 1) Ohio downstream costs of soil erosion exceed onsite prevention costs but vary widely geographically, 2) increased dredging and reduced sediment inflow to a lake both result in increased lakeside property values, but lakeside residents have a higher implicit willingness to pay for upstream soil conservation practices than for lake dredging, and 3) net economic gains are possible from economic vs. political targeting of dredging. Next, benefit transfer methods are utilized to generate policy recommendations for similar lakes in the case of recreation boating in Illinois. Finally, an attempt is made to suggest some policy implications as well as needs for further research in drainage basins in Ohio, the Gulf and other US regions.

Hoke, Josh
Annette Watson
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Resilience of Fishers to Rapid Development: a PGIS Study of Water Quality and Coastal Livelihoods in Mount Pleasant, South Carolina

Fishing is an important part of life in the South Carolina Lowcountry: for recreation, commercial interests, as well as for subsistence-based livelihoods. Water quality plays a major role in the health of the fisheries economically and ecologically, as well as the health of the people who consume the fish. Yet increases in coastal development in and around Mount Pleasant, South Carolina, may have led to changes in water quality that have had impacts on some residents who most closely depend upon coastal resources. This project engages Participatory Geographic Information Systems (PGIS) to assess changes in water quality, as well as assess the impacts that development has upon fishers' livelihoods. We conducted 4 focus groups in the Mount Pleasant area, with residents who have family ties to the area that date back multiple generations, to assess local knowledge and current community awareness of vulnerabilities. Through a mapping exercise, participants also located important fishing areas where rehabilitation or protection from development is most crucial. We then conducted water sampling at each of the sites identified by the focus groups; maps will be produced using GIS that highlight areas where water quality has become an issue as well as areas that need increased protection from development. This analysis will allow us to assess the resilience of fishers and coastal resources to rapid development, and allow us to make specific recommendations to local planners and policy-makers, such as locations where development should be prohibited in the future.

Hwang, Joonghyun
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Yes Votes, No Votes, and Non-Votes for Proposed Coastal Restoration in Louisiana

Coastal Louisiana has lost 40 square miles per year in the last 50 years, representing 80% of the coastal wetland loss in the entire continental United States. The objective of this study is to identify factors that affect the probability of observing a "prefer not to vote (PNV)" response to a contingent valuation question

in order to better understand preferences for coastal restoration in Louisiana. The “Blue Ribbon” panel recommended that respondents to contingent valuation surveys be explicitly allowed to give non-votes such as ‘don’t know / not sure / prefer not to vote’ in addition to the typical ‘yes / no’ responses. However, they did not provide any further guidelines on what to do with such responses. Although there are many studies about non-votes, there is no study that identifies impacts of offered bid level and consequentiality that is a measure of the degree to which respondents believe that the survey will affect policy on non-votes, even though consequentiality may be a necessary condition for obtaining meaningful welfare estimates from contingent valuation surveys.

In a nation-wide online survey, we identified variables that affect PNV responses using multinomial logit model with PNV as the baseline comparison group. Remarkably, we found that when PNV was compared to ‘yes’, 1) two consequentiality variables and bid level variable were statistically significant indicating that compared to ‘yes’, consequentiality of the survey decreases the probability of a respondent choosing PNV option, and 2) offered bid level increases the probability of a respondent choosing PNV. Interestingly, although we found that the effects of perceived consequentiality and offered bid were significantly different when comparing PNV responses to ‘yes’ responses, they were not significant when compared to ‘no’ responses, indicating that with respect to the effects of offered bid level and perceived consequentiality, PNV respondents behave statistically the same as ‘no’ respondents. In order to get more precise estimates for environmental restoration programs, we want to minimize PNV responses in the data. Our finding that consequentiality decreases PNV responses provides evidence that putting more effort on designing future surveys such that more respondents find it to be consequential can reduce the frequency of PNV responses.

Interis, Matthew G.
Daniel R. Petrolia
Mississippi State University

The Value of Ecosystem Services Provided by Oyster Reefs, Black Mangroves, and Salt Marshes in the Gulf of Mexico

We estimate the value of ecosystem services provided by three habitats of interest in the Gulf of Mexico: oyster reefs, black mangroves, and salt marsh. The services analyzed include storm surge protection, water quality improvement, commercial fisheries support, and wading bird habitat improvement. We target two estuaries: the Barataria-Terrebonne Estuary in Louisiana and Mobile Bay Estuary in Alabama.

Our estimates derive from a stated preference choice survey in which respondents choose their more preferred of two proposed restoration programs or express their preference for implementing neither. The proposed programs differ in their expected levels of restoration benefits (storm protection, bird habitat, etc.) as well as in the cost to the individual respondent of implementing them. By observing choices people make when confronted with different comparisons with different prices, we can statistically estimate how much they are willing to pay for the various ecosystem services. The populations of interest are taxpayers in the states of Louisiana and Alabama. We can examine how the various ecosystem services are valued both within estuaries and across estuaries. A previous study by the researchers, which focused on different habitats, found that people were willing to pay the most for storm surge protection, followed by increased fisheries productivity and wildlife habitat benefits. We also examine how respondents’ perceptions of how others will choose affect their own choices. This has important implications because the value estimates rely on the assumption that respondents truthfully reveal their most preferred option. However, under the condition that the option receiving the most votes will be implemented (the common plurality rule), a vote for the one perceived to be the least likely candidate has little effect on the outcome of the vote, so it is possible there may be an incentive to choose an option other than one’s unconditionally most preferred.

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The Economic Status and Performance of the Gulf of Mexico Crab Processing Industry in 2009

Wild crab harvests, especially blue crabs *Callinectes sapidus*, are a valuable economic resource in the U.S. Gulf of Mexico. According to NOAA Fisheries commercial landings statistics 61 million pounds of these crabs were harvested with a dockside value of \$73.3 million in 2011. Nevertheless, little information about the economic performance of crab processors, the sources of their raw products, and the distribution of their output is available other than trip ticket data and limited data about crab processors’ products and values obtained from annual voluntary surveys of seafood processors by NOAA Fisheries.

This research presents the findings of a survey of seafood businesses that process crabs in the U.S. Gulf of Mexico. The survey was coordinated by the Gulf States Marine Fisheries Commission and conducted by local state agencies and universities in 2009. It examines the sources of the seafood products they purchase for processing, the types of businesses and customers to whom they sell their seafood products, the forms of crab products they manufacture, and the percentage of crab products sold 1) within their base state, 2) the other U.S. Gulf of Mexico states, and 3) all remaining U.S. states. The research also includes basic measures of economic performance of the businesses that process crabs in the U.S. Gulf of Mexico, including asset value, indebtedness, equity, revenue, expenditures, net cash flow, and net income.

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Changes in Market Structure in Relation to Increasing Imports: The Gulf of Mexico Shrimp Processing Sector

The shrimp industry is by far the largest income generator among the Gulf of Mexico commercial fisheries. Since the 1990s, however, its economic viability has rapidly deteriorated due, primarily, to an increasing import base and a concomitant decline in price of the harvested product. The harvesting component of the industry has responded to the economic decline by significantly reducing effort primarily via a large reduction in the number of vessels targeting shrimp. While the impacts on the harvesting sector associated with increasing imports and a declining output price have been theoretically and empirically analyzed in a number of studies involving a large number of fisheries dating back to the 1980s, the impacts on the processing sector has not been considered in great detail. On one hand, domestic shrimp processors may benefit from higher imports as they present an additional source of raw material that can be potentially used in domestic processing activities. However, imported processed shrimp may also compete directly with domestically processed shrimp. Direct competition between imported and domestically processed shrimp becomes more likely as overseas processors increasingly move to value-added processing activities. The purpose of this paper is to examine the impact of imported shrimp on the Gulf of Mexico shrimp processing sector. The analysis will be conducted by product form and with an emphasis placed on changes in marketing margins and subsequent changes in market structure. In addition, consideration will be given to the role of monies distributed to processors because of the Continued Dumping and Subsidy Offset Act of 2000 (Byrd Amendment) on firm behavior and related industry structure.

Kerner, David
The Tauri Group, LLC
Scott Thomas
Stetson Engineers Inc.

Metrics for Assessing Defense Energy Resilience

The concept of resilience has been developed to describe the behavior of coupled social-ecological systems. While most research has focused on natural resources, Scott Thomas and David Kerner have taken the theory to address the resilience of a large governmental agency faced with energy supply challenges. Specifically, the authors developed analytical tools to assist the U.S. Department of Defense (DoD) in assessing and managing mission resilience.

All systems share attributes by which resilience can be assessed. Building on prior efforts (e.g., Amory Lovins), the authors developed a suite of metrics specifically for appraising defense system resilience to shortfalls in energy resources. They explore such factors as redundancy, diversity, substitutability, single points of failure, interconnection options, pathways for controlled reduction in function, situational awareness, skewing subsidies, critical dependencies, and control autonomy, among others. They also define a range of questions pertinent to assessing system status for each metric.

These metrics, while focused on energy considerations within a single organization, are nonetheless applicable to a very broad range of systems, inputs, and conditions. The metrics can be directly applied to assessing the resilience of coastal systems to natural and manmade stresses, including short- versus long-term and rapid-onset versus slowly evolving challenges. Certain variables will play a more prominent role than others for any given situation, and changes that foster improvements in some areas of resilience may reduce it in others; trade-offs will likely be necessary. The entirety of the suite, however, is intended to provide a firm foundation for beginning the resilience assessment process and for developing more holistic and insightful resource management policy.

Knapp, Lauren
University of Michigan

An Analysis of Offshore Wind Development: A Non-Market, Stated Preference Approach to Quantitatively Measure Perceptions and Estimate WTP in Three Lake Michigan Regions

There remains an empirical gap in estimating the explanatory factors that are correlated with offshore wind development support and opposition in the Great Lakes. This contingent valuation method (CVM) case study was conducted to understand the socioeconomic dimensions of opinions regarding offshore wind development in Lake Michigan and estimate willingness to pay (WTP) in the following regions: 1) Evanston, Rogers Park, and Wilmette, Illinois and 2) Mason and Oceana Counties, Michigan. Data was collected via online surveys after mailing invitations to systematic samples that received 6% and 10% response rates, respectively. Respondents were presented with three WindPro simulations of a 400 MW wind farm at three, six and ten miles from each region's respective coast along with one hypothetical (+ or -) monthly electricity price impact and then asked to vote 'for' or 'against' each scenario. Descriptive statistics and binary logit models were generated with offshore wind farm distances, price impacts, socioeconomic and demographic covariates. Similar to previous research, initial model results for Evanston (n=165 not including repeated measures) suggest that supporters are more likely to earn a household income of \$160,000 - \$200,000/yr (statistically significant at 95% level of confidence) and have a liberal political ideology (statistically significant at 90% level of confidence). Opponents are more likely to see the project on their daily routine (statistically significant at 90% level of confidence). These results provide insight on offshore wind development opinions in coastal communities both with and without prior exposure to development proposals.

Kruse, Sarah
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Fred J. Hitzhusen
The Ohio State University

Economic Analysis of River Restoration: A Dam Removal Case on Lake Erie's South Shoreline and Generalizations

A brief overview of the status of dams, and in particular dam deterioration and redundancy in the United States will be presented followed by a detailed case analysis of removal of the Ballville Dam on the Sandusky River in Northwest Ohio. This case study combined contingent valuation methods (CVM), ecological engineering and aquatic biology models to conduct a benefit cost analysis of the removal of the Ballville Dam. The dam was built in 1911 for hydroelectric production, which it no longer provides; however, its reservoir is the water supply for the city of Fremont, Ohio. Dam removal was expected to improve river water quality and increase spawning habitat for Walleye in Lake Erie. This study compared open-ended (OE) and dichotomous choice (DC) questions in assessing willingness to pay for dam removal. These stated preference approaches were in turn compared to constructed preference focus groups. Utilization of hydrodynamic and fish migration models made it possible to construct more realistic scenarios for the contingent valuation analysis.

Results and implications for coastal development in the Lake Erie context will be discussed including: (1) the Turnbull low-bound estimate of social benefits for a 30 mile radius around the dam is over \$12 million, which exceeds the estimated cost of removing the dam and building a supplemental water supply up-ground reservoir (2) the ecological benefits of expanded river spawning for Walleye will require additional management of the river fishery to realize the full Lake Erie economic benefits. Generalizations to similar dam removal, river restoration and coastal development situations will be suggested utilizing benefit transfer methodologies developed by Hitzhusen and Kruse (Chapter 12, *Economic Valuation of River Systems*, pp. 192-214, Edward Elgar Publishing 2007).

Land, Lauren
Louisiana Sea Grant

Human Well-Being and Implications for Restoration Policy

The dictionary defines sustainable as "a method of using a resource so that the resource is not depleted or permanently damaged" and development as "the act or process of developing; growth; progress." As defined by the 1987 Brundtland Commission, sustainable development is the process by which human populations meet their present needs without compromising the ability of future generations to meet their own needs, including extending to all the opportunity to fulfill their aspirations for a better life. At the global policy level, the picture of sustainable development includes three pillars: environmental health, economic growth, and social equity. In the context of sustainable human progress, there are sure to be tipping points between environmental health and economic growth at which society pursues a standard of living at the cost of intergenerational equity.

The United Nations defines sustainable human development as "the expansion of the substantive freedoms of people today while making reasonable efforts to avoid seriously compromising those [freedoms] of future generations" (Human Development Report 2011). Several researchers have dedicated their careers to defining dimensions of human well-being in order to create a list of factors that contribute to quality of life. Some examples include life sustenance, bodily health, reason, knowledge, mental well-being, participation and control over environment. For residents of coastal Louisiana, how does the natural environment satisfy basic human needs and contribute to quality of life?

This talk will provide a brief overview of various definitions of human well-being in the literature as well as methodologies to measure human well-being. We will also look at the influence of policy on human well-being, with the following questions in mind:

- Can local and state policies impact quality of life in coastal regions?
- To what extent does the condition of or access to the environment affect human well-being and what is the responsibility of local governments to ensure the existence of that environment for the public welfare of its citizens?
- What policies might be good for the environment while at the same time promoting equity and human well-being?
- How can natural ecosystems satisfy basic human needs outside of economic growth, and can local (or state or national) policy impact the sustainability of delivery of ecosystem services to satisfy those needs, including mental well-being?

For natural environments, the property of sustainability indicates the ability of an ecosystem to maintain the capability to adapt over time. For humans, how do we ensure that natural resources contributing to quality of life remain sustainable into the future, and how do governments incorporate this concept into policy? We must consider the impact of the natural environment on quality of life and how policy might influence coastal restoration to ensure the sustainability of future populations.

Landry, Craig E.
Thomas Allen
East Carolina University

Hedonic Property Prices and Coastal Beach Width

Previous empirical research on housing markets has demonstrated that coastal housing values capitalize the quality of nearby beaches. Recent papers document a number of important findings, including: i) a proximity effect, in which distance from the beach plays a key role in capitalization; ii) mis-measurement issues stemming from the dynamic nature of beaches; and iii) the possibility of endogenous beach width if housing values are used in Benefit-Cost Analysis to decide which beaches should be nourished and how much sand should be added. Focusing on Dare County, North Carolina (a community whose beaches had not been nourished at the time of analysis), we explore each of these issues, testing for errors-in-variables stemming from beach dynamics and estimating spatial hedonic regression models to see whether spatial autocorrelation can explain some of the patterns of findings in the existing literature.

Landry, Craig E.
Alyson R. Lewis
Hans Vogel song
East Carolina University

Visitor's Economic Value of Cape Hatteras National Seashore

We examine recreation demand, travel costs, and visitor expenditure patterns for Cape Hatteras National Seashore (CHNS) on the Outer Banks, North Carolina. CHNS is one of the largest protected barrier islands on the East Coast, comprised of nearly 30,000 acres along 70 miles of shoreline. The island system is unique, consisting of primarily thin barrier islands, dunes, and mud flats, backed by a large and shallow back-barrier estuary; CHNS is remote, accessible only by ferry or a single stretch of road that runs along the barrier. Data were collected at various beaches along CHNS in 2001-2002. We estimate count data demand models, controlling for endogenous stratification stemming from the on-site sampling. We present corrected estimates of economic value and extend the analysis of avidity bias to examine the impact of on-site sampling on economic expenditure analysis. Our hypothesis is that expenditure estimates will be downward biased (reflecting lower spending patterns of more avid users that live closer to CHNS), which would give rise to underestimates of economic impact.

Leiby, Julie
John V. Westra
Louisiana State University
Agricultural Center

Role of uncertainty in queen bee technology adoption: the case of VSH queens.

A probit model will be used to determine the influence of uncertainty in adoption for Varroa Sensitive Hygiene (VSH) queens. Factors include demographics, sale price and quantity, how many queens sold, contacts with the USDA and other beekeeping associations as well as if the breeder has used technology in their queen breeding operation. The accomplishments of this study are to determine the major factors that influence the decision of adopting VSH technology and to help build the foundation of technology adoption in the field of bees and the Varroa destructor.

Letson, David
University of Miami

A Model of Endogenous Hurricane Risk: Coordinating Mitigation and Evacuation

Hurricanes endanger society. We protect ourselves from specific storms by attempting to elude them and by investing in stronger infrastructure well in advance. Evacuation and mitigation jointly influence the risks we face and the means of reducing them. Yet their interplay is often neglected. Mitigation, in the form of land use policy and building codes, falls into the jurisdiction of land use planners, while individuals and emergency officials make evacuation decisions. Self-protection, in the form of either evacuation or mitigation, often may substitute for publicly supplied storm protection and may also enhance an individual's opportunities to benefit from collectively provided protection. Effective hurricane risk management calls for an integrated mix of mitigation and evacuation.

This paper formalizes the hurricane mitigation-evacuation linkage in an economic model of endogenous risk. The model evaluates the joint selection of hurricane risk reduction tactics—evacuation and mitigation—and examines how their interaction influences risk levels and risk reduction costs. Such a model of risk avoidance examines how small changes in mitigation would affect the marginal productivity of evacuation and vice versa. Our results suggest that a high priority should be to understand whether and when mitigation attenuates or accentuates the need for evacuation, and vice versa. While we may presume that a less resilient built community may encourage more evacuation, it is unlikely that mitigation and evacuation are always substitutes. At times, the two strategies are likely to be complementary. Mitigation and evacuation tend to differ fundamentally in the timing and geographic pattern of their effects and in the sectorial focus of their responses. Mitigation is anticipatory in nature, and becomes less effective as any given catastrophic impact approaches, because of its own time requirements. The capability of evacuation to avoid specific storms is limited in many cases, particularly for larger, more intense events. The extent to which mitigation and evacuation are substitutes or complements may depend on specific circumstances, including the rate and magnitude of coastal development.

Lindburg, Matt
Brown and Caldwell

Case Studies of Water Scarcity and Impacts on Policy and the Value of Water

Some states facing water scarcity issues have had to develop innovative and collaborative management plans in allocating water for human and natural resource uses. Examples from Colorado and Nebraska illustrate what could be a look into the coming "water economy."

Loomis, David K.
Shona K. Paterson
Mary E. Allen
East Carolina University

Ecosystem Services and Their Valuation: Moving Past the Stovepipes

There is a growing "shift" towards an ecosystem services approach to coastal resource management. This is consistent with ecosystem-based management, and is being hailed as an innovative way of achieving societal goals and objectives across biophysical habitats, human dimensions, and social values. Placing the things people care about at the center of the management paradigm provides a defensible and value-driven approach that makes sense to users and policy makers alike. This approach also describes a shift in focus beyond the narrow view where people are seen as only negatively impacting ecosystems (a one-way perspective) to a more realistic focus where people depend upon and benefit from ecosystems in exchange for some acceptable environmental impact (a two-way perspective). Understanding the relationship between 1) how society benefits from ecosystem services while 2) at the same time recognizing what constitutes acceptable biophysical changes/impacts in the ecosystem over time will help guide management strategies and regulations. We suggest there are two ways in which this can be considered.

First, a review of the literature will identify a growing body of "ecosystem service valuation" work. However, there exists a large body of high quality literature on ecosystem services that is not readily apparent. This scientific research focuses on topics such as recreation satisfaction, tourism, human well-being, storm surge protection, commercial activity, or public health. Specific research on areas like the social benefits of coastal restoration, hazard mitigation, and public preferences for shoreline management is also being conducted. These research topics, although not traditionally considered under the ecosystem services title, are in fact ecosystem services. They represent a broader big picture of ecosystem service valuation that can be recognized and utilized.

A second consideration is in how we "value" ecosystem services. Economists have risen to the challenge and attempted to place monetary values on a variety of services. However, as more economic studies of this nature are completed, we risk having the larger picture become skewed towards a specific disciplinary perspective. While an economic perspective is often a proper way to value an ecosystem service, other perspectives are equally valid, and often times more appropriate for given services or circumstances. Non-economic valuation methods offer a counter balance to this predicament, and will provide insights that have yet to be fully incorporated into current ecosystem service approaches.

An ecosystem services approach offers a significant opportunity to pursue interdisciplinary and socially driven coastal resource management. It is to our advantage to embrace an expansive view of ecosystem services and their implications.

Mack, Sarah K.
Tierra Resources LLC
Robert R. Lane
John W. Day
Louisiana State University

Application of the First Certified Methodology for Wetland Carbon Credits to a Wetland Municipal Effluent Assimilation System in Luling, Louisiana

Wetland restoration is a critical tool to combat wetland loss and is an effective climate change mitigation strategy as it enhances carbon sequestration and avoids carbon release that would occur in the absence of restoration activities. The American Carbon Registry (ACR) Restoration of Degraded Deltaic Wetlands of the Mississippi Delta methodology is the first carbon offset methodology that is specifically focused on U.S. wetlands. It is also the first wetland offset methodology in the world that is applicable at a large scale to broadly address wetland restoration through numerous eligible restoration techniques including hydrologic management, reforestation and afforestation. The objective of this project is to deliver a proof-of-concept carbon offset project at the wetlands near Luling, Louisiana, to address science gaps, "road test" the developed methodology, determine costs, benefits, and barriers to implementation, identify cost-saving measures, and potentially produce commercially viable offsets. This is the first wetland offset pilot project in the nation that also demonstrates the ability to create public private partnerships that leverage carbon finance. The results will inform managers and developers on how to develop wetland carbon credits that are compliance eligible, economically competitive, and scientifically defensible.

Mack, Sarah K.
Tierra Resources LLC
Robert R. Lane
John W. Day
Louisiana State University
Nick Martin
Winrock International –
American Carbon Registry

Guidance on the Nation's First Certified Wetland Carbon Credit Methodology

This presentation provides guidance on the first-of-its-kind American Carbon Registry (ACR) methodology, Restoration of Degraded Deltaic Wetlands of the Mississippi Delta, which was developed by Tierra Resources to transact wetland carbon offsets derived from wetland restoration. This is the first offset methodology to focus on wetlands in the United States and it is the first wetland offset methodology in the world to be applicable at a large scale and broadly address wetland restoration.

The ACR methodology, Restoration of Degraded Deltaic Wetlands of the Mississippi Delta, provides a rigorous scientific framework for project development and aims to give offset credit for a wide range of restoration techniques including hydrologic management as well as reforestation with a variety of species. The methodology is also unique in that it utilizes a modular approach to streamline the methodology to meet a variety of local conditions and different restoration techniques. The modular methodology addresses each aspect of the project from establishing a baseline, monitoring of eligible carbon pools, and estimating

project emission reductions, as discrete and independent modules. The individual modules that are applicable to a specific wetland restoration project can then be selected and applied under a framework module, which results in a project-specific methodology. These modules, when used together will ensure the environmental integrity and robustness of ACR restoration projects, and will prevent certification of poorly designed wetland restoration activities. Furthermore, this methodology will help shape the development of national market infrastructure for wetlands and water management. Background information will be provided on environmental markets and broad guidance will be provided on the Restoration of Degraded Deltaic Wetlands of the Mississippi Delta ACR modular offset methodology as to its applicability to the region and nation at large.

Mack, Sarah K.
Tierra Resources LLC
Robert R. Lane
John W. Day
Louisiana State University
Nick Martin
Winrock International –
American Carbon Registry

Guidance for the Use of Restoration of Degraded Deltaic Wetlands of the Mississippi Delta ACR Modular Methodology

In the last decade, considerable global, national, regional and state-level governmental participation in the stabilization of atmospheric greenhouse gases has facilitated significant growth in emissions trading markets. Although international, regional, and state carbon markets approve the use of terrestrial carbon offsets, most programs only have provisions for project types such as forestry and livestock manure management. However, the potential for a clear route to market for offsets derived from wetland restoration and water management does exist. Methods to develop a carbon offset credit align with specific standards set by federal, regional, state, or voluntary guidelines. To ensure quality and credit validity, protocols and methodologies must provide a transparent accounting methodology for the development, certification, and monitoring of offset projects, and be approved through a transparent process that provides opportunities for stakeholder engagement and scientific review. These methodologies then become the foundation for third-party validation and verification in accordance with standardized and transparent market practices.

Tierra Resources developed the American Carbon Registry (ACR) methodology, Restoration of Degraded Deltaic Wetlands of the Mississippi Delta. This methodology provides a rigorous scientific framework for project development and aims to give offset credit for a wide range of restoration techniques including hydrologic management as well as reforestation with a variety of species. The methodology is also unique in that it utilizes a modular approach to streamline the methodology to meet a variety of local conditions and different restoration techniques. The modular methodology addresses each aspect of the project from establishing a baseline, monitoring of eligible carbon pools, and estimating project emission reductions, as a discrete and independent module. The individual modules that are applicable to a specific wetland restoration project can then be selected and applied under a framework module, which results in a project-specific methodology. These modules, when used together will ensure the environmental integrity and robustness of ACR restoration projects, and will prevent certification of poorly designed wetland restoration activities. Furthermore, this methodology will help shape the development of national market infrastructure for wetlands and water management.

A carbon market that facilitates financial investment into the “blue carbon” stored in coastal wetlands such as mangroves, salt marshes, cypress swamps, and estuaries can potentially create carbon offsets that provide a wealth of co-benefits such as storm surge reduction, fish and wildlife habitat, recreation, job creation, and economic development that are vital to the sustainability of coastal Louisiana. A conservative estimate is that between \$5 billion and \$15 billion can be raised over the next 40 years if only one fourth of the eligible 4 million acre Mississippi Delta coastal zone is restored. Guidance will be provided on the Restoration of Degraded Deltaic Wetlands of the Mississippi Delta ACR modular offset methodology to inform managers and developers on how to create public-private partnerships that leverage carbon finance to develop wetland offset projects that are compliance eligible, economically competitive, and scientifically defensible.

Mattson, Gregory, II
Malay Ghose Hajra
University of New Orleans

Engineering Characterization and Beneficial Use of Dredged Sediments Used in Louisiana Marsh Creation and Coastal Restoration Projects

Coastal property development, loss of barrier islands, oil and groundwater extraction, coastal subsidence, and other factors have resulted in water quality degradation, decline in fisheries, wetlands loss, reduced storm and surge protection, and other challenges in coastal areas of Louisiana. Additionally, sea level rise, increasing number and intensity of catastrophic hurricane and tropical storms, and other natural and human hazards are putting more people and property at risk along Louisiana’s coast, with major implications for human safety and economic health of coastal areas. The loss of marsh in coastal Louisiana has also exposed significant infrastructure to open water conditions and has made the areas situated nearby less suitable for human and various wildlife and fish species. Efforts to reestablishing a healthy coastal ecosystem include rebuilding Louisiana’s wetlands with river diversion or sediment conveyance projects that optimally manage and allocate sediments, minimally impact native flora and fauna, and positively affect the water quality. Restoring the marshes through deposition of dredged material from adjoining navigation canals and the Mississippi river bed and subsequent reestablishment of emergent wetland vegetation will help to protect the back levees and create a sustainable coastal environment that bolster vital economic, social, and

recreational opportunities for thousands of Louisianans.

This poster will illustrate the benefits of characterizing the dredged material in regards to the Coastal 2012 Coastal Master Plan. It will define what suitable fill is in regards to coastal marsh renourishment and creation, explain how these characteristics are obtained, show how this material can be used, and demonstrate at which upcoming projects the material could appropriately be used. The potential economic impact of this research will also be explained.

Maybery, Jennifer
Louisiana Sea Grant Law &
Policy Center

Ocean Roads: Where Erosion Pushes Coastlines into Coastal Communities, To What Extent Are Local Governments Responsible for Maintaining Access and Resources for Seaside Property Owners?

The Florida Case *Jordan v. St. Johns County* deals with the question of constitutional takings based on maintenance of access roads. The community of Summer Haven, located south of St. Augustine, Florida, is accessible only by a coastal road referred to as Old A1A. Portions of Old A1A have been repeatedly washed out by storms, and the road has become unreasonably expensive to maintain, according to St. Johns County. The Summer Haven property owners filed suit against the county, seeking a finding that failure to maintain the access road would result in the devaluation of their properties, and that such devaluation qualifies as a "taking" of property without compensation under the 5th Amendment of the U.S. Constitution. The County concedes that governmental action compromising access to property could result in a taking, but questions whether destruction of access by natural forces could also result in a taking. In this case, the Florida court wrestles with these difficult questions, balancing on the one hand, citizens rights to access to and services for their communities, and on the other hand, Counties' discretion with regards to allocating funding. A ruling that the diminished access to Summer Haven qualifies as a Fifth Amendment takings claim could require St. Johns County to either maintain the road or provide compensation for property owners, both options being a substantial burden on the taxpayers. The economic issues presented in this case are highly relevant to other coastal areas where communities are susceptible to erosion, damage from repeated natural disasters, and sea level rise – where local citizens and governments face difficult decisions about maintenance and expense in the face of an inevitable take-over by mother nature.

Mazzotta, Marisa
U.S. EPA - Atlantic Ecology
Division

A Meta-Analysis to Evaluate Property Value Co-Benefits of Using Environmental Site Design for Stormwater Runoff Reduction

Elena Besedin
Paul Laskorski
Abt Associates

Practices to reduce stormwater runoff are implemented for several primary purposes: to protect and improve water quality and hydromorphology in water bodies that receive stormwater runoff, to prevent soil erosion, to maintain groundwater recharge volume, and to prevent increasing risk from flooding. Along with these primary benefits, many stormwater management practices results in co-benefits, including carbon sequestration, water temperature regulation, air quality improvements, energy savings due to microclimate regulation, wildlife habitat, and aesthetic benefits of increased vegetation. Low impact development (LID) encompasses a number approaches for retaining, slowing and filtering stormwater. LID developments may involve alternative neighborhood design, often referred to as environmental site design (ESD). One benefit of ESD is the potential increase in property values that may occur when vegetation replaces impervious surfaces. Often, ESD provides more open space, and greater access to and views of that open space, than conventional subdivision design. Numerous studies have shown that increasing the amount of open space leads to increases in residential property values. Therefore, the additional open space provided by ESD developments is likely to result in higher-valued properties, both within the new ESD developments and nearby.

This paper describes the use of many studies of open space hedonic property valuation to estimate benefits of ESD at the watershed scale. The meta-analysis includes 215 observations from 45 studies that evaluate general open space, vegetated open space, tree cover, riparian buffers, wetlands, and small water bodies. We did not include studies of golf courses and large parks. Based on the desired application, we measured open space as the percent open space within a radius of a property. The estimated meta-regression model allows one to account for both the type of vegetation used in ESD and distance decay factors. As an illustration, we applied the meta-analysis model to a hypothetical, yet realistic, scenario for the Narragansett Bay Estuary watershed. We estimated the projected change in property values if ESD is implemented in all new residential developments, as compared to a baseline of more traditional subdivision design. This was based on using projected residential development in the watershed from 2013 through 2040 and anticipated reductions in impervious surfaces associated with ESD.

Very few studies directly measure property value effects of LID. Studies to date have attempted to estimate these changes in property values using benefit transfer. They have generally drawn on ranges of point estimates from existing hedonic valuation studies that focus on various types of green space. Moreover, existing benefit transfers often use ad hoc assumptions regarding the how the distance to additional open space affects property values. We compare our results to typical point estimates used in other applications. While the most conservative of these point estimates fall within the range of our estimates, the higher point estimates grossly overestimate the effect of the marginal changes in greenspace expected to result from

ESD on home prices. Over large geographic scales, these values can thus diverge by a large amount. Thus, use of point estimates in benefit transfer may provide erroneous information to decision makers.

McDermott, Shana M.
University of New Mexico
Richard B. Howarth
Dartmouth College

Addressing the Assumption of Carbon Neutrality: Analysis of the Northern Forest

Harvesting timber for energy production is often deemed to have a carbon footprint of zero, or to be carbon neutral. This understanding is based on the assumption that the areas harvested for biomass remain forested such that the carbon is reabsorbed into growing trees. However, as carbon caps tighten, more land is converted into fuel wood, a wood of lower quality with lower carbon thresholds. In addition, when timber is burned for fuel, a pulse of carbon is released, which can take many years to accumulate and at the cost of other ecosystem services. The reduction in high carbon forests and ecosystem services imply a carbon footprint greater than zero.

We dispute the assumption of carbon neutrality. A tree harvested for fuel reduces carbon stocks. Thus, the harvested fuel should be accounted for in the carbon footprint and should not be assumed to be the same, as though it had never been harvested for fuel wood. We argue that it is necessary to also account for a reduction in carbon stocks by estimating the change in the biomass footprint, rather than underestimating biomass footprints. Using timber harvesting in New England as a motivating example, we built a dynamic model that estimates the optimal harvest time while also accounting for the social benefit of carbon sequestration. Specifically, we examine the Northern Forest in New Hampshire due to its unique forest structure and the availability of wood-based power plants in the region.

Our results indicate that under most conditions, it is inappropriate to assume carbon neutrality when timber is harvested for energy production. Specifically, our results suggest that timber harvesting for energy production should occur later than the optimal financial rotation, by up to 57%, or 12 years. Only under improbable market and carbon pricing conditions does the assumption of carbon neutrality hold. The difference between the rotation periods is due to the social benefit of carbon storage and depends on the efficiency of the energy conversion and yield.

Meyers, Sarah
Nicole Machuca
Annette Watson
College of Charleston

The Vulnerabilities of the Gullah/Geechee Peoples in the Sea Islands, South Carolina

Social-ecological systems (SESs) are comprised of linked social and ecological components that are increasingly at risk of being altered by natural resource loss and damage through climate change, natural disasters, and development. In this research, we seek to understand the vulnerabilities of the Gullah/Geechee, descendants of Africans who had been enslaved on the Sea Islands along the southeastern coast of the United States. These people have developed a subsistence economy that persists to this day; however, their traditions are vulnerable from the effects of globalization, increasing urbanization, climate change impacts, decreasing access to and displacement from traditional lands, and culturally restricting laws. This multi-method study combines the use of both qualitative and quantitative data to more holistically articulate this SES. Two focus groups will be conducted to identify Gullah/Geechee economic dependencies on coastal resources and how these coastal resources have changed with the growth of Mount Pleasant, South Carolina. The data collected in the focus groups will be triangulated with economic data on the monetary value of Gullah/Geechee subsistence in South Carolina.

This economic data will be collected through surveys, monetary conversions of subsistence goods, and participant-observation data on the hunting and fishing done by Gullah/Geechee people. We hypothesize that these peoples are responding to cultural stress through emigration and/or economic assimilation, but despite these pressures, Gullah/Geechee have also developed a suite of adaptive strategies to cope with these vulnerabilities.

Miller, Alex
Gulf States Marine Fisheries
Commission
Malinda Kelley
GCR Inc.

Gulf Seafood Trace: A Robust Electronic Traceability Program for the U.S. Gulf of Mexico Seafood Industry

Demand for seafood is partially driven by market confidence in the product. Confidence is driven by information. Creating assurances about seafood depends on the management and timely access to critical information about the product as it moves through the supply chain - vessel to plate. This information can be shared electronically with buyers, consumers, and other stakeholders for the purposes of innovative marketing, proving regulatory and buyer specification compliance, communicating safety and quality, demonstrating certifications, and improving labeling. A voluntary electronic seafood traceability program called Gulf Seafood Trace was created in the summer of 2011 to help drive increased market demand for U.S. Gulf seafood by telling its unique story and ensuring confidence in the market. The program consists of an Electronic Traceability Platform, a Data Quality and Confirmation component, and a Marketing Module. To date, 44 seafood processors and first receivers from Texas to Florida have enrolled in the program and can now deliver critical product information by integrating state trip ticket data, value-added data, marketing information, and other appropriate data. The program also empowers businesses with automated and manual data reviews of shared information to confirm the validity of product and source data, which can potentially lead to enhanced market confidence and demand.

Miller, Alex
Gulf States Marine Fisheries
Commission

Jack C. Isaacs
Louisiana Department of
Wildlife and Fisheries

The Economic Status and Performance of the Gulf of Mexico Seafood Processing Industry in 2009

Commercial seafood processors are a multi-million dollar component of the regional economy of the U.S. Gulf of Mexico and are an essential link in the supply-chain among the commercial seafood harvester, first-receiver, and consumer. Aside from annual voluntary surveys of seafood processors conducted by NOAA Fisheries that provide limited information regarding the volume and value of processors' products, there are no current data pertaining to the revenues, expenditures, and economic returns of the processing sector in the Gulf of Mexico.

This study presents a summary of the results of a survey of businesses identified as seafood processors in the five states in the U.S. Gulf of Mexico region for the year 2009. Data are derived from in-person surveys of seafood processors that were coordinated by the Gulf States Marine Fisheries Commission and conducted by local state agencies and universities. Variables included seafood species handled, sources of seafood purchased, the types of businesses and consumers to whom they sold their products, labor usage, the market value and replacement value of processing facilities, revenues, and expenditures. This research examines the economic performance of these processors and generates estimates of asset value, outstanding debt, net worth, net cash flow, and net income.

Newbold, Stephen C.
D. Matthew Massey
U.S. Environmental Protection
Agency

Estimating a Recreation Demand Model Using Aggregate Data on Visitation Rates to Outdoor Recreation Sites

Recreation demand models are frequently used to explain outdoor recreation behavior and to evaluate the economic benefits of environmental quality improvements at recreation sites. Among the most commonly used recreation demand models are site-choice models based on a random utility framework. The estimation of such models typically requires individual-level data on the recreation site choices for a representative sample of the user population. This paper develops an approach to estimating the parameters of a traditional recreation demand model using aggregate data on the number of visitors to each of multiple outdoor recreation sites in the study area, combined with survey data on individuals' total demand for trips in the study area. These data often will be much easier to obtain than individual-level site choice data, since aggregate visitation data are routinely collected by federal and state resource agencies who manage public parks and other publicly owned recreation areas. However, set against the advantage of low-cost data collection is the potential drawback that aggregate data may not contain enough information to produce sufficiently precise estimates of the model parameters.

We use a multinomial logit site-choice model that includes a "stay-home" option, which allows the model to explain both site choices and trip frequencies. The aggregate site visitation data allow identification of site-specific fixed effects, which include the influences of all relevant physical and environmental attributes associated with each site. The survey data on trip demands allow identification of the stay-home parameter and the travel cost parameter. We first demonstrate the model using 1) a simulated set of site choices based on data describing the locations of state and federal recreation areas with water access to the Chesapeake Bay and 2) data on the number of households living in each zip code within a two hour travel time to one or more of the sites. We show that these data sources, when combined, are sufficient to estimate all key parameters of a site-choice model with a stay-home option. We demonstrate that a second-stage ordinary least squares regression using the estimated site-specific fixed effects can recover the coefficients on the site attributes. We also compare the expected information content of aggregate data to individual-level data through simulations. This allows us to examine the tradeoff between ease of data collection and precision of the parameter estimates mentioned above.

The approach developed in this paper could allow coastal and other natural resource analysts to estimate recreation demand models in a wider variety of contexts by using data that are readily available or easy to collect. This in turn should improve the ability of resource managers to evaluate projects aimed at controlling access to outdoor recreation areas or improving water quality or other environmental attributes.

Norris-Raynbird, Carla
Bemidji State University

Changing Capacities: Local Coastal Zone Management, Perceptions of Vulnerabilities and Mitigation Strategies in Coastal Louisiana

Capacity is defined here as agreement with regulator ideology that undergirds policy and regulation promulgated by Louisiana Department of Natural Resources. Pre-hurricane Katrina data (2005) and post-hurricane Katrina data (2011) from surveys and interviews with local parish officials are compared to assess potential changes in capacity since the experiences of Hurricanes Katrina, Rita, Ike and Gustav. These post Katrina hurricanes bring into critical focus the need to provide the necessary tools to build knowledge and local capacities to manage the challenges of present and future coastal Louisiana.

Comparisons of the data in this natural experiment show an overall shift away from agreement with regulator ideology. In 2011 there is increased regulatory support by planners and CZM managers but much less regulatory support among local political officials than in 2005. Although the effect was weaker 2011,

'having an LCP' was shown to positively influence regulatory support and perceptions of vulnerability. Of all mitigation strategies presented in the 2011 survey, respondents overwhelmingly indicate that voluntary inland relocation is not an option for them. Regardless of coastal or inland location, most parishes indicate reliance on large-scale technological/engineered mitigation ('structural' such as levees and flood control devices or 'non-structural' such as wetlands restoration). Less support was found for locally implemented regulatory mitigation strategies.

**Ogunyinka, Ebenezer O.
Jack C. Isaacs**

Louisiana Department of
Wildlife and Fisheries

Gender and Angler Participation in Louisiana Recreational Fishing

This report examines gender differences in angling activities in Louisiana using data from a 2008 survey of Louisiana resident recreational fisherman. Variables analyzed include both continuous and categorical. Selected continuous variables are the age of fishermen, the number of freshwater and saltwater fishing trips taken in the 12 months prior to the survey and the number of times fishermen ate fish per month. The categorical variables include the level of education, annual household income, race or ethnicity, primary method of fishing, respondents' awareness of the health benefits of fish consumption and their reasons for going fishing.

Student's t-tests were used to test for differences between male and female respondents under each of the continuous variables. Chi-square tests of independence were conducted to test for association between gender and each of the categorical variables. Probabilistic analysis was also conducted on some outcomes related to the method of fishing and the reason respondents go fishing.

Results on the analysis of the continuous variables indicated that there were statistically significant gender differences in the number of freshwater and saltwater fishing trips respondents took in the 12 months prior to the survey. Preliminary results on the categorical variables suggest evidences of association between gender and annual household income, race or ethnicity, place of residence, method of fishing, period of fishing and reason respondents go fishing. While this study clearly identified differences among female and male respondents under different scenarios, it faces the challenge of small sample sizes for some variables whose effects on the results were not explored. The results, however, are expected to generate discussions, which will have implications for future survey design and data collection.

**Pandit, Mahesh
Krishna P. Paudel**

Louisiana State University
Agricultural Center

Stock and Flow Pollutants and Environmental Kuznets Curve Relationship in Water Pollution

There have been numerous theoretical and empirical studies of an income-pollution relationship, which is usually referred to as the environmental Kuznets curve (EKC). The hypothesis underlying the EKC is that the level of environmental degradation will increase as per capita income increases up to a certain threshold. Beyond this income threshold, or the turning point, it is assumed that further growth in income would be beneficial to the environment. Hence, the EKC curve is assumed to take an inverted U-shape.

Traditionally, when the turning point in pollution-income relationship is estimated in EKC framework, a single equation panel data model with an assumed functional form of income as an explanatory variable to a pollutant is the basis. Because it is known that several of these pollutants are inherently related to each other, a single equation estimation method may not be an appropriate way to understand the relationship between income and pollutant. Yet, when estimating EKC model for multiple related pollutants, researchers tend to estimate these pollutants in a single independent equation as if these pollutants are independent. In other words, the researchers do not consider the covariance of the error terms across different pollutants. Our study addresses four issues. 1) We jointly estimate stock and flow pollutants to determine if the EKC exists in both types. 2) We use the seemingly unrelated panel data model to analyze relation of the pollutants. 3) We address the issue of intercountry or interstate pollution concerns. 4) We utilize a semiparametric model specification and test whether a semiparametric model performs better than the parametric model.

Preliminary results indicated that a semiparametric SUR model performs better than a single equation semiparametric or parametric model. Results also indicated that EKC is present in both stock and flow pollutants, and seemingly unrelated panel model provided gain in efficiency over a single equation panel data model. Monte-Carlo simulations performed provided the evidence in favor of SUR model over a single equation semiparametric model. Parametric specification is rejected in favor of a semiparametric model.

**Pandit, Mahesh
Krishna P. Paudel**

Louisiana State University
Agricultural Center

A Survey of Semi-Parametric Methods Used in Environmental Kuznets Curve Analyses

The relationship between pollution and income per capita income generally appears as an inverted U-shape curve. This inverted U-shaped curve is known as the environmental Kuznets curve (EKC). The shape of the curve, however, is very sensitive to data period, location, and pollutant considered in the analysis. Many studies refute the inverted U-shape of the curve indicating that a more flexible functional form is needed to estimate the model. We review the literature on the application of parametric, non-parametric and semiparametric models used in EKC analyses. We also provide information on hypothesis testing among parametric, nonparametric and semiparametric functional forms. Our objective is to introduce recent

development in parametric and nonparametric econometrics to the environmental Kuznets curve studies. These new developments include Bayesian methods, generalized time-varying coefficient models, nonstationary panels, copula method, and seemingly unrelated semiparametric regression.

**Parajuli, Rajan
Sun Joseph Chang**
Louisiana State University
Agricultural Center

An Econometric Analysis of Softwood Sawtimber Stumpage Market in Louisiana

Louisiana is one of the major sources of softwood timber production in the southern USA. Even though there are several regional as well as state-level studies on econometric analysis of timber market in the US South, no particular study has been available on the softwood stumpage in Louisiana. Following a profit maximization framework on the four-input production function, we derived extensive demand and supply models of Louisiana softwood sawtimber stumpage market. The two-stage least square technique was applied to estimate the system of demand and supply models consistently. The annual time-series observations on timber harvest and stumpage prices were obtained from Louisiana Department of Agriculture and Forestry. Most of the estimated coefficients are statistically significant with expected sign. The results show that stumpage price is inelastic in both supply and demand models, suggesting that price changes will not result in significant stumpage harvest fluctuations. The pulpwood is a complement to the Louisiana sawtimber supply. The positive and high elasticity value of inventory estimates implies that sawtimber stumpage supply is highly driven by the standing softwood growing stock.

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Economic Issues Related to Groundwater Use in Louisiana

In this paper, we address major problems faced by the groundwater sector in Louisiana and potential economic solutions to overcome these problems. The problems addressed are saltwater intrusion in freshwater aquifers, optimal withdrawal of groundwater when there are multiple users, transboundary groundwater resources, and conjunctive use of surface and groundwater. To address the case of saltwater intrusion in aquifers and its management, we provide cases of the Sparta aquifer and the Southern Hills aquifer system. To provide the case of transboundary water use and multiple water resource uses, we provide the case of the Sparta aquifer shared by Louisiana and Arkansas and the Carrizo-Wilcox aquifer shared by Texas and Louisiana. Optimal management of water, when there are competitive users, is addressed with an example of industry/agriculture/municipal use in the Sparta and Wilcox aquifers. With the advent of natural gas extraction using hydraulic fracturing, the competition has increased even further for the limited amount of groundwater specifically in the Wilcox aquifer system. Although one policy design is not suitable for managing the ill of all groundwater issues, we think that optimal sustainable allocation designs based on the highest marginal value and conjunctive use of surface water and groundwater using a network of water supply and payment system may alleviate the problems faced by Louisiana groundwater sector.

**Petrolia, Daniel R.
Matthew G. Interis**
Mississippi State University

America's Wetland? A National Survey of Willingness to Pay for Restoration of Louisiana's Coastal Wetlands

A nationwide survey was conducted via Knowledge Networks to estimate the willingness to pay (WTP) for a large-scale wetland and barrier island restoration project in the Barataria-Terrebonne National Estuary in coastal Louisiana. A split-sample approach was used to administer both a binary-choice (contingent valuation) and multinomial-choice (choice experiment) version of the survey, with the latter used to estimate willingness to pay for increments in three specific wetland and barrier island ecosystem services: wildlife habitat, storm surge protection, and fisheries productivity.

Binomial and conditional (multinomial) logit regression models were estimated assuming a Random Utility framework. Results were segregated based on respondents' perceived consequentiality of the survey, i.e., whether it was perceived as having a real influence on policy decisions. Consequentiality has been shown to be a key condition for establishing a theoretically consistent incentive structure. Results indicate that perceived consequentiality, confidence in federal and state government agencies, political leanings, and "green" lifestyle choices were significant explanatory factors regarding support. All three wetland ecosystem services significantly affected project support, with increased fisheries productivity having the largest marginal effect, followed by improved storm surge protection, and increased wildlife habitat.

Overall, resource users as well as those for whom the survey was perceived as consequential were willing to pay substantially more than non-users, i.e., those for whom value is predominantly existence value. However, even non-users were still estimated to be willing to pay in the neighborhood of \$1,000 per household (in the form of a one-time tax). A conservative lower-bound estimate of aggregate WTP is \$86 trillion, well above a recent \$100 billion estimate of restoration cost. Given that the sample was comprised mostly of non-Louisiana, non-Gulf Coast residents, this result gives some credence to the claim that Louisiana is perceived as "America's Wetland".

Petrolia, Daniel R.
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William Walton
Auburn University - Shellfish
Laboratory

Consumer Preferences for Branded Gulf of Mexico Oysters

The overall goal of this research is to evaluate branded Gulf of Mexico oysters in the context of a choice experiment accounting for potential effects of consumers' real and perceived risks associated with Gulf seafood. Data were collected via two on-site taste panels and an online choice experiment survey targeted to residents in key metropolitan regions both nationally and along the Gulf Coast. The online survey was conducted via Knowledge Networks, which provides the only probability-based online survey panel (Knowledge Panel).

The taste panels and survey were used to evaluate consumer preferences toward branded, farm-raised Gulf of Mexico oysters. Key attributes under study were the effect of brand name, harvest location, production method, appearance, and price. Branded Gulf oysters were paired with various combinations of East and West Coast oysters as well as un-branded (generic) Gulf oysters to determine if consumers are willing to pay a premium for branded Gulf oysters relative to un-branded ones and if there is market potential for them in markets currently dominated by un-branded oysters and those from the other coasts. The taste panels add a dimension not feasible for testing in the online survey: taste.

Four key hypotheses are to be tested: 1) Are oyster consumers willing to pay a price premium for geographically-branded Gulf oysters? 2) Are oyster consumers willing to pay a price premium for oysters with a specific suite of improved attributes? 3) Do consumer risk preferences affect preferences for branded Gulf oysters? 4) Do consumer risk perceptions regarding the effect of the Deepwater Horizon oil spill and/or *Vibrio vulnificus* have a significant effect on the WTP for Gulf oysters. The results of this work should provide Gulf oyster producers with useful information regarding market potential for alternative oyster products. Results indicating weak potential would make evident the risk associated with pursuing alternative production methods and/or marketing schemes. However, results indicating strong potential would provide useful information both on what gains are possible, but also identify specifically those product attributes that have the most potential. Outreach personnel, oyster producers, wholesalers, restaurateurs, and others concerned could utilize these results immediately.

Posadas, Benedict C.
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Economic Impacts of the Deepwater Horizon Oil Spill to the Mississippi Seafood, and Commercial and Recreational Fishing Sectors

This paper measures the economic impacts of the 2010 oil spill to the business operations of Mississippi seafood establishments and commercial and recreational fishing establishments. The economic sectors included in the impact analysis were commercial fishing, charter boats for-hire, live bait dealers, seafood dealers and processors, and seafood restaurant sector. The economic impacts are measured in terms of the "changes in business operations in the year 2010 due to the April 20, 2010 Deepwater Horizon oil spill" in total annual sales, number of workers employed, length of shut down period, and amount of claims for financial losses filed and received by participating seafood and marine-related establishments.

Posadas, Benedict C.
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Decisions to Stay or Leave the Commercial and Recreational Fishing Fleets Following Natural Disasters

The results of the economic assessment conducted after Hurricane Katrina indicated massive devastation of the Mississippi commercial and recreational fishing fleets. Almost half of the 1,030 resident commercial fishing boats and vessels operating in the state participated in a damage assessment survey in 2005 and 2006. The decision to remain or leave the industry was crucial to these participants. About 87% of participating commercial boats or vessels and 69% of the participating charter boats reported damages associated with Hurricane Katrina. Using the 2005, 2006, 2007, 2009 and 2011 databases on licenses issued by the Mississippi Department of Marine Resources, the decision to stay or leave the industry by the participating boats and vessels was determined. The economic decision to stay or leave the commercial

fishing or charter boat for hire industry was examined with respect to the type of license required, total damages, insurance proceeds, outstanding loans at the time of the storm, size of boat, size of crew, size of sales, lost sales, and location of boat.

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Linking the Effects of Conservation Investments in the Mississippi River Basin to Areal Extent of Northern Gulf of Mexico Hypoxia: Baseline and Scenario Assessment

USDA's Conservation Effects Assessment Program (CEAP) has documented the effects of existing conservation practices in the entire Mississippi River Basin and developed several scenarios for additional conservation investments in erosion control and nutrient management practices. While significant nitrogen and phosphorus losses have been prevented by the existing set of conservation practice investments, further reductions are likely needed to reduce the size of the Northern Gulf of Mexico seasonal hypoxic zone to the 5,000 km² goal identified in the 2008 Action Plan. Existing assessments suggest that nitrogen reductions of up to 45 percent are needed to achieve the hypoxia reduction goal.

USDA-ARS

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To link the CEAP modeling effort's estimates of the impact of conservation practice investments on riverine nutrient loads to the areal extent of the Gulf hypoxia, we estimate a new empirical relationship between nutrients and hypoxia size. Despite the strong policy focus and well-established theoretical importance of nutrients in limiting phytoplankton growth, statistical evidence regarding the role of multiple nutrients in contributing to the size of the hypoxic zone has been sparse. We build upon the existing work and estimate the area of the hypoxic zone using simple production function estimation methods and account for the possibility of multi-year lags, importance of multiple nutrients, and the time series structure of the data. The estimated "production function" relationship suggests that both contemporaneous and legacy contributions of nutrients contribute to areal extent of mid-summer hypoxic zone, highlighting concerns that ecologists have raised about lags in the recovery of the system and affirming the importance of multiple nutrients as target pollutants.

The relationship estimated allows for improved hypoxia forecasts and permits evaluating upland conservation efforts scenarios in terms of their impact on Gulf hypoxia. We evaluate the performance of CEAP conservation scenarios and find that significant additional upland investments are needed in order to achieve the 5,000 km² policy goal. Using historical climate data, we assess the performance of each scenario with respect to historic climate variability. As a part of the CEAP effort, detailed farm-level surveys were used to estimate the costs of adoption of the suite of conservation practices considered in additional conservation investment scenarios. In addition to being in the position to evaluate the ecological consequences of additional conservation investments in the Mississippi River Basin, we present the estimated costs of these investments and consider a range of plausible costs required to reach the hypoxia Action Plan goal. Further, using historic climate variability, we estimate the additional costs required to achieve the policy goal with a greater degree of certainty.

Ramseur, George, Jr.
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Marine Resources

Developing Policies and Practices for the Beneficial Reuse of Dredged Material in Coastal Mississippi

The progression toward larger acreage beneficial use of dredged material (BU) projects is good news for Mississippi. The state has lost approximately 10,000 acres of tidal marsh since the 1950s and has suffered a corresponding decline in fisheries productivity, particularly menhaden, shrimp and blue crab. This annual loss of 150 acres of marsh can be reversed if the bulk of Mississippi's dredged materials are applied to restoration. Critical to that effort is the development of pre-permitted BU projects, which can accommodate materials from various sources over extended periods of time instead of building separate projects for each source.

Significant efforts to redirect dredged materials in Mississippi toward ecological uses began in 2001 with a project on Deer Island, Harrison County. This BU project was implemented by the Mobile District USACE (Corps) and supported by the Mississippi Department of Marine Resources (MDMR). This project restored 40 acres of tidal marsh by placing Biloxi Channel maintenance dredging material inside a sand dike containment structure. Since then, the Corps facilitated two smaller BU projects in Jackson and Hancock Counties plus two significantly larger projects totaling 100 and 425 acres.

Mississippi's Beneficial Use of Dredged Material Group (BUG) was formed in 2008 by a broad range of dredging dependent industries, regulatory agencies, political representatives and other stakeholders to better understand and promote BU. The BUG facilitated a significant policy change in 2010 in the form of State Law § 49-27-61 which requires non-federal projects that dredge over 2500 cubic yards of material to participate in Mississippi's Beneficial Use of Dredged Material Program (MS-BU). This law has helped to punctuate the state's priorities for both dredgers and the regulatory/consulting community. An initial result was Mississippi's first significant non-federal BU project: a new 40 acre marsh adjoining the original 2001 Corps effort on Deer Island.

The MS-BU program continues to refine administrative, logistical, technological and other aspects that are critical to better utilization of the State's dredged material resources. The next major step for the MS-BU will be a restoration project on Round Island, MS that could exceed 200 acres.

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Economic Viability of Harvestable Nutrient Filters for Water Quality Improvement and Energy Production

Harmful algal blooms (HABs) are caused partly by phosphorous, nitrogen, and suspended sediments in runoff from agriculture and other sources and affect many bodies of water. The Western Basin of Lake Erie is a prime example of an area that suffers from HABs, which create large dead zones and have a negative effect on local economies and public health. A potential remedy to these HABs is the construction of harvestable nutrient filter systems. These systems are constructed adjacent to crop lands and accompanying drainage ditches and are composed of native plant species and treated soils. The filters collect nutrients and sediments from the agricultural runoff. The above ground biomass from the system is

then harvested to remove the collected nutrients. This prevents the filters from becoming saturated with nutrients over time. The biomass is anaerobically digested to produce methane-rich biogas for use in converted farm equipment. Nutrients captured remain in the digester silage and are reapplied to agricultural land in a high quality form.

This study presents an economic model for the present value of the system. It was hypothesized that the system has a positive cash flow and that it would have a reasonable payback time. The model was constructed through systematic accounting of monetary expenses and savings to the farm attributed to the filter system. Time dependent expenses and savings terms were summed and integrated over time and then added to fixed terms to obtain the present value of the system. Expense and savings terms were governed by 40 parameters. Some of the dynamic parameters that affect the payback time of the system are: cattail yield per acre, corn stover yield per acre, biogas composition, engine efficiency, costs of fuel, mass of nitrogen and phosphorous in biomass, and capital costs of digester equipment. Ranges of values for each parameter were obtained from literature values. Current and potential government subsidies and restoration programs were also taken into account in the model. The model can be modified to evaluate different farm sizes and configurations. Using average parameter values and assuming the use of both biomass produced from the filter and 50% of farm field waste, the system was found to have a cash flow of +32,360 \$/year and a payback time of 2.3 years. The model suggests that harvestable filters are a viable option for water quality improvement.

Ropicki , Andrew
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Network Analysis of the Gulf of Mexico Red Snapper IFQ Program

Individual Fishing Quota (IFQ) programs have become a popular tool for fishery managers trying to stop overfishing, overcapitalization, and derby style fishing. Although IFQs, and other tradable rights programs, provide market based management tools for fishery managers, the effectiveness of such programs requires the quota trading markets function effectively. In short, this means that buyers and sellers must be able to find each other with relative ease (i.e., low transaction costs), market participants must have relatively uniform knowledge of prices, and no market participants should be able to exert undue influence on market prices. This research uses network analysis to examine trading in the quota lease market and in the fish market (the actual sale of fish from quota holders to registered dealers) for the first five years (2007-2011) of the Gulf of Mexico Commercial Red Snapper IFQ Program. Network analysis is a technique commonly used in other social science fields that analyzes some aspect of a groups' interaction to provide insight into social processes and the characteristics and roles of the group and its members. For this research, the group analyzed is the participants in the IFQ program and the interaction is the trading of quota and fish.

Network analysis is used in this research to examine the following issues regarding the Gulf of Mexico Red Snapper Fishery: 1) what type of trading network exists and how it has changed over the first five years of the IFQ program, 2) whether the quota and allocation markets are segmented geographically or by some other attribute of market participants, 3) how IFQ management has changed participation in the red snapper fishery, and 4) how the quota and actual fish market networks effect each other. This analysis is designed to provide insights on both the efficiency and competitiveness of the red snapper IFQ and fish markets.

The shift in fisheries management toward rights-based management, including IFQ programs, requires a thorough analysis of such systems post-implementation. The ability of rights-based management to decrease overcapacity and overfishing is tied to the efficiency and competitiveness of the quota trading in the fishery. Although basic measurement of the effectiveness of these systems with regards to decreasing overcapacity and overfishing have occurred, IFQs have not been thoroughly studied with regards to the efficiency and competitiveness of quota trading markets and the effect these markets have on the subsequent composition of the fishery. This research will provide insights into how IFQ programs affect the participants in these fisheries and could provide methods to improve not only quota trading but also the ability of IFQs to alleviate overfishing and overcapacity in fisheries.

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Developing Strategies for Valuing Ecosystem Services on Coastal Properties Along the U.S. Gulf of Mexico

Ecosystem services are the benefits realized by humans through ecological functions of habitats. In 2012, the National Research Council's Committee on the Effects of the Deepwater Horizon Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico (GOM) recognized 19 primary ecosystem services provided by the GOM in their Interim Report. Examples of services identified in the report include soil and sediment balance, recreational opportunities, and hazard moderation. The value of goods and services are traditionally determined through market prices (i.e., prices at which the goods or services are sold in a market); however, because ecosystem services possess market and nonmarket components, determining the value of benefits is not as straightforward. The primary objective of this study at its current state is to facilitate discussion in order to develop strategies for valuing ecosystem services on coastal salt marsh and mangrove properties along the U.S. GOM coast using a revealed preference approach.

Obtaining necessary and quality data may prove to be the study's greatest challenge. Market prices for coastal properties with saline wetlands or mangrove habitats will be needed with corresponding property characteristics (e.g., specific location, acreage, habitat type(s) and expanse on property, and infrastructure on property at the time of transaction). Market prices can likely be obtained through the respective court responsible for recording property transactions in each county or parish (e.g., Probate Court). Attempts to obtain property transactions data for the last 10 years will require a combination of online information gathering, personal contact with court officials to request records, or in-person visitation to necessary courts (depending on electronic availability of records in each state's county or parish). These market prices will then need to be matched with available property characteristics through Geographic Information Systems (GIS) mapping for identified properties. Once all necessary data is acquired, a hedonic pricing model will be used to estimate ecosystem service values for property owners.

**Scyphers, Steven B.
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Waterfront Landowners and Coastal Protection: Understanding Decision-Making and the Implications for Social and Ecological Resilience

Traditional approaches for balancing human desires to live and work along coastlines with the sustained delivery of ecosystem services have fallen short of achieving both ecological and social resilience. Coastal development is often perceived as one of the most pervasive causes of environmental decline, and traditional approaches to "protect" shorelines have often involved introducing hardened structures such as vertical walls. While the detriments of vertical walls are widely recognized (habitat degradation, altered estuarine hydrodynamics, water quality and sediment transport processes), numerous obstacles have prevented a transition to more sustainable approaches. The focus of our study was to explore how waterfront residents perceive hazards and environmental change, prioritize their resources, and make decisions regarding coastal protection.

We delivered 1,000 survey packets to waterfront residents surrounding Mobile Bay, Alabama (USA), an "Estuary of National Significance" that has been drastically altered by humans. Three hundred and sixty were completed and returned. The most popular shoreline protection scheme among respondents was vertical walls (73%), and only 15% of respondents stated their shorelines were natural or unaltered. Three attributes of coastal protection schemes dominantly influenced the decisions of waterfront respondents as the combined responses of "effectiveness", "cost" and "durability" accounted for more than 87% of the top-ranked decision criteria. While most residents were concerned with the environmental impacts of their decisions, only 5% cited it as the most important factor influencing their decision.

Contrary to most scientific and management perspectives, 86% of respondents perceived vertical walls as beneficial for estuarine shorelines and upland properties. Additionally, respondents perceived unaltered shorelines to require more annual maintenance than vertical walls, but actual maintenance costs were revealed to be twice as much for respondents with vertical walls. Another interesting pattern that emerged was that 96% of residents with shorelines protected by vertical walls were bordered by at least one neighbor with a vertical wall. Similarly, residents with natural shorelines bordered residents with natural shorelines on both sides more than three quarters of the time. Although there may be obvious biophysical (or regulatory) explanations for this clustering, such as the known impacts of vertical walls on adjacent shorelines, our study revealed that collective-choice arrangements (i.e., property-owner associations) might be important within some coastal communities. This study and others have revealed significant biophysical and social impediments facing a transition away from shoreline armoring, but our results also identified areas where stakeholder cooperation and conservation gains may be achieved.

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University of South Alabama

Two Years Later: The Deepwater Horizon Disaster from the Perspective of Fishers

Following the Deepwater Horizon disaster and oil release, marine fishery stocks and coastal habitats in the northern Gulf of Mexico were surrounded with unprecedented uncertainty due to the massive volume of released oil, use of chemical dispersants, and drastic reduction in fishing effort. The primary goals of our study were to determine how recreational and commercial fishers perceived the overall health and ecology of the Gulf of Mexico, which fisheries species and coastal habitats were potentially most damaged, and the relative impacts of released oil versus chemical dispersants. Our study involved two comprehensive surveys of licensed anglers from the state of Alabama conducted one and two years after the incident. Our 2011 data collection involved a random-digit dial telephone survey of 700 fishers, while our 2012 efforts utilized an online survey platform and surveyed 568 individuals. A general finding of our surveys was that the perceived level of damage to fisheries and habitats declined from 2011 to 2012. For instance, the perception that released oil was "very damaging" for the overall health and ecology of the system decreased from 46% to 30% from 2011 to 2012. However, although representing only a small percentage of anglers, the belief that fisheries and habitats would require at least 25 years to recover from impacts was more common in 2012 than 2011. Other general trends included the belief coastal habitats were more damaged than inshore or offshore fisheries stocks, and that the effects of dispersants were more harmful than the released oil. In 2012, participants were asked whether they were more worried or more hopeful than one year prior, and 59% were more hopeful to some extent, while only 13% were more worried. Our poster highlights these results, along with the findings of additional survey questions designed to quantitatively document

observable impacts on marine life (e.g., sores or lesions on fishes) and to provide context on broader social or economic impacts of the disaster.

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Justice

A New Twist on Intrastate Water Disputes: The Compact Angle – Tarrant Regional Water District v. Herrmann

For several years, Texas and Oklahoma have been quarrelling over water rights within Oklahoma, but covered by the interstate Red River Compact. This dispute has now moved to the United States Supreme Court after the Tenth Circuit Court of Appeals ruled in Oklahoma's favor. The ruling in question reinforced the primacy of state legislative control over water within a sovereign's boundaries. This case will have significant implications for all river compact states nationwide, but more proximately Texas, Oklahoma, Arkansas, and Louisiana (the Red River Compact states).

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Jamie Schubert
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Karl Havens
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Identifying and Implementing Hydrological Restoration Opportunities in the Gulf of Mexico through a Federal/University Partnership

Hydrological regimes along the Gulf of Mexico coastlines are complex and have experienced various levels of anthropogenic alteration over the past century. In some cases this has caused saltwater intrusion, while in other cases, there has been a decrease in salinity due to construction of dikes, causeways, levees and other barriers between coastal wetlands and the sea. Development has altered the landscape and adversely impacted the species that once inhabited these brackish and marine systems. Hydrological restoration allows managers to invest resources to remove these man-made barriers in a relatively small area but have a positive impact in a large area both upstream and downstream.

The NOAA Restoration Center and four Sea Grant programs in the Gulf of Mexico formed a partnership to identify and fund restoration projects that "remove or modify anthropogenic barriers to restore historic tidal estuarine and freshwater exchange to benefit coastal and marine fisheries habitat." This multi-faceted approach includes building a Gulf-wide geo-referenced inventory of restoration projects that are more than 5 acres in size and range up to \$5 million in project cost. The inventory is growing through Sea Grant extension agents facilitating face-to-face meetings with community leaders, resource managers, restoration practitioners and others to identify potential projects. The inventory could be used by multiple organizations and efforts that are funding on-the-ground restoration. Another component of this partnership is directly supporting on-the-ground restoration projects through grants of up to \$160,000. The three projects funded to date are located in New Orleans, Apalachicola and Tampa Bay. One or two additional projects will be funded in the summer of 2013. This presentation will 1) highlight the inventory, 2) provide instructions on how to add projects to the inventory and be considered for the summer funding opportunity, and 3) present an overview of projects funded to date.

Shackelford, Jason
SWCA Environmental
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Estimating the Value of Harvest Rights in the Louisiana Oyster Fishery: An examination of Various Socioeconomic Indicators

The Louisiana oyster fishery is a lease-based industry in which the state has historically leased oyster habitat via 15-year contracts, for a nominal fee. In addition, the state has maintained public oyster grounds from which seed and marketable oysters could be obtained by leaseholders and the public. This system coexisted and competed with the oil and gas industry for a number of years. The introduction of the state's coastal restoration and protection program in the early 1990's complicated this relationship and introduced an additional competing use of state owned water bottoms. Once issued, an oyster lease cannot be cancelled or revoked. Therefore, the state needed to establish a program by which the leases could be acquired. In order to accomplish this procurement, a single, consistent valuation method had to be established. Prior to the adoption of the current Oyster Lease Acquisition and Compensation Program (OLACP), there were many competing valuation methodologies associated with oyster lease harvest rights. Some of these included: 1) damage payments from oil and gas activities, 2) lease auction sale data, 3) recorded sales, 4) judicial awards, 5) and an earlier voluntary acquisition program. These different value indicators will be explored and compared in relation to the current Fair Market Value Appraisal Methodology employed under the OLACP. Their role and relative importance in the development of the OLACP will be explored.

Smith, Jordan W.
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A Geovisualization-Based Scenario Planning Framework for Climate Change Adaptation in Small, Natural Resource Dependent, Coastal Communities

A potential solution for coastal climate change adaptation in small, natural resource dependent, coastal communities is a geovisualization-based scenario planning framework. This framework can provide these communities with a formalized procedure through which they can gain a better understanding of localized climate change impacts and take adaptive measures based upon a deliberative and inclusive planning process. In the poster presentation, we present the adaptation planning framework and illustrate how it is being applied in a pilot-study community.

The geovisualization-based scenario planning framework couples the capabilities of geographic information systems and landscape visualizations with deliberative stakeholder involvement processes. The framework involves synthesizing and qualitatively downscaling global climate change projections into several scenarios describing and illustrating localized impacts at distinct time horizons. The framework also involves a deliberative stakeholder involvement process whereby critical community assets, vulnerabilities, and potential adaptation options are identified. The framework culminates in a consensus among local stakeholders regarding future climate change adaptation planning.

Our intent in developing the planning framework is two-fold: first, to leverage the unique structure of small, natural resource dependent, coastal communities' social networks; and second, to minimize their relative lack of access to the technological and scientific resources and information needed to make informed policy decisions. Collectively, the planning framework integrates global climate change science with local decision-making processes in an effort to increase the resilience and adaptive capacities of such communities.

Sparks, Christopher M.
Craig E. Landry
East Carolina University
Daniel R. Petrolia
Keith H. Coble
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Risk Preferences and Perceptions: Factors That Increase Flood Insurance Uptake and Coverage Levels

This study combines household-level data on consumers' flood insurance purchase decisions including whether to purchase coverage and how much coverage to purchase. The analysis focuses on the role of risk preference, risk perception, experience, and expectations of disaster assistance on an individual's flood insurance purchase. Our sample is representative of the Atlantic Coast of Florida and the entire Gulf Coast of the U.S. The sample includes data from households exposed to differing risk levels. Results show that risk aversion to losses, past experience and future expectations, as well as an individual's geographic and personal characteristics positively and significantly affect all three aspects of policy decisions investigated.

Stefanski, Stephanie
Yale
Jay Shimshack
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Economic Valuation of Marine Biodiversity in the Gulf of Mexico

Social values for preserving marine biodiversity are poorly understood. While it is relatively easy to value changes in commercial seafood products using market prices, it is much more difficult to assess changes in passive use and other nonmarket values. Optimal marine policy choices, however, require a full understanding of many benefits of marine preservation.

This study explores U.S. residents' willingness to pay, a measure of overall social value, for increasing marine biodiversity protection in the Gulf of Mexico. We focus on marine preservation in the Gulf for three reasons. First, marine resources contribute a disproportionate share of economic and cultural welfare in Gulf-coast communities. Second, the Gulf is home to several threatened and endangered, and these species may have high nonmarket values. Third, the Gulf is a focal point of U.S. marine policy. Recent debate has

highlighted controversial trade-offs between commercial harvesting, resource extraction, and environmental preservation.

The study applies contemporary contingent valuation (CV) techniques to elicit respondents' willingness to pay for marine sanctuaries that enhance biodiversity in the Gulf of Mexico. We survey a sample of 1000 participants constructed to be representative of the U.S. population. We use double-bounded dichotomous-choice questions that assess if respondents would vote for or against a hypothetical – yet realistic – program that would designate new marine sanctuaries if the cost to their household was some fixed amount. Our survey was comprehensively pre-tested, and the final survey aimed to minimize embedding, hypothetical response bias, and other common forms of bias.

We find that the average respondent perceived that threats to biodiversity in the Gulf were moderately serious to serious. Quantitative contingent valuation results indicated that the average US resident expressed a significantly positive willingness to pay for expanding marine preservation in the Gulf of Mexico. Younger residents, with higher incomes, living further away from the Gulf of Mexico were willing to pay more, all else equal. On a more cautionary note, however, our qualitative follow-up questions indicated that, despite positive willingness to pay, respondents expressed some skepticism regarding the overall effectiveness of marine preserves as a tool to protect and enhance marine biodiversity.

We believe our results contribute to economics and policy in at least two ways. First, our final willingness to pay figures provide direct estimates of social benefits from new or expanded marine preserves in the Gulf. These results are especially timely, as the policy scenario presented in our CV study is based on a current NOAA proposal to expand marine preserves in the Gulf of Mexico. Second, our sample is nationally representative. Most CV studies assessing willingness to pay for terrestrial or coastal ecosystem goods and services target specific populations, like local residents or visitors. Yet nationally policy decisions should be informed by comparing national benefits to national costs. We find that willingness to pay, perhaps driven by passive use values, is actually higher away from the Gulf coast region.

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A Source Differentiated Mixed Demand Model for Shrimp: An Analysis of the Influence of U.S. Imports by Source on the Gulf of Mexico Dockside Price

With a 2009 dockside value of \$314 million, the shrimp fishery is the largest contributor to the \$615 million (2009) Gulf of Mexico commercial fishing sector. The annual production of shrimp from the Gulf of Mexico has remained relatively stable in the long-run though year-to-year variations can be significant due to changes in environmental conditions influencing reproduction, survival, and growth. While the long-run production of Gulf shrimp, in pounds, has remained stable over time, the same cannot be said about the value of landed product, especially when the influence of inflation is removed. The long-run dockside value of the Gulf shrimp harvest has, overall, been declining both on a current and deflated basis. This decline has been particularly pronounced since 2001. On a current dollar basis, the value of Gulf production fell from an average of just over \$400 million annually during 1990-94 to about \$350 million annually during 2005-09. After adjusting for inflation, the decline was approximately 40%, from \$617 million to \$367 million (expressed in 2009 dollars). Relatively constant production in association with a declining value implies, of course, a falling price.

While there are several reasons for the sharp decline in the Gulf dockside shrimp price beginning in 2001, the overriding one is that of increasing imports. Imports (heads-on equivalent weight) increased from an average of 850 million pounds annually during 1990-94 to 2.3 billion pounds annually in 2005-09 with much of the increase occurring post-2000. By comparison, Gulf production since 1990 has averaged less than 250 million pounds (heads-on weight) and imports currently account for more than 90% of the shrimp consumed in the United States.

The primary objective of this paper is to examine the impact of imports, by country of origin, on the Gulf of Mexico dockside price. To accomplish this objective, a system of mixed Rotterdam demand equations was estimated based on quarterly data from 1994(1) through 2009(4). Countries considered in the analysis include Thailand, Vietnam, China, India, Indonesia, Ecuador, and Mexico. Demand for Gulf shrimp was specified by size of shrimp with three sizes (large, medium, and small) being considered. U.S. imports from the various countries were modeled in a quantity dependent framework while demand for the domestic product was modeled in a price dependent framework. Results, in general, closely confirm to theory with most parameter estimates significant at the 5% level. Imports were found to clearly influence the domestic price with the degree of influence varying significantly from one country to another. Results can be used to explain the post-2000 decline in the Gulf dockside price and the influence of the growth of exports from Asia on this decline.

Testroet-Bergeron, Susan
Coastal Wetlands, Planning
Protection, and Restoration Act

The Dollars and Sense of Louisiana Coastal Restoration

It is time to encourage students to ask tough questions about the environmental and economic crisis resulting from the loss of land along Louisiana's Gulf Coast and explore how choices made today will affect their future. Getting young people excited about economics can sometimes be a difficult task but by tying it to dynamic coastal Louisiana issues, the hook is set. There is a human dimension associated with the use of coastal resources and money matters; it usually starts at a yearly age when young people start to pay for their own recreational entertainment. Capturing that connection may be a great way to introduce students to understanding natural resource economics and policy. People naturally become connected to the resources that are a part of their recreation. It couldn't be truer than here in Louisiana where the majority of coastal lands are owned by private citizens and public coastal waters are resources for a host of fun activities and very profitable industries. Getting youth engaged in dialogue about how to allocate coastal resources through engaging practices is important and should begin prior to students becoming part of the voting public. But how should adolescents appropriately be connected to economics?

Louisiana Public Broadcasting (LPB), Louisiana Sea Grant, and the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Public Outreach Committee joined forces to create interactive video shorts and lessons to engage learners. The film, *Turning the Tide*, an award-winning LPB documentary, has been divided into digestible clips that take a look at the proposed solutions, strategies, and engineering that can "turn the tide" on Louisiana's coastal erosion problem. In addition to the film, a new curriculum titled *Turning the Tide: A Companion Teaching Guide* has been developed to engage high school students. This new curriculum is where environmental science meets mathematics to measure up to the challenge of saving Louisiana's delta and coastal landscapes.

This session examines how to engage youth on the national land loss crisis unfolding at the mouth of America's largest and most productive river delta. During this session practice using this nationally recognized film and curriculum that is filled with relevant materials presented in a format that meets the new science standards and frameworks. It includes crosscutting concepts, engineering, and ongoing

scientific practices. Meet the dynamic Louisiana Public Broadcasting (LPB) senior producer of the film and members of the curriculum writing team to gain first-hand knowledge of how to share this information in a changing academic community. Topics to be discussed include (1) cost-benefit analysis of coastal wetland restoration, (2) integration of ecosystem service values in project prioritization and selection, (3) environmental planning, and (4) educating youth.

Tillis-Nash, Gina M.
National Weather Service's
Lower Mississippi River
Forecast Center

National Weather Service's Operations and Advances to Improve Sustainable Coast Protection

The mission of the National Weather Service (NWS) is "to provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy." This presentation will include a review of the services provided by the NWS's Lower Mississippi River Forecast Center (LMRFC) to coastal communities in Louisiana and Mississippi, from the Calcasieu watershed in the west, to the Pascagoula watershed in the east. Services provided by the LMRFC include daily river stage forecasts that directly impact coastal waterway operations, improve public safety, and quantify coastal flow volume, which in turn affects fisheries. The LMRFC provides these forecasts for a full range of hydrologic conditions, including low-water events. For example, in 2012, these forecasts prompted the construction of a low-water sill at Mississippi River Mile 64 to minimize saltwater encroachment effects on industry, potable water, and habitat along the lower portion of the river. They also support the U.S. Coast Guard's shipping lane traffic operations to optimize port activity and minimize impacts of low water on the

national economy. The LMRFC also incorporates forecasts of storm surge into river forecasts to better inform riparian communities of an impending tropical cyclone's impacts.

The LMRFC uses emerging technologies to benefit coastal economic viability. The LMRFC recently converted its operational forecasting software to the Community Hydrologic Prediction System (CHPS), a Delft Flood Early Warning System, which is an open architecture Java based system. The CHPS currently integrates 1-D hydraulic models and incorporates existing 2-D and 3-D coastal ocean model output, with the potential to assimilate new ocean and hydraulic models to enable water quality modeling. The LMRFC, in conjunction with local, state, federal, and academic partners, is in the process of implementing total water level forecasting to create a robust forecasting framework, which will provide year-round coastal hydrologic information. Improving hydraulic understanding of coastal rivers, forecasting ability, and inland inundation prediction will better enable LMRFC support of emergency planning, coastal and habitat restoration, hazardous spill remediation, potential eco-modeling, and surge protection alternative evaluations.

Tjaden, Bob
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Maryland Farmers and Tree Farmers Attitudes Toward a Payment for Ecosystem Services Program

Maryland farmers' and tree farmers' knowledge, attitudes and entry point into a Maryland Payment for Ecosystem Service Program was analyzed. A contingent valuation and conjoint analysis study was developed and a mail survey was designed. A mail survey was sent to 2,000 farmers and tree farmers April 2012. This survey will serve as a foundation for future educational grants and policy recommendations.

Turner, R. Eugene
Louisiana State University
Doug Daigle
Lower Mississippi River Sub-
basin Committee

Innovative Watershed Projects: Cure for Gulf Hypoxia?

Following the 2010 BP oil disaster, President Obama directed a task force to create a plan to restore the Gulf of Mexico's ecosystem to a better condition than before the spill. Achieving that goal requires addressing chronic problems related to water quality in the Mississippi River, including the oxygen-depleted 'Dead Zone' that results from excess nutrients from upriver. Changes in farming practices in the Mississippi River Basin – especially in the Midwest – could help turn these problems around. But agriculture itself faces a confluence of challenges, including variable weather and rainfall, rising fertilizer, pesticide, and energy costs, and reductions in federal subsidies. Many rural communities also face major economic challenges.

Are there ways to address the problems of the basin and the Gulf together? Promising answers are being provided by innovative projects being carried out at the watershed level. One example can be seen in the small city of Madelia, Minnesota, where local residents and agencies are collaborating closely with a range of entrepreneurs, state and federal governments, and non-profit groups, who see win-win opportunities in a new agriculture built from a new mix of crops. Local farmers are getting organized to grow perennial biofuel crops that will create habitat for wildlife and biodiversity, conserve and purify water, create opportunities for ecotourism, and attract new residents. These perennial crops are being established in places where conventional annual crops don't thrive, especially in the floods and droughts that are occurring with increasing frequency. There is good evidence that these perennial crops can significantly expand the total 'basket' of goods and services from agriculture, without interfering with current food and feed

production.

Is there a potential for broad implementation of watershed-scale “innovation incubator” projects that follow the example of the Madelia model and others like it? There are other innovative projects operating at the watershed level - a scale large enough (e.g., 2,000 mi²) to capture the ecological, social, economic, and political complexities of modern farming – that are providing critical information. In addition to increasing the productivity, profitability and sustainability of basin agriculture, these innovation projects may have the best potential to improve the Mississippi’s water quality enough to provide a significant boost to the health of the Gulf and its fisheries and shoreline ecosystems, at a time when new federal funding seems highly unlikely. Directing a portion of the BP funds to such efforts upstream may be one of the best options for reversing the growing trend of Gulf hypoxia.

Vogelsong, Hans
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Social and Experiential Impacts of Driving on the Beach: Human Dimensions of ORV Use at Cape Lookout National Seashore

In 1972 President Nixon signed Executive Order 11644 requiring federal agencies that permitted Off Road Vehicle (ORV) use on public lands to develop and implement ORV management plans. Few federal agencies have complied with this order, and a consequence of non-compliance has become that they are susceptible to lawsuits seeking to abolish or end ORV use. National Seashores are one example of public areas that are feeling pressure to develop and implement ORV plans. They typically have few or no roads, have high visitation numbers, and were traditionally used by visitors in ORVs to access fishing sites.

The purpose of this presentation is to share the results of a human dimensions study on Cape Lookout National Seashore (CALO) conducted to gain information from users of CALO in order to develop an ORV Management plan. While much was known about the environmental and ecological impacts of ORV use on the seashore, this study focused on the experiential and social impacts of ORV use. Data for this study was collected from May 2006 through November 2007. A combination of observations, on-site interviews, and mail-back questionnaires were used for gathering data. A total of 979 visitors were interviewed on-site, with 517 of these returning the mail-back survey for a response rate of 53%. Survey items examined the socio-economic profile of visitors to CALO, as well as their attitudes and preferences toward ORV use and management at the seashore. Conflict between ORV users and a comparison of their attitudes and norms toward ORV use on the seashore, as well as their feelings for the seashore and its environmental attributes will be discussed. Recommendations will also be made to help insure that regulations and/or policies concerning ORV use in the park be accepted by the most visitors possible.

Wainger, Lisa A.
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Opportunities for Enhancing the Cost-Efficiency of TMDLs: Chesapeake Bay Case Study

Water quality pollution caps that are established to comply with the Clean Water Act, such as the Total Maximum Daily Load (TMDL), are not legally required to meet a cost-benefit criterion. Yet, because TMDLs are established without explicitly considering costs, they raise questions regarding whether the caps and pollution allocations appropriately balance compliance costs with social benefits. For example, the Chesapeake Bay TMDL case reveals that both private and public emitters are tempted to sue rather than comply, if they feel that the imposed costs are unwarranted.

Using the Chesapeake Bay TMDL as a case study, policy analysis, data, and results from an optimization framework are used to explore the TMDL implementation strategies. These strategies may be adapted to reduce costs of compliance while retaining all or most of the benefits derived from water quality improvements. The analysis focuses on how policies affect total costs of compliance and alter the shape of the marginal cost curve. In addition, marginal costs are compared with changes modeled in the probability of water quality violations with increasing nutrient reduction effort (a proxy for marginal benefits). This analysis reveals how costs and benefit proxies could be compared when setting TMDLs. However, the analysis also suggests that using water quality criteria as benefit proxies can obscure the risks of ephemerally exceeding water quality criteria. In this case the requirements of aquatic life may be met even if water quality criteria are violated, because organisms can be adapted to occasional stress. Such tolerances were considered in the Bay TMDL in an innovative manner, yet when data were poor, tolerances were set more stringently than when data were available and were set without considering costs.

Perhaps some of the simplest opportunities for increasing the cost-efficiency of TMDLs are in the implementation details. Some design choices for the Bay TMDL managed costs. However, other policies and program rules reduced the ability to target cost-effective practices and to promote innovation that could lower costs in the long run. Overall, the evaluation of technical choices made during the TMDL and some of the scientific uncertainties embedded in determining the TMDL suggest that many approaches to reducing costs are possible without harming the public interest. However, a key decision in designing TMDL rules is how much risk of exceeding water quality criteria is acceptable. An explicit consideration of costs in TMDL design is needed to put a price on risk aversion.

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Scaling Hurricane Impacts on Wetland Restoration Project through GIS

Frequency data for hurricanes and tropical storms are well documented in coastal Louisiana, however, the impact of these events on wetland restoration projects is not well known. Estimates of surface acreage loss were developed for two project types, diversions (DIV) and marsh creation (MC), as part of an economic analysis of restoration alternatives under hurricane risk. Land loss from Hurricanes Katrina and Rita was examined for the Caernarvon Freshwater Diversion Project and the Holly Beach Sand Management Project, respectively. Land change classification analysis was undertaken through analytical use of ERDAS Geographical Information System (GIS) software. Landsat 4-5 Thematic Mapper imagery was acquired from the USGS Global Visualization Viewer. Pre- and post-storm images were classified to demonstrate land changes within project boundaries. Results indicate that acreage losses at Caernarvon (-15%) were nearly seven times greater than the Holly Beach project (-2.2%).

A second phase of the assessment involved conceptualizing a range of impacts as a function of project scale denoted by percent of completion. This variable range allows for project vulnerability to change as projects build land over time. Accordingly, the approach implies greater impact resiliency for MC project types with shorter, steeper restoration trajectories.

The final phase of this research was to integrate these climatic and physical assumptions into a risk-adjusted cost-efficacy comparison of DIV and MC project types. The study utilizes an Expected Valuation construct to incorporate the probability of a major hurricane landfall. Preliminary results from this economic analysis are providing insight on how the hurricane resiliency of restored coastal land is affected by project location, scale, and type.

Wang, Huabo
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Factors Influencing At-Home Seafood Consumption and Substitutability of Other Protein Sources for Seafood

U.S. consumption of commercial fish and shellfish increased from 12.5 pounds (edible meat weight) per capita in 1980 to 16.6 pounds in 2004 and thereafter declined in successive years to 15.8 pounds in 2010. While seemingly moderate in nature, the increase from 1980 to 2004, when adjusted for population change, represents an additional source requirement of 2.1 billion pounds annually. Though per capita consumption has fallen since 2004, the increase in population since 2004 has resulted in virtually no change in source requirements.

From February 2005 through January 2006, a NOAA Fisheries Seafood Consumption Survey was conducted eliciting information about seafood purchases and consumption behavior. The sampling design, which included both cross-sectional samples and longitudinal cohorts, consisted of 10,798 completed interviews of which 5,311 represented fresh cross-sectional interviews. This database was used to estimate at-home seafood demand in a complete system framework using a modified Almost Ideal Demand System (AIDS) model, which permits analysis of the influence of quality on demand. Products included in the analysis are seafood and other protein sources (meat, pork, and poultry.) The model used in the analysis facilitates a comparison of results with previous studies and helps to point to possible changes in demand over the last 30 years. In general, results confirm to theoretical expectations with most own-price elasticities being negative and statistically significant and most cross-price elasticities being positive and statistically significant. Quality was also found to significantly influence demand for seafood consumed at home.

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Labeled vs. Unlabeled Choice Experiments for Valuing Great Lakes Beach Characteristics

With over 600 public Great Lakes beaches and millions of visitors each year, beach-going is among the most popular recreational uses of the Great Lakes (GL) in Michigan. Nevertheless, beaches face many threats, and little is known about (1) who visits GL beaches or (2) the value of changes in water quality at GL beaches. We address this through two surveys. First, a mail survey of 32,000 Michiganders investigated the number of people that visited GL beaches, showing that more people visited GL beaches than went fishing or boating on the GLs. We profile GL beachgoers and show they are significantly ($p < 0.01$) more likely to be: younger, employed full-time, white, highly educated and high income. Second, we conducted a follow-up survey of 5600 residents who visited a GL beach in 2011. In the follow-up, we elicited preferences for beach attributes using a choice experiment wherein respondents choose between beaches with varying levels of attributes (levels of algae, E.coli testing, etc.) and economic cost (driving distance). We then estimated preferences and economic values for changes in beach characteristics such as water quality.

Not surprisingly, we found respondents prefer beaches that are closer to home, tested frequently for bacteria, and have lower amounts of algae on the shore and in the water. Respondents were also more concerned about algae in the water than on the shore. Resource managers can use these preferences and values to predict the benefits of quality improvements, or to estimate the damages caused by decreases in beach quality. Finally, as a part of the survey we also implemented a split-sample test of choice experiment format. Specifically, we tested the effect of naming (or labeling) the Great Lake associated with each alternative in the choice experiment. We found while there were some statistically significant differences in

individual parameters and MRS estimated from results of the labeling schemes, results are highly similar in rank and magnitude, suggesting a large degree of preference consistency and perhaps a high degree of transferability for use in benefit transfer.

Westra, John
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Estimate of Economic Loss to Producers of Row Crops in Louisiana Resulting from the 2011 Mississippi River Flood

In the spring of 2011, many areas adjacent to the Mississippi River experienced flooding caused by a combination of meteorological events. In Louisiana, threats of flooding to the Baton Rouge and New Orleans areas prompted a decision to open gates of the Morganza Spillway, causing over 92,000 acres to be inundated by floodwater. We explore the economic implications of this unique natural and man-made disaster for the agricultural sector. In this attempt, we estimate the economic damage for all row-crops (plus rice and crawfish) producers in the affected area using standard and alternative methodologies. The loss of expenses incurred by commodity producers in the flooded region (the conventional method for estimating true loss to producers) is estimated by summing the estimated costs of (1) seed, (2) herbicides, insecticides, and fertilizers, (3) the expense necessary to operate the equipment required to apply these inputs (including fuel, labor, and depreciation/maintenance of capital) and (4) any other expenses that were expected to have been dispersed prior to the date of flooding (May 14).

This estimate was compared to estimates obtained using alternative methodologies. These alternatives include gross revenue loss, net revenue loss, and loss of return on invested production expenses. In addition to damages related to crop loss, we estimate damages related to the cleanup of productive land after the floodwaters receded. Because there was no enrollment in government-sponsored programs that assists in such cleanup, these costs are assumed and estimated accordingly. Finally, there is land that was replanted with alternative commodities after the floodwaters receded in an attempt to salvage a harvest. Ultimately, because of the delayed nature of the planting, the resulting harvests would have a smaller yield than what is typical, resulting in a loss of revenue. Monetary losses from reduced yields at harvest are also estimated. Economic damages related to cleanup costs and lost revenue from reduced yield at harvest are superfluous to the damages incurred directly from flood damage to crops. Accordingly, these aspects of economic damages are added to the conventional and alternative damage estimates to provide a range of generally applicable estimates of damage to row-crop producers resulting from the 2011 Mississippi River flood.

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A Comparative Analysis of the Multi-Mode Chesapeake Bay Menhaden Survey

Recreational anglers and various conservation associations have long been concerned about the harvesting of menhaden in Chesapeake Bay. Their concerns include 1) the fact that menhaden are filter feeders, whose overharvest could affect water quality, and 2) that menhaden are forage fish for various recreationally important predators, such as striped bass, weakfish, speckled trout, bluefish, as well as various marine mammals and seabirds. Also important is the fact that the reduction fishery is believed to be vital to the social and economic wellbeing of Reedville, VA. As a consequence, the Virginia Marine Resources Commission requested a study be done by the Virginia Institute of Marine Science of the social and economic importance of the fishery to Chesapeake Bay region. The emphasis of the study was to document how reallocating the Bay quota might affect the social wellbeing and economies of the region and to determine the economic value of menhaden in the region. In order to provide some answers to this question we conducted a multi-mode Chesapeake Bay menhaden survey of Virginia and Maryland residents. The Menhaden survey has 12 versions (3 scenarios and 4 tax amounts) distributed in Maryland (MD) and Virginia (VA). The multi-mode survey contains three elements: telephone, mail and internet surveys. Data collection followed the "tailored design method" where the budget allowed.

The mail survey was conducted between May and August 2010. Four thousand three hundred and nineteen surveys were sent to randomly chosen households in Maryland and Virginia. Using the total number of surveys delivered, the response rates were 8% for Maryland, 13% for Virginia and 10% overall. The Survey Research Laboratory at Appalachian State University conducted telephone interviews between June 1 and July 22, 2010. A list-assisted method of random digit dialing (RDD) was used to obtain phone numbers in the sample from Maryland and Virginia. Calls were staggered over times of day and days of the week to maximize the chance of making contact with potential respondents. The Cooperation Rate was 36 percent. Zoomerang (www.zoomerang.com) is an online survey research firm that has recruited 2 million U.S. residents to complete online surveys in response to a survey incentive (Zoomerang, undated). Zoomerang invited a random subsample of Virginia and Maryland residents to take the Menhaden online survey. The survey opened on July 16, 2010 and closed on July 19, 2010 with 849 respondents completing the survey.

In this paper we examine differences across survey mode for response rates, item nonresponse rates, demographics, Chesapeake Bay recreation trips, concern about the impacts of changes in the menhaden fishery on the Virginia economy, and willingness-to-pay higher taxes for changes in the menhaden fishery. We find significant differences in each of these variables across survey mode.

Woodward, Richard T.
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NOAA Fisheries

Robust Ecosystem-Based Management of the Chesapeake Bay Blue Crab Fishery

Precaution is a routine mandate for fisheries managers. But what exactly is precaution? How much precaution should decision maker's use? These are interesting conceptual questions with important applied consequences. In this paper we develop a new approach to precautionary fisheries management and apply the approach to the Chesapeake Bay blue crab fishery. The approach is grounded in the economic theory of robust optimization as a response to the problem of choice under ambiguity.

There is a rich body of literature on the theoretical justifications for precautionary resource management, with much of that work treating precautionary management as a response to the fact that policy makers are rarely operating in environments of risk in which probabilities are well known. Rather, policies must be developed in conditions of Knightian uncertainty or ambiguity, where probabilities are not known. One approach to this problem is the use of robust optimization as a rational response to decision making in conditions of ambiguity. A robust decision rule is one that maximizes the objective relative to the worst possible outcome across the parameter space over which the decision maker is uncertain. It is, therefore, a formalization of the general principle of precautionary management. Previous literature in this area, however, is quite conceptual, lacking a specific policy context. Moreover, the work to date has failed to provide a specific answer to the question of where the uncertainty bounds should come from. This paper will overcome both of these shortcomings.

First, our paper follows a statistical approach based on the underlying certainty in the problem. In this approach a decision maker could set a policy that, based on the available data, would have at least a 90% chance of achieving or surpassing the target outcome. In this way, the method overcomes the ad hoc approaches that are common in precautionary management and also has a straightforward way of responding to new data by increasing the aggressiveness of policies as understanding of the resource improves. Second, we will apply these ideas in a specific empirical context, the Chesapeake Bay blue crab fishery. We will be developing a robust version of the 2011 blue crab stock assessment, which is an empirically based model that estimates sustainable-yields for the fishery. We will be able to identify the robust sustainable yields associated with specific policies, for a range of statistical confidence levels.

We believe that this paper offers an important advance in applied fisheries management. It builds on a solid theoretical foundation, includes methodological advances that demonstrate its practicality, provides an intuitively appealing way to understand precautionary management, and finally, by carrying out the work in the context of a specific fishery, we offer immediate and practical policy guidance.

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Empirical Testing of Strategic Voting and its Implications for Choice Experiment

Choice experiments, in which participants are asked to state their most preferred option of several proposed alternatives, have been widely used in environmental valuation. Whether the welfare estimate from choice experiments is valid, however, is largely dependent upon whether participants reveal their unconditionally most preferred option. Theory predicts participants will answer choice experiment questions in a way to maximize their own expected utility. It can be the case, however, that revealing their unconditionally most preferred option does not maximize expected utility for participants. For example, in a multi-candidate voting scenario in which the candidate receiving the greatest number of votes wins, rational participants will ultimately vote for their more preferred of the two candidates that have the greatest chance of winning, regardless of their unconditionally most preferred choice. This "strategic voting" is potentially a problem for choice experiment data analysis. If strategic voting occurs empirically with high frequency, then it is reasonable to question the validity of choice experiment estimates.

In our work, we set up a lab-controlled experiment to mimic a choice experiment to examine strategic voting in three-alternative voting settings. Each participant chose one of three items (ranging in market value from \$5 to \$20), which was available at a specified price. They chose under two different decision rules. Under the first rule, each person pays for and receives the item he chooses. Under the second rule, everyone pays for and receives the item that most people choose. This is the standard "plurality" rule under which strategic voting might occur. Each participant cast these two votes for three different sets of items. After the voting questions participants answered questions about their expectations of other participants' votes, their own second unconditionally most preferred option and their demographic information. Using their votes and the additional information collected, we can observe (1) whether people vote for different items under the two rules, and (2) whether, if they believe their most preferred item has the least chance of winning, they vote for their second most unconditionally preferred item.

Preliminary results show some evidence that people do not vote for their unconditionally most preferred choice under the plurality rule. Roughly 25% of participants voted for an item that is not their unconditionally most preferred. Although 58% of these voters chose their second most preferred option and 7% thought their most preferred item would receive the fewest votes, only a fraction of the overall votes recorded (less than 1%) can be classified as "strategic" based on the criterion that when a person believes his most preferred item has the smallest chance of winning, he will vote for his second favorite. Overall, our

empirical evidence suggests that strategic voting may not significantly undermine the validity of choice experiments. Instead, the more general problem of people not choosing their unconditionally most preferred option may pose difficulties for researchers who use choice experiments in environmental valuation.

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Texas A&M University-Corpus
Christi

Effects of the Deepwater Horizon Oil Spill on Ecosystem Services: The Final Report from the National Research Council

In order to evaluate the loss of ecosystem services in the Gulf of Mexico Large Marine Ecosystem resulting from the Deepwater Horizon Mississippi Canyon-252 spill, it is necessary not only to collect and analyze information related to specific types of services, but also to identify relationships among the lost ecosystem services and assess interdependencies. This presentation will highlight the results from the final report of the National Research Council's Committee on the Effects of the Deepwater Horizon Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico. Five questions were addressed in this report. 1) What ecosystem services (provisioning, supporting, regulating, and cultural services) were provided in the Gulf of Mexico Large Marine Ecosystem prior to the oil spill? How do these differ among the subregions of the Gulf of Mexico? 2) In general terms, how did the spill affect each of these services, and what is known about potential long-term impacts given the other stresses, such as coastal wetland loss, on the Gulf ecosystem? 3) How do spill response technologies (e.g., dispersant use, coastal berm construction, absorbent booms, in situ burning) affect ecosystem services, taking into account the relative effectiveness of these techniques in removing or reducing the impacts of spilled oil? 4) In light of the multiple stresses on the Gulf of Mexico ecosystem, what practical approaches can managers take to restore and increase the resiliency of ecosystem services to future events such as the Deepwater Horizon Mississippi Canyon-252 spill? How can the increase in ecosystem resiliency be measured? 5) What long term research activities and observational systems are needed to understand, monitor, and value trends and variations in ecosystem services and to allow the calculation of indices to compare with benchmark levels as recovery goals for ecosystem services in the Gulf of Mexico?

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Shooting in the Dark? Assessing Costs and Benefits of Proposed Coal and LNG Port Expansion near the Great Barrier Reef

Australia's Great Barrier Reef (GBR), a World Heritage Site, is the largest and most diverse coral reef system in the world. A recent UNESCO review found that the future of the GBR is threatened by coastal development, especially a proposed major expansion of ports for coal and LNG (coal seam) processing and shipping. Past management failures by the Australian and Queensland governments include 1) the lack of overarching ecological objectives and indicators to maintain the resilience of the GBR and 2) a lack of integrated planning for coastal industry growth. In early November, 2012 the Queensland Government released a Draft Strategy for Port Development 2012-2022 which asserted the principle that future decisions about port development be based on a "rigorous analysis of full costs and benefits",

This paper examines what is known about the economic and environmental costs and benefits of proposed energy-related port expansion near the Great Barrier Reef. The analytical framework focuses on four questions: 1) what are the current and projected streams of direct and indirect economic costs and benefits of coast-dependent industries in north Queensland including tourism, fishing, and mining, 2) what are the vulnerabilities of GBR eco-system services to the expansion of port facilities and associated shipping, 3)

what would be the economic impact on tourism and fishing of mining-related port expansion, and 4) to what extent can GBR ecological vulnerabilities be mitigated by "green" port design and management.

Based on a review of recent studies and available data, including the IMPLAN data set to assess direct and indirect economic benefits, the paper concludes that port expansion could 1) pose significant economic risks to Queensland's tourism and fishing sectors, and 2) further undermine the ecological resilience of the GBR. A greater knowledge is needed of what comprises GBR eco-system services, how they are vulnerable to human impact, and how they will be affected by projected climate change. Without this base of information policymakers are largely "shooting in the dark". The final part of the paper will provide pointers to further research needed for a fuller assessment of costs and benefits.

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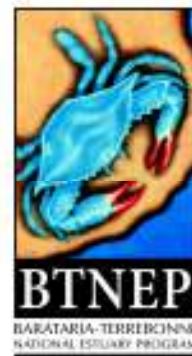
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