



The Impact of Hurricanes Katrina and Rita in Louisiana: America's Coasts Under Siege

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The 2005 hurricane season acutely demonstrated the vulnerability of coastal areas in the United States to extreme storms and the hazards of coastal zone living. As a nation, we are faced with rebuilding Louisiana's coastal zone and the realities of increasing storm intensity in the future.

The Louisiana coastal zone, including New Orleans on the bank of the Mississippi River surrounded by wetlands and separated from the Gulf of Mexico by a system of barrier islands, provides natural and cultural resources and economic opportunities that are of fundamental importance to the welfare of the State and Nation. Currently, more than two million people live in coastal Louisiana, representing a workforce and infrastructure that produces more than 30% of the nation's seafood catch, 25% of domestic and imported hydrocarbons, and an important port corridor in the United States.

The Louisiana coastal zone is, however, highly dynamic and fragile, and the toll exerted by continued human occupation and expansion is clearly evident in maps that show nearly 2,000 square miles of collective land loss since 1900. Disappearing Louisiana wetlands are more than just the conversion of fresh and saltwater marshlands to open water; it is the loss of an ecosystem of national importance and its suite of resources that provide for our way of life.

Coastal Zone Land Loss Processes

In a geologic timeframe, the Louisiana coastal zone is a recent construction by the forces of nature, representing 7,000 years of land building by the Mississippi River. Ironically, some processes that have shaped the coastal zone are now the very ones that threaten its longevity. For example, the muddy sediment deposited by the rivers of the coastal zone is prone to compaction, contributing toward rapid land-surface sinking. Locally along the coast there is growing evidence that rates of natural sinking have increased because of the removal of subsurface oil, gas, and water, which causes collapse of the overlying sediment and movement along faults.

Simultaneously, the modification of the coastal zone through the construction of river levees has reduced the delivery of sediment and nutrient-laden waters to coastal marshes and shorelines,

limiting their ability to remain above a rising sea level that is created by land-surface sinking and global sea-level rise. A myriad of navigation canals dredged through the wetlands has similarly produced land loss, marine incursion, and death of saltwater-intolerant vegetation that helps to stabilize the wetlands soils and to provide a buffer against storm surges created by large tropical cyclones.

What Can Be Done?

Conceptually there are options regarding what may be done to help mitigate the Louisiana situation:

1. Disregard the dramatic coastal changes of the last century and allow coastal recession to proceed;
2. Attempt to fully restore the southern Louisiana coast to some preexisting configuration;
3. Strategically reengineer the coast to protect local and national interests; or
4. Develop a plan for managed retreat from the coastal areas where the hazards are the greatest.

The "do nothing" and "full restoration" approaches are likely impossible stances. A lack of intervention would constitute a deathblow for Louisiana, the effects of which would be felt throughout the nation. Full restoration is similarly an impossible track as no amount of labor or monetary investment, within the needed timeframe, could restore the coastal zone of southern Louisiana to its status of even 10 years ago.

The third approach is a suitable option, but requires a visionary plan for building storm-resistant infrastructure and greater State and Federal cooperation in using modern technologies to build robust, vegetated levee systems that are surrounded by reconstructed wetlands and barrier island systems.

In one sense, the fourth option has already unfortunately occurred as a result of the recent hurricane impacts, but as a reactive and quite possibly temporary measure rather than a proactive initiative. An even more devastating hurricane will one day strike southern Louisiana causing even greater destruction than recently witnessed.

To lift the siege on coastal Louisiana demands strategic, federally supported plans that address the entire coastal zone and provide strong coastal management policies that place preservation of the coastal zone above individual stakeholder needs.

The complexity of the problem means that any solution must be multi-disciplinary in nature. Communication is required among geologists, biologists, engineers, and planners to in order to develop cost-effective coastal restoration and protection measures.

At the forefront of these efforts should be geoscientists who can provide valuable knowledge regarding coastal processes, rates of coastal change, and insight into how coastal mitigation will affect coastal processes and hence, the social and economic future of the Louisiana coastal zone.

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