

A New Approach to River Management: Action for a Sustainable Coastal Landscape

Denise J. Reed

*Pontchartrain Institute for Environmental Sciences, University of New Orleans
 Department of Earth and Environmental Sciences, University of New Orleans*

“Sustainable restoration of Louisiana’s coast and all it supports can be achieved only by redirecting the freshwater and sediments of the Mississippi River onto the nearshore, stemming the direct loss of these valuable resources to the deep waters of the Gulf of Mexico.”

On June 1, 2006 at the beginning of the first hurricane season after Hurricanes Katrina and Rita, a group of 35 experts in geology, ecology, coastal geomorphology, oceanography, engineering, and economics from across the United States and from as far away as Italy, the Netherlands, the United Kingdom, Egypt, Russia, and Australia delivered this message to the Governor of the State of Louisiana (<http://www.futureofthegulfcoast.org/files/finalreport.pdf>). Brought together to consider the future of the Louisiana coast after the hurricanes of 2005, for a week in April 2006 the Technical Group of the Envisioning the Future of the Gulf Coast (TGEFGC) conference toured the coast, heard about its problems, shared their perspectives, and then developed their recommendations. This paper considers those recommendations and the progress, or lack thereof, toward their implementation in the post-Katrina management of the Louisiana coast.

The Future with Current River Management

Their message was clear – without aggressive action, the future is bleak for Louisiana. Even if populated areas can be protected from hurricanes with levees and floodgates, the continued loss of the coastal landscape will pose an increasing threat

to the regional economy and environment. Despite all of the previous restoration efforts, including the investment of over \$50 million per year since 1990 under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) – a wide range of analyses still shows that land loss exceeds land gain (Barras et al. 2003, Bernier et al. 2006). The processes that contribute to ongoing land loss (Day et al. 2007) will be compounded in the 21st century as sea-level rise accelerates (Intergovernmental Panel on Climate Change 2007, Rahmstorf 2007) and by the likelihood of increased frequency or intensity of major hurricanes (Webster et al. 2005, Emanuel 2005). Higher and wider levees will be required just to retain the current levels of storm flood protection for the communities fortunate to be within a protection system. The haphazard retreat of people from the unprotected communities along the coast that occurs after every storm impact will continue. Despite these projected calamities, more than 120 million tons of river sediment that could be used to rebuild and sustain the coast will be lost to the Gulf of Mexico each year (Galler and Allison 2008).

The Call for Action

Small-scale management efforts such as sediment mining to construct marshes and stabilize barrier islands or the diversion of flow and sediments from the Mississippi River through controlled breaches may slow land loss locally. However, from the system perspective, the collateral impacts of some of these approaches must be weighed against their benefit. Many past restoration

projects have mined the bottom of shallow open bays to rebuild marsh substrates in adjacent areas. The volumes of the material excavated are not trivial. For example, two CWPPRA projects, the Dedicated Dredging near Round Lake, and Bayou LaBranche Wetland Creation each dredged approximately two million m³ of sediment from adjacent water bottoms for marsh creation. Cannibalizing adjacent habitats to replace lost marsh is not a sustainable approach to system level restoration in coastal Louisiana. Such measures will never achieve a sustainable coastal landscape for future generations. Allowing relatively small amounts of the riverine sediment supply to reach coastal wetlands through ‘diversions’ gives the false impression that the coastal landscape can be restored while maintaining ‘business as usual’ on the river. Rather, all the available resources of the Mississippi and Atchafalaya Rivers will be required to sustain the coastal system, as was typical over past millennia before engineered channels and levees began forcing sediment directly to the deep Gulf, reducing coastal sediment deposition.

According to the TGEFGC, aggressive action is needed to redirect all of the available renewable resources within the Mississippi River system to rebuild, replenish, and sustain coastal Louisiana. Harnessing the resources of the Mississippi River is the only way to move towards a sustainable landscape in the face of continued subsidence, rising sea levels, and more frequent and intense tropical storms and hurricanes. It is important to recognize that under the best of circumstances, the sustainable coast will likely be smaller than the present, and its character, in terms of the distribution of habitat types and the configuration of landforms, will be different from both the present and the recent past. However, it could still support the culture and economy unique to the region by allowing many threatened coastal communities to safely persist as well as maintain the array of recreational and commercial activities currently enjoyed that are dependent on healthy wildlife habitat and ecosystems.

An Opportunity for Action

Such a new approach to management of the Mississippi River and its resources can be compatible with the needs of riverine navigation

and the provision of freshwater for industries and residents. Our current approach to river management began in the 1800’s with the taming of the river for navigation. Control and management of the river system was reinforced with the 1927 Mississippi River and Tributaries Act. Since that time, navigation and flood control have been the paramount concerns in managing the Mississippi River system, not the sustainability of the coastal ecosystem. However, in the 2007 Water Resources Development Act, Congress identified coastal restoration as an important national priority comparable to that for River navigation and flood control. Section 7002 of the Act integrated the traditional concerns under the Mississippi River and Tributaries program into a long-term framework for the coast that provides for “the comprehensive protection, conservation and restoration of the...coastal Louisiana ecosystem”. Further, the 2007 Water Resources Development Act calls for an investigation of strategies to take maximum advantage of the water and sediments of the Mississippi River system for coastal restoration.

Since the passage of the 2007 Water Resources Development Act, there has been little obvious action toward a new approach to using the resources of the Mississippi River. Rather, agencies involved in restoration are wrangling over who should pay for shoaling in the river apparently induced by a Coastal Wetlands Planning, Protection, and Restoration Act project that moves water and sediment into West Bay. The potential for shoaling has long been recognized, ‘The diversion may induce shoaling in the main navigation channel of the Mississippi River and the adjacent Pilot town anchorage area. Dredging of the main channel is accomplished under the U.S. Army Corps of Engineers’ ongoing Operations and Maintenance Program for the river, but additional dredging of the anchorage area would be an added feature and cost of the project.’ (MR-03 Project Fact Sheet - <http://lacoast.gov/reports/gpfs/MR-03.pdf>). The discussion about who pays for shoaling the river channel resulting from the removal of water and sediment for restoration purposes illustrates the disconnect that still exists amongst those seeking to use the river for navigation and trade and those seeking a sustainable coast. Despite the

recent legislation, navigation is still seen as the primary use of the river – currently any alterations or modifications to that use associated with reconnecting the river with the delta plain must be compensated.

The Future of the Coast

The TGEFGC acknowledged that the future would not be like the past, that a sustainable coastal landscape was possible, even in the face of subsidence and sea-level rise, if bold action is taken and the sediment resources of the river are directed to restoring the coast. Achieving a sustainable coast will bring change for all aspects of the environment and the river-dependent economy. The sediments supplied by the Mississippi River are insufficient to rebuild and maintain the entire coast as it looks now. The future coastal landscape will likely be less extensive than at present, and retreat from some areas must be expected and planned for. Such changes occur now as communities react to storms, coastal land loss, and as global trade and changing societal preferences influence commodity prices for seafood.

Change is also on the horizon for others who use the river. As issues such as biofuel production and climate variations influence global commodity prices, the types of materials imported and exported from the U.S. via the Lower River will also change. Just as the nature of vessels entering and leaving the mouth of the river have changed since the mid-19th century, so will they likely change in the 21st century as vessel drafts increase, the new expanded Panama Canal facilities are completed, and fuel prices alter the economics of global trade.

The idea of fully utilizing the resources of the Mississippi River to restore the coast is not new. Many recent coastal restoration plans (e.g., the 1998 COAST 2050 report (LCWCRTF 1998) and the Louisiana Coastal Area (LCA) Study (USACE 2004)) document the importance of major realignment of the lower Mississippi River as essential to addressing coastal sedimentation issues and comprehensive restoration. Managing the river as a whole is a daunting task – and all previous restoration plans include an array of seemingly more tractable, if less effective, approaches. It requires the engagement of an array of stakeholders, addressing technical challenges,

and the direct involvement of many state and federal agencies. There are three essential steps to moving this concept forward:

- establishment of a committed high-level leadership group (including State and Federal officials with decision-making authority, senior experts in engineering and natural sciences, and conservation leaders),
- outreach to and involvement of key stakeholders for the affected economies, environments, and societies, and
- an invitation for the world's experts on large river management and public works to contribute the newest and best ideas.

Most importantly, a new approach to river management requires forward thinking. Thinking more about the possibilities for the future than the problems of the past; thinking about economy, environment, and society together as a system. The group of 35 scientists and engineers convened as the Technical Group for Envisioning the Future of the Gulf Coast started that thinking anew. For post-Katrina coastal Louisiana, turning those thoughts into plans and actions is essential.

Acknowledgements

This work builds on the work of the Technical Group for Envisioning the Future of the Gulf Coast conference. The contributions of those scientists are acknowledged as well as the support of America's WETLAND Campaign and British Petroleum for hosting the conference. The ideas presented here on the opportunity presented by the 2007 Water Resources Development Act benefitted from input from Jim Tripp and Paul Harrison of the Environmental Defense Fund. Brendan Yuill of the University of New Orleans made helpful comments on a draft of this paper.

Author Bio and Contact Information

Denise Reed is a Professor of Earth and Environmental Sciences at the University of New Orleans and Interim Director of Pontchartrain Institute for Environmental Sciences. He can be reached at: Department of Earth and Environmental Sciences, University of New Orleans, 2000 Lakefront Dr., New Orleans LA 70148. e-mail djreed@uno.edu.

References

- Barras, J., S. Beville, D. Britsch, S. Hartley, S. Hawes, J. Johnston, P. Kemp, Q. Kinler, A. Martucci, J. Porthouse, D. Reed, K. Roy, and J. Suhayda. 2004. Historic and predicted coastal Louisiana land changes from 1978 to 2050. U.S. Geological Survey OFR 03-334 39pp.
- Bernier, J. C., R. A. Morton, and J. A. Barras. 2006. Constraining rates and trends of historical wetland loss, Mississippi River Delta Plain, south-central Louisiana. Pages 371-382 in Y. J. Xu and V. P. Singh (eds.) *Coastal Environment and Water Quality*.
- Day, J. W., D. F. Boesch, E. J. Clairain, G. P. Kemp, S. B. Laska, W. J. Mitsch, K. Orth, H. Mashriqui, D. J. Reed, L. Shabman, C. A. Simenstad, B. J. Streever, R. R. Twilley, C. C. Watson, J. T. Wells, and D. F. Whigham. 2007. Restoration of the Mississippi Delta: Lessons from Hurricanes Katrina and Rita. *Science* 315: 1679-1684.
- Day, J. W. Jr., G. P. Shaffer, L. D. Britsch, D. J. Reed, S. R. Hawes, and D. R. Cahoon. 2000. Pattern and process of land loss in the Mississippi Delta: A spatial and temporal analysis of wetland habitat change. *Estuaries*, 23: 425-438.
- Emanuel, K. 2005. Increasing destructiveness of tropical cyclones over the past 30 years. *Nature*, 436: 686-688.
- Galler, J. and M. A. Allison. 2008. Estuarine controls on fine-grained sediment storage in the Lower Mississippi and Atchafalaya Rivers. *Bulletin of the Geological Society of America*, 120: 386-398.
- Intergovernmental Panel on Climate Change. 2007. Summary for Policymakers. In S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press: Cambridge, United Kingdom and New York, NY, USA.
- Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF) and the Wetlands Conservation and Restoration Authority. 1998. *Coast 2050: Toward a sustainable coastal Louisiana*. Louisiana Department of Natural Resources. Baton Rouge, LA. 161 pp.
- Rahmstorf, S. 2007. A semi-empirical approach to projecting future sea level rise. *Science*, 315: 368-370.
- U. S. Army Corps of Engineers (USACE). 2004. Louisiana Coastal Area, Louisiana Ecosystem Restoration Study ([http:// data.lca.gov/Ivan6/main/main_report_all.pdf](http://data.lca.gov/Ivan6/main/main_report_all.pdf)).
- Webster, P. J., G. J. Holland, J. A. Curry, and H. R. Chang. 2005. Changes in tropical cyclone number, duration, and intensity in a warming environment, *Science*, 309: 1844.