Government and Academic Institutional Involvement in Gulf Coast Resiliency[1]

Sharon H. Hodge, J.D.[2]

I. Introduction

This contribution to the inaugural edition of the Sea Grant Law and Policy Journal addresses an issue with significant societal, economic and ecological implications for the citizens along the northern coast of the Gulf of Mexico. How do we encourage and support development of our coastlines so that the communities are resilient to reoccurring hazards and prepared to face future challenges? Coastal resource and emergency managers face the enormous challenge of balancing the sirens' song of coastal living with the realities and responsibilities of protecting people and property. As a lifelong resident of coastal areas, this author will confess to falling under the magical spell of this fragile interface between land and sea in defiance of all things logical. The migration by others also enchanted by the shore has continued at a rapid pace. In 2003, it was estimated that 153 million Americans, or 53% of the U.S. population, lived in a coastal county. [3] Although changes in public policy might be able to address the steady shift in populations to the coast,[4] governmental and academic programs generally do not specifically address how to turn the migration patterns away from the coasts. Instead, the focus has been on building "resiliency."

Several events during this decade shifted this nation's focus toward disaster recovery and rebuilding like never before. We survived the mysteries of Y2K and the possible breakdown of all modern systems related to computers' internal clocks programmed for decades with a two-digit year field. The events of

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[1] This paper was presented during the Sea Grant Law and Policy Journal's inaugural symposium on Coastal Resiliency held on March 25–26, 2008 at the University of Mississippi in Oxford, Mississippi. Coastal resiliency refers to the ability of coastal cities, towns, and communities to adapt to and recover from natural hazards, including hurricanes, tsunamis, floods, and disease epidemics. Seven authors were selected to present papers on a wide range of topics related to coastal resiliency. Powerpoint presentations and additional information about the symposium are available at http://www.olemiss.edu/orgs/SGLC/National/SGLPJ/SGLPJ.htm .

[2] Northern Gulf Institute, a NOAA Cooperative Institute. This paper was prepared by Sharon Hodge under award NA06OAR4320264 06111039 to the Northern Gulf Institute by NOAA's Office of Ocean and Atmospheric Research, U.S. Department of Commerce.

[3] KRISTEN M. CROSSETT, ET. AL., NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, POPULATION TRENDS ALONG THE COASTAL UNITED STATES: 1980-2008 (Sept. 2004).

[4] Please see two contributions to this issue of the Sea Grant Law and Policy Journal addressing policy development in this field: Sandra Nichols, *Coastal Adaptation – Keys for Successful Legal and Policy Response*, and Megan Higgins, *The Legal and Policy Impacts of Sea Level Rise on Beaches and Coastal Property*.

September 11, 2001 clearly changed history forever. Most of the changes after 9/11 relate to everyday air travel, but a large federal agency was quickly created to help bolster our security and make us more resilient to the next attack. Most of those issues have been addressed on a federal level, with assistance by state and local law enforcement. The threat from terrorism is an additional element that coastal resource and emergency managers must address in their planning efforts. While terrorism is not limited to coastal areas, most major cities are located on or near our coasts. The coast, therefore, presents unique security issues as an entry point for international shipments by sea and the primary national boundary.

While the December 26, 2004 tsunami in the Indian Ocean did not hit close to home, global news coverage and prevalent video coverage gave us images of devastation we could never have imagined before. We were once again reminded of the vulnerability of coastal areas around the world when Tropical Cyclone Nargis hit low-lying areas of Myanmar on May 3, 2008 resulting in over 134,000 dead or missing.[5] And the historic earthquake in central China on May 12, 2008 serves as a reminder that coastal areas are not the only areas at risk. The fatigue from responding to these major losses is setting in. Coastal areas were not the only areas facing threats recently. Historical flood events, such as the 1997 floods of Grand Forks, North Dakota, astounded us as we watched historic buildings burn on the nightly news as firefighters stood by – helpless to reach the downtown through the flood waters. The importance of implementing resiliency concepts worldwide is more critical now than ever.

This paper will provide an overview of the government and academic institutional roles in Gulf of Mexico coastal resiliency. Sources of risk like climate change, sea-level rise, and terrorists are global, but the impacts are definitely in my back yard,[6] and in yours. Just as the problems arise at different levels, the solutions are multi-level. Many solutions are relevant to the entire country, but some are distinctly beneficial to the coastal areas and most important for the Northern Gulf of Mexico region. The first part of the paper provides a discussion of the expansion of resiliency planning an implementation related to Hurricane Katrina and its impacts on Gulf Coast communities. The second part provides a catalog of definitions used to describe the various elements of "resiliency" and their associated applications areas. This is followed by a survey of the state of practice by government and academic sectors, with a mention of the role of private and non-governmental organizations. The paper concludes with a discussion of the specific challenges facing the coast of the northern Gulf of Mexico and some recommendations to address immediate and long term needs.

II. Expansion of Resiliency Work in the Wake of Hurricane Katrina

Hurricane Katrina was by almost all measures the most devastating disaster to hit the United States. In Harrison County, Mississippi 68% of, or 48,617, of homes were damaged or destroyed. Some communities lost 90% of the structures.[7] Most can agree that failures occurred at many levels before and after Katrina, with loss of many lives in the floods in New Orleans. The state and local governments were overwhelmed and federal elements missed many opportunities to do more to rescue and protect life. However, many within the government ranks rose to the occasion and made heroic efforts to save those stranded by the ravaged and flooded areas after the hurricane. The Coast Guard serves as a stellar example of first response to Katrina. U.S. Geological Survey operations based in Lafayette, Louisiana employed 30 of their vessels and all available staff to assist in rescuing victims in flooded New Orleans in the days immediately following Katrina.[8]

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[5] Seth Mydans, *Weeks After Cyclone in Myanmar, Even Farmers Wait for Food*, N.Y. TIMES, May 26, 2008.
[6] Perhaps it's time for a new acronym, DIMBY, Definitely In My Back Yard.
[7] HARRISON COUNTY, LONG-TERM COMMUNITY RECOVERY PLAN (Aug. 2006) *available at* http://www.governorbarbour.com/Recovery/links/documents/HarrisonPlan.pdf
[8] U.S. Geological Survey, *USGS Participates in Interagency New Orleans Search and Rescue Mission: A Summary of Activities*, http://www.nwrc.usgs.gov/hurricane/katrina-help.htm .

Total impacts to health and loss of income and property have not yet been fully realized. Short-terms needs included first aid and evacuation of the seriously ill. Ironically, those who stayed and accepted housing assistance from FEMA ended up with trailers emitting toxic fumes. Many occupants fell ill trying to survive in these cramped quarters. Many more residents, even those with permanent housing, are having difficulties living in the ravaged region. Some face personal economic ruin due to loss of a business or job. Given the great emotional stress, there has been a steady rise in mental health problems. Suicide rates in Harrison County, Mississippi remain at high levels more than two years after Katrina, and are perhaps related to toll of daily living in a disaster zone. The Mental Health Association of Mississippi is working hard to address this sad reality. [9] The need for mental health treatment may continue for years. Federal and state agencies are working with non-governmental organizations to address "stress exhaustion" with programs such as "resilience coaching" and "resilience training".

Nothing brought the importance of coastal community resiliency to the forefront like the 2005 hurricane season. Those storms resulted in an estimated combined loss of life of 1016 souls, (estimates by the National Hurricane Center range up to 1833).[10] The National Hurricane Center estimates that Hurricanes Katrina and Rita caused $85 billion of total damages to property.[11] The non-economic damage to individuals and society is immeasurable. First responders rarely weigh the cost of rescue at the time of a disaster, but common sense would suggest that it is much greater than the cost of avoiding the life-threatening scenario in the first place. With their devastating impacts, Katrina and Rita "opened a window of opportunity for creating more resilient communities." [12]

III. Concept of Coastal Resiliency

Various definitions of "resiliency" have developed over the past decade or so. Important concepts related to resiliency are "hazard resistant community," "risk management," and "adaptability."[13] It is important to note that application of these terms is not limited to coastal zone management. There is a widespread movement: the resiliency focus is "an area of explorative research under rapid development with major policy implications for sustainable development." [14]

Resiliency is one of the six principles of sustainability which is defined as "the ability or capacity to keep something going or the state of being durable or able to persist over time."[15] The six principles of sustainability are:

1. Use a consensus-building, participatory process when making decisions.
2. Maintain and enhance quality of life.

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[9] Press Release, Foundation for the Mid-South, *Community Resilience Grants Awarded to Nonprofit Organizations* (Nov. 20, 2007) *available at* http://www.fndmidsouth.org/Documents/FMS_BCR_PressRelease_Final.pdf .
[10] 2005 Tropical Cyclone Fatalities, http://www.weather.gov/os/hazstats/hurricane05.pdf .
[11] NATIONAL HURRICANE CENTER, TROPICAL CYCLONE REPORT, HURRICANE KATRINA, 23-30 AUGUST 2005 (Dec. 20, 2005; Updated Aug. 10, 2006). This report also contains information on tropical wave history, storm surge, tornadoes, surface observations, fatalities, and damage cost estimates.
[12] Philip R. Berke and Thomas J. Campanella, *Planning for Postdisaster Resiliency*, THE ANNALS OF THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE, 604(1): 192-207 at 193 (2006).
[13] Many of the definitions discussed in this section were compiled by the Resiliency working group of the Gulf of Mexico Alliance with great assistance by the Alliance Federal Workgroup and Resiliency Group. Lead support provided by Heidi Recksiek of NOAA's Gulf Coast Service Center.
[14] Stockholm Resilience Center: Research for Governance of Socio-Ecological Systems, www.stockholmresilience.org .
[15] NATURAL HAZARDS CENTER, HOLISTIC DISASTER RECOVERY: IDEAS FOR BUILDING LOCAL SUSTAINABILITY AFTER A NATURAL DISASTER 11-17 (2006).

3. Build local economic vitality.
4. Promote social and intergenerational equity.
5. Protect environmental quality.
6. Incorporate disaster resilience and mitigation.[16]

The practice of sustainable development has a solid footing in national and international planning and conservation practices, and resiliency programs build on that foundation. "The concept of resilience provides a fresh and useful perspective on *sustainable development* – the notion that industrial development today must not jeopardize the well-being of future generations."[17] Governmental involvement is primarily focused on the response and recovery, mitigation, and planning of the built environment. However, a significant aspect of protecting property is restoration and conservation of natural environments.

A basic dictionary definition of "resilience" is an important place to start. Merriam-Webster's online dictionary defines "resilience" as:

> (1) the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress; (2) an ability to recover from or adjust easily to misfortune or change.[18]

Ecosystem resilience is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes. A resilient ecosystem can withstand shocks and rebuild itself when necessary. Ecosystems naturally evolve to a fairly resilient state (e.g., Mississippi River prior to channelization and levees).

C.S. Holling is widely recognized for introducing the concept of resiliency applied to ecosystems in his seminal piece *Resilience and Stability of Ecological Systems.*[19] Holling shifted the perspective from a life and death cycle to a focus on "numbers of organisms and the degree of constancy of their numbers . . . viewing the behavior of systems . . . and the properties of the system concerned."[20] Research by Holling and his associates matured to include elements of biodiversity and capacity:

> It is the buffer capacity or the ability of a system to absorb perturbation, or the magnitude of disturbance that can be absorbed before a system changes its structure by changing the variables.[21]

Resilience as applied to ecosystems has three defining characteristics:

> (1) The amount of change the system can undergo and still retain the same controls on function and structure; (2) the degree to which the system is capable of self-organization, and (3) the ability to build and increase the capacity for learning and adaptation.[22]

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[16] *Id*. at 1-2.
[17] Center for Resilience, *Resilience and Sustainability*, http://www.resilience.osu.edu/ResSust.html .
[18] Merriam-Webster Dictionary online, http://www.merriam-webster.com/dictionary/resilience .
[19] C.S. Holling,, *Resilience and Stability of Ecological Systems,* ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS (1973).
[20] *Id.* at 4050.
[21] Holling, C.S., *et. al*., *Biodiversity in the Functioning of Ecosystems: an Ecological Synthesis*, in BIODIVERSITY LOSS: ECONOMIC AND ECOLOGICAL ISSUES, 44-83 (C. Perrings, *et. al*., eds. 1995).
[22] The Resilience Alliance, *Key Concepts: Resilience*, http://www.resalliance.org/576.php.

Social systems have the added capacity of humans who can anticipate and plan for the future. Some scoff at the term "natural disaster," arguing that events such as Katrina should be referred to as "man-made disasters."[23] Humans, however, are part of the natural world. We depend on ecological systems for our survival and we continuously impact the ecosystems in which we live from the local to global scale. Coastal management must address both nature's forces and the impacts of "man-made" disasters, because what might be the perfect solution to protect human development could have negative impacts on the environment.[24]

Resilience is a property of these linked social-ecological systems. Resiliency, when applied to social systems, refers to the capacity to cope with unanticipated dangers after they have become manifest; i.e. learning to bounce back.[25]

> The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures.[26]

The approach to understanding what makes a community resilient has evolved into a science. For example, researchers funded by the National Science Foundation have developed a framework for resiliency which includes: robustness (ability to withstand disaster), redundancy (capability of satisfying function), and resourcefulness (identify and solve problems), and rapidity (restore function in timely manner).[27]

A distinction should be made at this point between resistance and resilience. Disaster resistance emphasizes the importance of pre-disaster mitigation measures that enhance the performance of structures, infrastructure elements, and institutions in reducing losses from a disaster. Resilience reflects a concern for improving the capacity of physical and human systems to respond to and recover from extreme events.[28] Resilience is rooted in making choices about future losses when development decisions are made. While some would like to believe that lightning and other ill winds never strike twice, the likelihood is quite high that weather patterns will repeat. An area that experiences one high hazard event will likely experience many. Resiliency thinking may force us to choose what is lost in future disasters. This is absolutely a new way of thinking which places 100 percent responsibility for those losses on people, as opposed to nature.[29]

A key component of local resiliency is self-reliance. "Local resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life without a large amount of assistance from outside the community."[30] Places such as New Orleans and Myanmar are on the low end of the spectrum of resiliency

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[23] Bob Minzesheimer, *Deluge: A History of Katrina*, USA TODAY ONLINE, May 8, 2006, *available at* http://www.usatoday.com/life/books/reviews/2006-05-07-brinkley_x.htm .

[24] Personal Interview with Michael Carron, PhD, Chief Scientist, Northern Gulf Institute, March 15, 2008.

[25] AARON WILDAVSKY, SEARCHING FOR SAFETY (1991)

[26] UNITED NATIONS, LIVING WITH RISK: A GLOBAL REVIEW OF THE INTERNATIONAL STRATEGY FOR DISASTER REDUCTION (UN/ISDR) 16-17 (2004).

[27] Kathleen Tierney and Michel Bruneau, *Conceptualizing and Measuring Resilience A Key to Disaster Loss Reduction*, TR NEWS 250 MAY–JUNE 2007 14-17, *available at* http://onlinepubs.trb.org/onlinepubs/trnews/trnews250_p14-17.pdf .

[28] *Id.*

[29] S.B. Manyena, *The Concept of Resilience Revisited*, DISASTERS 30(4): 433-450 (2006).

[30] D.S. MILETTI, DISASTERS BY DESIGN: A REASSESSMENT OF NATURAL HAZARDS IN THE UNITED STATES (1999).

– they have a low capacity to respond to external shocks. An increase in community spirit, however, can lead to an increase in resiliency. "The reduction of social vulnerability through the extension and consolidation of social networks, both locally and at national, regional, or international scales, can contribute to increases in ecosystem resilience."[31] Failure to plan, however, is not unique to coastal zones. The failure to plan for the 500-year earthquake event could result in similar tragedy. Communities with plans in place can more quickly respond to the needs of their citizens and recover from disasters.

A key ingredient to responding effectively to a disaster is proper response planning,[32] with the essential step of confirming that all assumptions are valid. For example, the evacuation call for New Orleans in advance of Hurricane Katrina was based on the assumption that all citizens had private transportation and a specific safe destination available. That assumption proved fatally flawed for hundreds of individuals.[33] Part of the problem was the lack of emergency shelters and temporary lodging which would accept pets. Calls for sheltering in place and shelters that accept family pets have been heeded since the storm and should benefit citizens in any region faced with the difficulties of evacuations.[34]

For example, understanding the demographics of the community is critical to planning a sheltering program or evacuation plan. Many of Hurricane Katrina's victims were senior citizens who became trapped by floodwaters and drowned in their homes, according to a newly released accounting of the 2005 storm. The average age for men who died in the northern Gulf Coast hurricane was 64 years old, according to a Scripps Howard News Service analysis of data recently released by the Centers for Disease Control and Prevention. Female victims were older, averaging 71. That is more than 23 years older than the average age of women who died during the 2004 Atlantic hurricane season and 13 years older than women who died in other 2005 storm events.[35] If emergency planners had known more about the demographics of their respective jurisdictions, more people may have been evacuated or other, safer, arrangements made.

Financial systems in coastal communities must also be resilient. For those individuals whose homes are their savings or retirement plans, income is lost forever when the properties are washed away. Tourism to ravaged areas declines, as does the financial viability of tourist attractions and their employees. Of course, the Gulf of Mexico did experienced an unprecedented rebuilding boom with a huge increase in sales tax, but as a wise man once said, even a 10 car pile-up on the interstate is economic development. However, resiliency is not just the ability of a community to begin rebuilding quickly. The hallmark of a resilient community is its wise use of resources during the rebuilding process. The right economic incentives are as important as education and regulation in guiding development and rebuilding in the direction we want it to go. State economic development agencies can help make the connections with the private sector to get the economy rolling again. Federal grants and tax incentives, such as the Gulf Opportunity Zone Act of 2005, can spur capital investment back into the damaged region.[36]

Similar in approach, but with less of a focus on risk management, "smart growth" has been widely adopted in planning circles. Definitions of smart growth range slightly, but a useful one comes from the

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[31] Tompkins, E. L., and W. N. Adger, *Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change?*, ECOLOGY AND SOCIETY 9(2): 10 (2004).
[32] Henry R. Renteria, *Mutual Aid and State Plans are Key to Effective Emergency Management*, NATURAL HAZARDS OBSERVER 43(2): 4-6 (Nov. 2007).
[33] Maureen Fordham, *Social Vulnerability and Capacity*, NATURAL HAZARDS OBSERVER 43(2): 1-3 (Nov 2007).
[34] *Wildfires Force Mass Evacuations in Southern California*, FOX NEWS, Oct. 23, 2007 *available at* http://www.foxnews.com/story/0,2933,303881,00.html .
[35] Gavin Off, *Look at the Victims of Hurricane Katrina*, SCRIPPS HOWARD NEWS SERVICE, Feb. 20, 2008.
[36] For more information on the GoZone Act and its application within Mississippi, visit http://www.mississippi.org/content.aspx?url=/page/3120

Environmental Protection Agency: "a range of development and conservation strategies that help protect our natural environment and make our communities more attractive, economically stronger, and more socially diverse." The American Planning Association has adopted similar concepts with several additional core principles.[37]

A resilient community captures that smart growth flavor and includes "intentional action to enhance the personal and collective capacity of its citizens and institutions to respond to, and influence the course of social and economic change."[38] The Centre for Community Enterprise has identified behaviors that a resilient community demonstrates, with the first being that "they take a multi-functional approach to create a sustainable (economically, ecologically, politically, and socially) development system with the community."[39]

Hurricane Katrina had a huge impact to the field of resiliency planning. Books on sustainable development were rewritten after the 2005 hurricane season to address the shift in, or rather the realization of, this risk. [40] The remainder of this paper examines the current state of resiliency initiatives on the federal level and within the Gulf of Mexico region.

IV. Federal Resiliency Efforts

Essential elements of any coastal resiliency initiative includes building capacity to respond to a disaster and planning to avoid risks facing the coast. Utilizing education, outreach, regulation, and incentives, programs can help effectuate stronger, more resilient coastal communities. The resiliency work by governmental entities is somewhat cyclical in nature – plan, respond, learn, plan, and respond again. Emergency managers who run through a "lessons learned" exercise, will come out better prepared to respond to the next event. Federal, state and local governments plan and prepare for known hazards, but they have to respond to unexpected, as well as known, hazards. The time-frame to take advantage of the opportunity presented by a disaster to build back resiliently is very short, however. Pressures come from residents wanting to move back home and from commercial interests needing to recapture their income streams.[41] Governments must be ready to implement resilience concepts quickly.

This section describes the current state of practice by federal, state, local government and academic sectors in the field of resiliency in the Gulf of Mexico. Although it is important to consider the international activities in this field, a review of the practice throughout the globe is beyond the scope of this paper. Many of the federal activities of this country, such as those related to tsunami warning systems, are shared with the international community. But as discussed in more detail below, the bulk of planning and implementation occurs at the local level.

Three months before Hurricane Katrina, the President's National Science and Technology Council issued a report on disaster reduction recognizing that resiliency is a multi-facetted effort.

> Grand Challenge #5 – Assess disaster resilience using standard methods. Federal agencies must work with universities, local governments, and the private sector to identify effective standards

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[37] *See*, JOSH CLEMONS, MISSISSIPPI-ALABAMA SEA GRANT LEGAL PROGRAM, SMART GROWTH, MASGC 07-030 (Dec. 2007).
[38] The Community Resilience Project, Centre for Community Enterprise, http://www.cedworks.com/communityresilience02.html
[39] *Id*.
[40] Holistic Disaster Recovery, *supra* note 15.
[41] Berke and Campanella, *supra* note 12, at 193 (noting that resiliency issues have both short- and long-term windows of opportunity).

> and metrics for assessing disaster resilience. With consistent factors and regularly updated metrics, communities will be able to maintain report cards that accurately assess the community's level of disaster resilience. This, in turn, will support comparability among communities and provide a context for action to further reduce vulnerability. Validated models, standards, and metrics are needed for estimating cumulative losses, projecting the impact of changes in technology and policies, and monitoring the overall estimated economic loss avoidance of planned actions.[42]

A. National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) leads the field of coastal resiliency planning. Their efforts are both large scale (*e.g.*, integrated ecosystem assessment planning) and local (*e.g.*, direct support to state coastal programs, regional and local efforts and individuals). The efforts range from very technical research and development to the most basic of approaches. NOAA has developed sophisticated risk assessment tools with a basis in geospatial technologies. However, the very low tech two-sided, laminated 8.5" x 11" NOAA Extreme Weather Information Sheets developed shortly after Katrina has been very well received by the public.[43]

NOAA is also a leader in assimilating and disseminating relevant and important information to assist in resiliency planning. It has made clear that improving resilience is a top priority for the agency:

> Whether the hazards are coastal or inland, or the losses felt immediately or gradually over time, NOAA's primary responsibility is to mitigate the escalating economic, societal, and environmental costs associated with environmental hazards. . . [T]he longer term challenge of improving resilience also requires a strategic approach to the full set of capabilities that NOAA can bring to bear on this challenge. With this overarching strategic imperative in mind, NOAA has included "contribution to resilience" as a key criteria in its decision matrix for FY 2009-2013 program priorities.[44]

NOAA is helping communities address the things they can change. Through the Coastal Storms Program, NOAA focuses its assistance on helping to develop strong partnerships, create user-driven products, and target outreach.[45] Resiliency for the northern Gulf coast area, for example, includes a special emphasis on hurricanes. It is readily apparent that the tropical system storm surge (or in the case of New Orleans, failed levees and the floods that resulted from the storm surge) presents the largest threat to people and property in the coastal zone. While high winds are damaging, modern construction codes have been widely adopted and enforced with very positive results. Setting aside the notion that the strength of Katrina was due to global warming, can we explain how we as an advanced society created such a precarious existence?

Currently the National Hurricane Center has difficulty communicating risk – the long used Saffir-Simpson Scale actually reflects only the wind risk – with very little correlation to storm surge, which is a function of the storms entire energy budget, geomorphology of the coastline, shelf slope and wetlands

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[42] SUBCOMMITTEE ON DISASTER REDUCTION, NATIONAL SCIENCE AND TECHNOLOGY COUNCIL, GRAND CHALLENGES FOR DISASTER REDUCTION (June 2005).

[43] NOAA Coastal Services Center, Storm Data Resource Guides, *available at* http://www.csc.noaa.gov/storm_info/guide.html .

[44] NOAA OFFICE OF PLANNING AND INTEGRATION, ANNUAL GUIDANCE MEMORANDUM FOR FY 2009-2013 (2006).

[45] *See*, www.csc.noaa.gov/csp/ and www.csc.noaa.gov/hat/ for the Hazard Assessment Tool which can help educate residents about the potential hazard risk. The HAT includes descriptions and general information about each of the hazards such as storm surge, flood, wind and erosion.

buffer loss. The National Science Foundation and NOAA recently released a call for proposals "focusing on advancing fundamental understanding of the communication of hurricane outlooks, forecasts, watches, and warnings both to decision makers (i.e., emergency managers, elected officials) and to the general public."[46]

B. Federal Emergency Management Agency

Many lessons have been learned and a new attitude of individual and organizational responsibility has taken hold. At the time of Hurricane Katrina, it seemed that many citizens expected federal agencies to provide any and all support in the face of such disasters. There are limits, however, to the authority and ability of agencies like the Federal Emergency Management Agency (FEMA) to reduce the loss of life and property. FEMA's approach is to protect the Nation from all hazards, including natural disasters, acts of terrorism, and other man-made disasters, by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation.[47]

Many areas of our country are subject to damage from floods. The approaches to building near or in areas subject to floods vary among communities, especially after a devastating storm. After Hurricane Katrina legions trumpeted a "return to normalcy," but those communities hit hardest remain a long distance from normal. Not all communities, however, aim for a return to status quo or "normalcy." Some want to build back stronger and better. Fortunately, the National Flood Insurance Program (NFIP) managed by FEMA has matured to a point that it accommodates smart growth and resiliency. For example, flood insurance claim payouts do not have to be reinvested in structures that will be subject to the same hazards in the future. Significant grants of $30,000 per home were offered for mitigation, a real step in the resiliency direction.[48]

When the NFIP was conceived and promulgated, the basic philosophy viewed land use regulation as of the primary focus of floodplain management.[49] The drafters of the flood program expressed concerns for the difficultly of regulation, a concern that has proven to have been well founded as we continue to see approval of wetlands fill in the coastal zone.[50] Part of the problem is the perceptual differences between gradual changes and sudden catastrophic events. The small changes, such as filling an acre of wetlands here, two acres of wetlands there, are tolerated. The total amount of destruction is often not realized until of the changes make a difference in the resilience of a community during a severe weather event.[51]

The NFIP administration has suffered through fraud, abuse, and ill-conceived policy shifts. According to one report:

> NFIP estimates just 1% of insured properties were responsible for about 25% of claims, mainly due to repeated flooding and rebuilding in the same location. . . structures with repeat losses

[46] National Science Foundation, Program Solicitation NSF-08-551.

[47] The authorization for most federal disaster response that FEMA undertakes is based on the Robert T. Stafford Disaster Relief Emergency Assistance Act, Pub. L. No. 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, Pub. L. No. 93-288.

[48] Harrison County Community Recovery Plan, *supra* note 5.

[49] For a thorough discussion of the NFIP, *see* Ernest Abbott, *Floods, Flood Insurance, Litigation, Politics – and Catastrophe* in this issue of the Sea Grant Law and Policy Journal.

[50] Rutherford Platt, *Comments on the National Flood Insurance Program (NFIP) Evaluation Final Report*, NATURAL HAZARDS OBSERVER, 32(2): 11-12 (Nov 2007).

[51] Samuel D. Brody, *et. al*., *Examining the relationship between wetland alteration and watershed flooding in Texas and Florida*, NATURAL HAZARDS 40(2):413-28 (Feb. 2007).

> represented almost a third of all claims paid between 1978 and March 2004. The areas in Alabama and Mississippi affected by Hurricane Katrina include roughly 2,400 structures with repeat losses, while the areas of Louisiana damaged by the storm include roughly 20,000 structures that have had repeat claims.[52]

FEMA also supports state and local governments in the wake of a disaster through its Public Assistance Grant Program.

> Through the [Public Assistance] Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit organizations.[53]

C. Other Federal Efforts

Numerous other federal programs address important components of our communities' resiliency. For example, the Naval Research Laboratory conducts surge inundation modeling and the U.S. Geological Survey's Northern Gulf of Mexico Ecosystem Change and Hazards Program provides mapping and planning to supports particular technical needs of other researchers and stakeholders.[54] The National Guard plays an essential role providing assets found nowhere else such has human power, toughened vehicles, and survival training and tools.

The Department of Homeland Security's Southeast Region Research Initiative is addressing resiliency issues in areas such as technology and infrastructure that are key to our complex society.[55] Three related projects under the Community and Regional Resilience Initiative are described as ". . . a new U.S. Department of Homeland Security pilot program focused on helping more communities strengthen their ability to prepare for, respond to, and rapidly recover from significant man-made or natural disasters with minimal downtime to basic community, government and business services."[56] The goral of these projects is to develop a community risk index for Memphis, Tennessee, Gulfport, Mississippi and Charleston, South Carolina which would be transferable to other communities. The Gulf of Mexico Alliance Resiliency Working Group, discussed below, is also developing a resiliency index to serve as a guide for identifying weakness in the community.[57]

Resiliency projects are rolling out so fast that new ones present themselves as this research proceeds. For example, the Department of Transportation recently released the following information about climate change studies.

> Based on 21 simulation models and a range of emissions scenarios, the study found that potential changes in climate over the next 50 to100 years could disrupt transportation services in the region. 27% of major roads, 9% of rail lines, and 72% of area ports are at or below 4 feet in

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[52] David C. John, *Fixing Flood Insurance Before the Next Disaster: House Bill Takes Several Steps in the Wrong Direction*, Heritage Foundation WebMemo # 16455 (Sept. 27, 2007) *available at* http://www.heritage.org/Research/Regulation/wm1645.cfm

[53] FEMA Public Assistance Grant Program, http://www.fema.gov/government/grant/pa/index.shtm .

[54] USGS, Northern Gulf of Mexico Ecosystem Change and Hazard Susceptability Project, http://ngom.usgs.gov/

[55] South East Region Research Initiative, http://serri.org/research.html . SERRI research areas are aligned with the US Department of Homeland Security's Science and Technology Integrated Product Teams (IPT).

[56] Community and Regional Resilience Initiative, CARRI News, http://www.resilientus.net/pdfs/carrinewsletteroctober2007.htm

[57] RESILIENCE WORKING GROUP, GULF OF MEXICO, PROGRESS REPORT, *available at* http://www2.nos.noaa.gov/gomex/coastal_resil/resil_wg_2pager.pdf

> elevation, and could be vulnerable to flooding due to future sea level rise and natural sinking of the area's land mass. The study is designed to help state and local officials as they develop their transportation plans and make investment decisions. Federal transportation officials will continue to work closely with state and local planners as they incorporate the study into their planning processes.[58]

It is important to remember, however, that resiliency is not just a bricks and mortar issue. The Department of Health and Human Services awards grants to states for preparation against pandemic influenzas.[59] Additional Department of Health and Human Services programs address health care, mental health care, quality of life, and emergency service needs such as hospitals and clinics, emergency operations centers, evacuation plans, law enforcement and fire protection, and libraries.

V. Gulf of Mexico Resiliency Programs

Coastal resiliency planning is a complex, calculating, and deliberate approach to the wise use and development of coastal areas. This section will describe some of the regional efforts toward building a hazard resistant coastline.

In spite of the recent active storm seasons, related insurance increases and instability, and the housing bubble and mortgage crisis, Mississippi's southern six counties led the state in population increases.[60] And experts believe the trend will continue – people are still likely to migrate toward the coastlines. In addition, the Gulf of Mexico is rich in recreational opportunities, natural fisheries stocks, and petroleum reserves which draw tourists, fishermen, and seasonal workers.

Leadership sets the tone for any rebuilding, and thankfully the call for rebuilding smartly has been made in the Gulf. For example, the Corps' Interagency Performance Evaluation Task Force, convened to analyze how the hurricane protection system in Southeast Louisiana worked during Hurricane Katrina, has developed a state-of-the-art prototype risk assessment model to characterize current annual flood risk in the area.[61]

Progress, however, is slow. Infrastructure repair is proceeding along beachfront Highway 90, but the storm water, wastewater and drinking water lines have not been modernized in advance of the highway repairs. Although the coastal region is the fastest growing region in Mississippi, affordable housing is difficult to find. A few months after the storms, the states of Mississippi and Louisiana hosted charettes to help guide the communities in rebuilding while retaining their sense of place. Two and a half years later, however, many homes have not been restored or replaced. While Mississippi is credited with embracing smart growth and New Urbanism[62] principles, the plans developed during the charettes disregarded important conservation and hazard concerns.[63] Resilient communities will only emerge if homes are rebuilt in a way that reduces the risk to each structure and to the community as a whole.

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[58] U.S. CLIMATE CHANGE SCIENCE PROGRAM, IMPACTS OF CLIMATE CHANGE AND VARIABILITY ON TRANSPORTATION SYSTEMS AND INFRASTRUCTURE: GULF COAST STUDY (2008) *available at* http://www.climatescience.gov/Library/sap/sap4-7/final-report/ .

[59] One stop access to U.S. government avian and pandemic flu information is available at www.pandemicflu.gov/news/allocation.html .

[60] Melissa Scanlan, *Shelter from the Storm*, SUN HERALD (Biloxi, MS), Mar. 20, 2008 at A-1.

[61] Information on the IPET and its model is available at http://nolarisk.usace.army.mil/index.htm#map .

[62] New Urbanism is an architectural movement to transform sprawling city blocks into compact, walkable neighborhoods with old-fashioned features.

[63] *See* Mississippi Governor's Commission on Recovery, Rebuilding, and Renewal, http://www.mississippirenewal.com/ ; Berke and Campanella, *supra* note 13, at197.

Just as important as rebuilding the infrastructure, is rebuilding the social fabric – schools, churches, shopping and recreational venues. The schools in most of the Mississippi communities reconvened within six weeks of the storm. Test scores have even rebounded in several areas to surpass pre-storm levels.[64] However, hope is low that parts of New Orleans that were uninhabitable and nearly completely evacuated will ever be rebuilt.[65]

A. Gulf of Mexico Alliance

Now and again Congress takes stock of the world around us in a big way. The early 1970's brought our first wave of major federal environmental legislation. In 2000, Congress passed the Oceans Act and formed the U.S. Commission on Oceans Policy, which embarked on a comprehensive review of the health of our oceans and emerged with a vision for a new approach to conservation of its resources. The U.S. Commission on Ocean Policy released its report of findings, *An Ocean Blueprint for the 21st Century*, in 2004.[66] In 2003, the independent Pew Oceans Commission released similar findings with its report *America's Living Oceans: Charting a Course for Sea Change*.[67] We need to care for and treat our oceans as ecosystems, not as a separate media disconnected from man's activities on land, and vice versa. While the goal of ecosystem management is healthy oceans, the call to manage systems holistically should serve a model for other coastal management objectives, including hazard resiliency.

Shortly after these comprehensive efforts to address the crisis of our oceans' health, the President released the *U.S. Ocean Action Plan*.[68] One of the actions identified by the President for immediate implementation was support of a regional partnership in the Gulf of Mexico. The five states bordering the Gulf of Mexico, Florida, Alabama, Mississippi, Louisiana, and Texas, have formed a coalition – known as the Gulf of Mexico Alliance (GOMA) – to work together to implement the President's action plan in the region. GOMA's first report, *Governors' Action Plan for Healthy and Resilient Coasts: March 2006-March 2009* was released in March 2006.[69] All of the national reports and GOMA's new action plan highlight smart growth and coastal resiliency concepts. The 2006 – 2009 action plan is almost fully implemented with great gains in environmental education, nutrient management, habitat restoration, and water quality.

One of the most significant developments during this first implementation phase was the GOMA's recognition of the importance of resiliency. The level at which federal and state governments are working together on this issue is unprecedented. NOAA and the Environmental Protection Agency lead a thirteen-agency "Alliance Federal Workgroup" to coordinate support of the Gulf of Mexico Alliance. Numerous initiatives are underway to build resilience in the region. A recent request for proposals to address elements of the Governors' Action Plan will further increase collaboration and resiliency programs in the Gulf. While the focus of GOMA is the Gulf of Mexico region, their activites are not limited to the coastline and their approach could serve as a model for other regions. The Alliance is currently drafting its second action plan which will address the 2009 – 2014 time period.

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[64] Mississippi Department of Education, Mississippi Assessment and Accountability Reporting System, online at: http://orsap.mde.k12.ms.us:8080/MAARS/index.jsp .

[65] Berke and Campanella, *supra* note 13, at 200.

[66] U.S. COMMISSION ON OCEAN POLICY, AN OCEAN BLUEPRINT FOR THE 21ST CENTURY (2004) *available at* http://oceancommission.gov/ .

[67] PEW OCEANS COMMISSION, AMERICA'S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE (2003) *available at* http://www.pewtrusts.org/our_work_detail.aspx?id=130 .

[68] U.S. OCEAN ACTION PLAN: THE BUSH ADMINISTRATION'S RESPONSE TO THE U.S. COMMISSION ON OCEAN POLICY (2004) *available at* http://ocean.ceq.gov/actionplan.pdf .

[69] The Governors' Action Plan is available at http://www.dep.state.fl.us/gulf/plan.htm .

B. Mississippi Coastal Improvement Program

In response to a 2006 directive from Congress, the Corps developed the Mississippi Coastal Improvement Program (MCIP). Congress required the Corps to:

> conduct an analysis and design for comprehensive improvements or modifications to existing improvements in the coastal area of Mississippi in the interest of hurricane and storm damage reduction, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and other related water resource purposes at full Federal expense; Provided further, that the Secretary shall recommend a cost-effective project, but shall not perform an incremental benefit-cost analysis to identify the recommended project, and shall not make project recommendations based upon maximizing net national economic development benefits; Provided further, that interim recommendations for near term improvements shall be provided within 6 months of enactment of this act with final recommendations within 24 months of this enactment.[70]

The MCIP is criticized for settling merely for risk reduction, instead of aiming for risk avoidance altogether.[71] The Corps has proposed a number of alternative storm protection plans, including submerged gates that would be raised at the bays to prevent storm surges, levees and pump systems (smaller versions of New Orleans system), and buyouts of properties inappropriate for redevelopment. Instituting any large-scale changes in the hurricane protection system along the Gulf will be difficult. For example, plans to restore the barrier islands to their elevations in the 1960s are in direct conflict with the current plan of the Gulf Islands National Seashore managed by the National Park Service. In addition, homeowners are wary of buyout offers, the environmental community is concerned about the impact of engineered structures on the fragile Gulf coast environments, and communities still do not agree on how much protection is enough.

C. Mississippi Department of Marine Resources

The efforts of the Mississippi Department of Marine Resources (DMR) following the storm is a real success story of a state agency that served its citizens well and could serve as a model to others.[72] The DMR's Comprehensive Resource Management Plan program funded by NOAA and the EPA and in place since 1998 helped county and municipal planners and stakeholders in the southern six counties of Mississippi address smart growth issues and eventually develop a "Land Development Suitability" map. The program's essential ingredient was regularly convening a network of representatives from the six counties. That network, when combined with a comprehensive inventory of county assets compiled shortly prior to Hurricane Katrina, enabled the Mississippi Governor's Office to address the needs of the communities in the most efficient manner. This success story can serve as a model for planning, education and collaboration for communities in any region.

VI. Role of Academic Institutions

In addition to the government agencies working to protect the public's health, safety, and welfare, academic institutions have an important role in building more resilient coastal communities. Academic institutions can provide the science and education upon which governments can base their actions. Education and training programs help with national, regional, and local public efforts to balance the

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[70] Department of Defense Appropriations Act, 2006, Pub. L. No. 109-148 (Dec. 30, 2005).
[71] Berke and Campanella, *supra* note 13, at 197.
[72] Information on DMR's Comprehensive Resource Management Program is available at www.dmr.state.ms.us .

preservation of natural areas, oil and gas and other energy needs, provisions of bountiful seafood harvests, and need for recreational opportunities. Government and academic institutions have had a long partnership, with government funding often helping academic institutions conduct research and fulfill their stated missions.

Education systems at the primary level resumed classes in just a matter of weeks amid all of the devastation. The resumption of routine for the children obviously benefited the community greatly, and test scores for these systems are even higher in the year after the storm in some categories. But the role of academic institutions after an extreme weather event along the coast is not limited to just research and education. There are many examples of institutions of higher learning saving lives. In the immediate aftermath of Katrina, the GeoResources Institute of Mississippi State University brought to bear its expertise in remote sensing and mapping to help in the search and rescue and recovery efforts.[73]

As a compliment to the governmental role, academic programs support the field of resiliency with research and educational programs in numerous disciplines. Examples of important educational program areas are emergency management, homeland security, risk management, disaster management and hazard mitigation, urban planning, and environmental liability and related engineering disciplines that support these fields. One guidebook lists over 100 resiliency-related degree programs.[74]

A few academic programs with a focus on resiliency deserve special mention. The University of South Carolina's Coastal Resiliency Information Systems Initiative for the Southeast was awarded nearly $400,000 to fund eighteen research projects on the societal and environmental impacts of Hurricane Katrina within days of the storm[75] Another leader in the field is the Natural Hazards Center at the University of Colorado at Boulder. The NHC's mission is "to advance and communicate knowledge on hazards mitigation and disaster preparedness, response, and recovery . . . using an all-hazards and interdisciplinary framework . . ."[76]

Essential to the academic approach is the delivery of the research from the scientists to the various user groups. The National Sea Grant College Program has been developing partnerships and delivering research results to coastal communities for over thirty years. In addition to funding research supporting NOAA missions, the Sea Grant program provides this important translation service through academic institutions around the country. There are four Sea Grant programs in the Gulf – Florida Sea Grant; Mississippi-Alabama Sea Grant; Louisiana Sea Grant; and Texas Sea Grant. From the development of databases to helping to manage limited resources, such as waterfront property,[77]to delivering data generated by the Gulf Coastal Ocean Observing System, the Sea Grant network in the Gulf provides valuable research, education, and outreach services.

Another effective hybrid of government and academia is the NOAA Cooperative Institute Program. There are twenty-one cooperative institutes within NOAA, thirteen of which are directed by NOAA's Oceanic and Atmospheric Research (OAR) line office. The cooperative institute in the Gulf is the Northern Gulf Institute, a consortium of five universities led by Mississippi State University. Researchers

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[73]For more information on the Mississippi State University GeoResources Institute's hurricane forecasting and recovery assistance, *see* http://www.gri.msstate.edu/eid/hurricanes/katrina.php

[74] PUBLIC ENTITY RISK INSTITUTE, RISK MANAGEMENT RESOURCE GUIDE 2007 (2007).

[75] University of South Carolina's Katrina CRISIS (Coastal Resiliency Information Systems Initiative for the Southeast) Program, http://www.sc.edu/katrinacrisis/eric.shtml .

[76] For more on the Natural Hazards Center at the University of Colorado at Boulder, visit http://www.colorado.edu/hazards/

[77] Mississippi-Alabama Sea Grant Consortium, *Working Waterfronts: Database Tool for Planning*, Sea Briefs, 8(1): 1 (Spring 2008).

at these five universities and NOAA are conducting research to address priority gaps and reduce limitations in current Northern Gulf of Mexico awareness, understanding and decision support of coastal ecosystem issues. The NGI conducts research, education, and outreach programs in the following areas: ecosystem-based management, geospatial data/information and visualization in environmental science, climate change and climate variability, effects on regional ecosystems, and coastal hazards and resiliency.[78] The Northern Gulf Institute is researching the economic costs of storms, including evacuations, on a coastal economy. For example, the NGI recently funded research at Mississippi State University "to develop regional economic valuation (REV) models that will define the interconnected relationships between the economic activities and drivers in the coastal communities."[79]

One particularly unique challenge to the Gulf coast's resiliency is the need to carry out expensive evacuations. The Northern Gulf Institute is researching the economic costs of storms, including evacuations, on a coastal economy. There is a movement toward reducing the need for difficult (and sometimes deadly) evacuations with the new philosophy of "shelter in place" – or at least shelter nearby. This supports the notion of providing substantial shelters within a short distance of the coastal areas to help encourage more use of shelters thereby eliminating near gridlock on the highways leading away from the coast. Combined with new research that is improving estimates of the track and impact of hurricanes, decision-makers will be better prepared to implement the next evacuation order.

Other important government programs with essential associations with academic institutions are making significant contributions to the field of coastal resiliency. For example, the Department of Homeland Security has recently announced its decision to fund a Center of Excellence to combine the strengths from several complimentary organizations. The University of North Carolina at Chapel Hill and Jackson State University in Jackson, Mississippi will co-lead the new Center of Excellence for Natural Disasters, Coast Infrastructure and Emergency Management. The new Center is responsible for conducting research and enhancing the nation's ability to safeguard populations, properties, and economies from the consequences of catastrophic natural disasters, including hurricanes, tornadoes, floods, earthquakes, droughts, and wildfires. This Center will build on existing expertise at these and affiliated institutions.[80]

These initiatives both established and new are taking advantage of synergies and existing government networks to build regional associations between government, academia and private sector. Such activities, of course, are not limited to the coastal zone. But engaged regional associations can help deliver information to coastal communities and provide the critical step of involving the public in the sustainable development and resiliency building processes. Building participation by the public, helping people acquire new civic skills, building networks, and developing a culture that values resiliency are key to creating a resilient community.[81] Although there will be a new sense of place to go along with the new landscape, it contains remnants of the historical community which has evolved to better respond to the known and unknown hazards of the future.

VI. Role of the Private and Charitable Sectors

As is apparent by this survey so far, the practice of resiliency management is being carried out by governmental agencies and academic institutions on a large scale. Important work by the private sector, non-governmental organizations and professional associations, however, is essential to complete the

[78] Northern Gulf Institute, www.NorthernGulfInstitute.org .
[79] *See* Garen Evans, Developing a Foundation for Analysis of Natural and Human-Induced Disturbances to Coastal Economies, abstract online at: http://www.northerngulfinstitute.org/research/abstract.php?pid=1 .
[80] BROWER, D.J., *ET. AT.*, REDUCING HURRICANE AND COASTAL STORM HAZARDS THROUGH GROWTH MANAGEMENT: A GUIDEBOOK FOR NORTH CAROLINA COASTAL LOCALITIES (1987).
[81] Berke and Campenella, *supra* note 13, 205-206.

network of resiliency components. Professional organizations closely linked to academic and governmental agencies, for example, play a vital role in disseminating information and advancing the state of the practice. For example, a conference regarding state-of-the art floodproofring, sponsored by the Association of State Floodplain Managers, FEMA Headquarters and Corps' National Nonstructural Floodproofing Committee was just announced for the fall of 2008.[82]

One private organization worthy of recognition for exemplary performance is Mississippi Power Company, which experienced 100 percent loss of power, but restored service within twelve days to those of the 194,725 customers who could receive.[83] Utility commissions are part of the government which helps ensure competent public utility services, an integral part of a resilient community. While the utility companies are effective in response, much of the utility infrastructure remains unhardened (*e.g.*, power lines have not been buried) and the system is once again vulnerable.

Anyone who has lived through a rebuilding after a major disaster such as Hurricane Katrina cannot overlook the huge role charitable and religious organizations play. In the Gulf, some faith-based groups have established semi-permanent bases and announced they will remain in the region for three years to help rebuild. Foundations are providing money to address the evolving long-term resiliency needs of the coast (e.g., Rockefeller Foundation Announces $70 Million Commitment to Climate Change Resilience).[84]

Individuals can also play an important role by adopting an attitude of personal responsibility. Individual personal responsibility is an essential component of coastal resiliency too. A very useful role played by individuals is information-sharing. For example, after Hurricane Katrina, internet-savvy individuals helped rejoin family, friends and pets. This author even learned that she was reported "Alive" in Gulfport on September 2, 2005.[85]

VIII. Conclusion

Since we all cannot or will not do what is logical and move to regions with less natural hazards, we will continue to see development pressures increase along our shorelines and low lying areas near our bays and bayous. Unfortunately, litigation[86] and the 104th Congress and its vocal supporters of private property rights, have dampened the spirit of the hardiest of conservation-minded coastal resource manager. Most state coastal programs and state statutes have provisions favoring the use of shorelines for water-dependent activities, but administering the program is difficult. Off course, major storms have the last word about which developments will prove true folly. Fortunately, insurance availability and rates might advance resiliency along the Northern Gulf coast faster than regulation and education efforts can possible hope to by limiting, or at least slowing, development in some areas.

Low-lying coastal properties are particularly vulnerable to increases in sea level. According to the U.S. Geological Survey's *National Assessment of Coastal Vulnerability to Future Sea-Level Rise*, the "best guess" estimate of sea-level rise is 50 cm by 2100 – double the rate of the last century. The sea level rise

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[82] The call for abstracts for the conference is posted at: http://www.floods.org/Conferences%2C%20Calendar/nfpc4.asp

[83] *See* Resolution by the Mississippi Legislature describing these heroic efforts and commending Mississippi Power Company for their phenomenal accomplishments to help the Mississippi coastal community recover after Hurricane Katrina *available at* http://billstatus.ls.state.ms.us/documents/2006/pdf/SC/SC0562SG.pdf .

[84] Rockefeller Foundation News Advisory, August 9, 2007.

[85] http://sharon-hodge-1.katrina.aidpage.com/sharon-hodge/

[86] The seminal Supreme Court case involving coastal management is *Lucas v. South Carolina Coastal Commission*, 505 U.S. 1003 (1992). In *Lucas*, the Supreme Court held that a state regulation resulted in a constitutional taking if it deprives an owner of all economically viable use of the property.

combined with high water from tides and storms can create more destruction, and with more frequency.[87] Floods from precipitation and from storm surge can both be addressed by the NFIP through its community rating system. In the effort to ease the regulatory burden on those trying to rebuild after Katrina, some communities are reportedly relaxed in their approach to building code creation and enforcement. If this is true a higher community rating, and therefore higher flood insurance premiums for the entire community might result. The City of Gulfport is currently addressing a recent report of noncompliance and hopes to assuage the concerns of the insurance administration.[88]

One concern with guiding future development in coastal areas is how to deal with communities steeped in maritime traditions. Numerous families of immigrants have been proud to call coastal places "home" for many generations. Most of the pressures for non- water dependent activities on the fragile waterfronts does not come from people who grow up on the water, but rather from those not familiar with the risks of coastal living. Hopefully through efforts like the Mississippi-Alabama Sea Grant Program's Working Waterfronts Initiative, stewardship of these very limited resources will increase.[89] Resiliency also addresses recovering from diaspora – the displacement or scattering of entire populations. Residents scattered from New Orleans in the wake of Katrina in numbers greater than ever before witnessed in our nation's history. But the call of the clan is strong. Many clusters of New Orleans transplants have formed in other towns and cities in an effort to retain the community spirit. The call of home is strong as well. Visitors and immigrants who tolerated the adverse conditions came to rebuild the ravaged areas. Only time will tell when or if those who were scattered can be part of the effort to rebuild resilient communities.

Insurance battles in the wake of Hurricane Katrina took every form. Some of the conflicts seem counter intuitive. Policy holders who filed claims under their flood insurance and their standard homeowners wind policies objected to claims being settled on their slabbed homes solely based on "flood."[90] Those outside the region expressed concern that the taxpayers were carrying a heavier burden of the loss than insurance companies, because the government was paying on the flood policies. An effort was launched to implement a national approach through all-hazard insurance, and the debate is vital in order to develop an equitable incentive policy that encourages resiliency building.[91]

Armed with the lessons learned discussed above, a few observations can be made and policy recommendations drawn for rebuilding in coastal areas after a disaster. Berke and Campanella make the following recommendations:

> First, plans in place before a disaster make a difference in mitigating risk after a disaster. . . Second, federal and state governments should play a stronger role to encourage or require local planning for post-disaster recovery and mitigation. . . Third, New Urbanism [can be used], however, without proper planning, this high-density development pattern can lead to greater risk. . . Forth, federal disaster policy is in need of major reform . . . and state and local governments

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[87] Dan Cayan et al., *Projecting Future Sea Level Rise: A Report for California Climate Change Center*, 18 (March 2006).

[88] Public Meeting, City of Gulfport, MS, Mar. 20, 2008.

[89] See program information at: http://www.masgc.org/communications/pubs/masgp/08-011-01.pdf The program in Alabama has been successful in focusing attention on the importance of careful development of waterfronts for water dependent activities.

[90] "Slabbed" is a term that came into common parlance after Hurricane Katrina forces left only slabs of tens of thousands of homes.

[91] Efforts to pass a multi-peril insurance program have stalled at this time, *see* http://74.86.203.130/bill/110-h920/show .

> must play a more significant role in accepting the risks posed by development in hazardous locations.[92]

As a next step, researchers need to conduct a comprehensive gap analysis to assess what elements of a community and region are not currently being addressed in hazards planning. Currently there are several groups working in parallel on developing community resiliency indices. Should they be working together or is there a need for more than one approach? There is wide agreement on the need for more research and educational efforts in several areas – understanding the societal context, improving weather forecasting and communicating information to enable informed decision making.[93] The trick will be eliminating overlap and maximization of scare resources and funding.

In a recently five-year plan released by the NOAA Gulf Coast Service Center, two themes stood out:

> 1. Communication and coordination. Regional customers need help keeping track of the myriad of entities, projects, and resources and facilitating better coordination across local, state, regional, and federal parties.
>
> 2. Product delivery. Delivery of products and services is as important as their development. Simply providing more data and more technical tools is not the answer – there is a need for more outreach, training, and technical assistance to ensure that NOAA's information and tools are truly useful to constituents and other users.[94]

The clear simple delivery of the information is essential – and providing a constant reminder of real risks is important for residents of a region that can seem like paradise most days, but is actually the foundation of a fragile existence if not properly stewarded.

The keynote address for the *Sea Grant Law and Policy Journal's* 2008 Inaugural Symposium was provided by Lt. Gen. Clark Griffith who chairs the Mississippi Reviving the Renaissance Commission. His presentation reminded the author that perhaps the most important ingredient of coastal resiliency programs is the deep felt personal care for community and country shown by people like General Griffith, his wife and fellow citizens during times of tragedy and recovery

And with a "res ipsa loquitur,"[95]or perhaps rather more of a "Being John Malkovich"[96] sensibility, this survey would be incomplete without acknowledging the work of one of the most relevant hybrid government/academic activities, the National Sea Grant Law Cener at the University of Mississippi. The center made a spot-on and timely selection of this important topic to focus its inaugural edition of the *Sea Grant Law and Policy Journal*.

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[92] Berke and Campanella, *supra* note 13, at 201.

[93] NOAA, RESEARCH IN NOAA, TOWARD UNDERSTANDING AND PREDICTING EARTH'S ENVIRONMENT: A FIVE-YEAR PLAN: FISCAL YEARS 2008-2012 (Feb. 2008).

[94] NOAA COASTAL SERVICES CENTER, NEEDS ASSESSMENT FOR THE NOAA GULF COAST SERVICES CENTER, FINAL DRAFT (Nov. 27, 2007).

[95] Latin phrase meaning "the thing speaks for itself."

[96] Wikipedia on-line, http://en.wikipedia.org/wiki/Being_John_Malkovich .