Local Strategies for Making Community More Resilient to Coastal Hazards

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Introduction

One of the perplexing patterns of modern American urban growth is that lands most attractive to new development in our coastal areas are often the most dangerous to life and property. People place a high priority on locating their homes and other development in close proximity to the beachfront, river shorelines, and other water bodies, which are hazard prone areas that are most susceptible to flooding and wind damage during time of coastal storms and hurricanes. Over the past half century, Americans have viewed these areas as a place of great outdoor recreational opportunities and if they can afford them, second or retirement homes. The perception of the coastal area as an area of recreation and enjoyment is part of the American psyche. This, coupled with the high real estate value of lands located along the beachfront, river shorelines, or other waterfront areas, creates a powerful mix that encourages real property developers to continue and intensify development in these areas.

In many respects, this dynamic has been encouraged by our current land use, development, and other public policies, which do not account for the damages and destruction that occur in these-hazard prone areas from coastal storms and flooding. Even though such storms and flooding do not occur every year, they are inevitable, and when they do occur, the damage to property and businesses can be staggering. The most recent example is development along the Galveston area of the Texas coast, which was devastated during Hurricane Ike in 2008. Estimates indicate there was over $27 billion dollars in property damages alone from Ike across the state, along with a near total destruction of 1,000 structures. In addition, there was a short-term loss of 96% of the state's oil refineries, and significant lost revenues to businesses along the coast, who had to shut down for a period of time after the storm. A paradox of the current development dynamic and practices that has existed for the past half century is that our policies, if not changed, are making the situation worse. Demographic data indicates that over the past 50 years, population growth within five miles of the Atlantic and Gulf coast shores has been three times faster than the nation as a whole. Development densities in counties within 50 miles of these shorelines are much greater than the national average. Even though development practices have improved to some degree over the past 30 years, development continues to occur along the beachfront, river shorelines, and other water bodies, which are the hazard prone areas most susceptible to flooding and wind damage during time of coastal storms and hurricanes. Today, there are many communities where much of the urban development is located within hazard prone areas. Consequently, an increasing amount of development and population is being exposed to a hazard event. In a nutshell, the problem with land use controls and development policy is that they allow urban development in hazard prone areas without a corresponding ability to protect this developed property from damages due to coastal storms and flooding. The result is a never-ending spiral of increasing property damage and destruction, and even loss of life, from coastal storms, which cannot be sustained. It is important these policies change if development in our coastal areas is going to be sustainable.

Framework

The primary damage from coastal storms comes from flooding, storm surge, and erosion, which generally occur along or in close proximity to the beachfront, river shorelines, or other water bodies in the coastal area, even though in some instances such activities extend further, across entire peninsulas or across barrier islands. Generally, development on lands in close proximity to these places have the greatest risk of damage and destruction from coastal storms (hazard prone areas). It is well recognized that these key elements of the coastal area's natural environment – the beachfront, river shorelines, and other water bodies – are generally dynamic – and if not disturbed by development or other human activities, act naturally to absorb the floodwaters, storm surge, wind, and erosion from coastal storms. When development in these areas occurs in ways that do not respect the natural functioning of the ecosystem, it detrimentally impacts the natural system's ability to absorb a storm's energies, and results in higher flood levels, a stronger storm surge, increased areas of flooding – and greater damages to property and businesses.

Given these circumstances, the foundation of any effort to make a community more resilient to coastal hazards is to preserve the natural functioning of its coastal ecosystem. This means being especially sensitive about the protection of the beachfront and its dune system, river shorelines and estuarine areas, other water bodies like wetlands, and other riparian and floodplain areas. At the same time, it is also important to recognize, especially given the development that has already taken place in many coastal areas over the past 50 years, that there are coastal communities where there is existing development in these hazard prone areas, which will be redeveloped in future years; there are also communities where these type of development exists, that as a matter of policy will allow new development in the future. Given these circumstances, additional strategies and regulatory tools must be included in our development codes to ensure redevelopment is more hazard-resilient that what it replaces, and new development does not diminish the natural functioning of the coastal ecosystem.

Goals for Making Community More Resilient to Coastal Hazards

Communities have been using land use controls to regulate development in the coastal area for over 75 years. While regulations in some communities have improved over the last 30 years to encourage practices that make development more resilient to coastal storms, much more can be done. This chapter offers regulatory strategies for improving local development practices to make them more hazard-resilient. The solutions are organized in two ways: first by the type of regulatory solution (removing barriers, creating incentives, enacting standards), and second by the degree of potential success, ranging from good to best (bronze, silver, gold).

The goals of this chapter are to:

- Identify obstacles that impede the application of better hazard mitigation practices to development;
- Suggest and identify regulatory incentives such as density bonuses that can be used to encourage relocation of development outside of hazard prone areas and encourage better hazard mitigation practices;
- Identify incentives that local governments can provide to developers, in the form of development review assistance, to encourage better hazard mitigation practices; and
- Suggest regulatory provisions that require development to incorporate better hazard mitigation practices.

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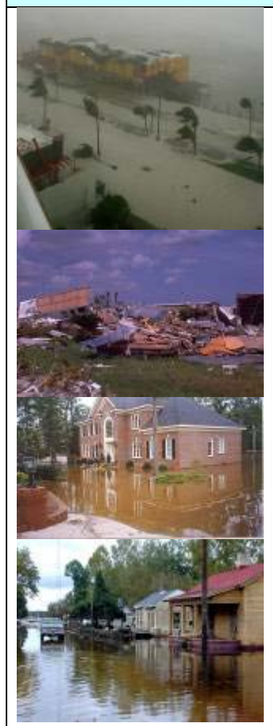
COASTAL HAZARDS

KEY STATISTICS:

- Damage from coastal storms and flooding is significant.
- In North Carolina, Hurricane Fran in 1996 resulted in a total of $3.2 billion in damages. The damages from Hurricane Floyd in 1999 were even greater: an estimated $4.5 billion in damages; every river basin in eastern North Carolina exceeded 500-year flood levels; 31,000 jobs were lost.
- In Florida, Hurricane Andrew in 1992 resulted in approximately $28.5 billion in damages. In 2005, the total damage from Hurricane Charley was $15 billion, and the total damage that same year from Hurricane Wilma was estimated to be $20.6 billion. After Wilma, power outages lasted for more than 20 days after the storm, and rebuilding took over one year.
- In Louisiana and Mississippi, total property damage from Hurricane Katrina in 2005 was estimated at $81 billion, with an estimated total economic loss of $150 billion; at least 1800 people lost their lives.
- In 2008, Hurricane Ike in Texas is estimated to result in over $27 billion dollars in damages; there was a near total destruction of 1,000 structures in Galveston, and 96% of the state's oil refineries had to shut down.

MAKING COMMUNITIES MORE RESILIENT TO COASTAL HAZARDS THROUGH LOCAL REGULATORY TOOLS



	ACHIEVEMENT LEVELS				
	Bronze (Good)	**Silver (Better)**	**Gold (Best)**	**References/Commentary**	**Code Examples/Citations**
Remove Obstacles	▪ Remove barriers for redeveloping existing structures to make them more hazard-resilient by adopting nonconformity regulations that allow improvement of nonconforming structures for the purpose of constructing more hazard-resilient structures.	▪ Adopt a planned development regulation process that allows nonconforming development (density and height) to be replaced or redeveloped to improve hazard resiliency.	▪ Adopt planned development or cluster development regulations that allow flexibility to locate development outside of hazard prone areas (floodplains, wetlands, beachfront, other riparian areas).	▪ Raymond Burby, et. al., *Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities* (Joseph Henry Press 1998). ▪ D. Godschalk, "Avoiding Coastal Hazard Areas: Best State Mitigation Practices," *Environmental Geosciences* 7:1, 13-22. 2000. ▪ "Natural Hazards, Smart Growth, and Creating Resilient and Sustainable Communities in Eastern North Carolina," in *Facing Our Future: Hurricane Floyd and Recovery in the Coastal Plain*, pp.271-282 (Coastal Carolina Press, 2001). ▪ D. Godschalk, *Natural Hazard Mitigation: Recasting Disaster Policy and Planning* (Island Press, 1999), ▪ Pilkey, Orin et. al., *Coastal Design: A Guide for Builders, Planners, and Home Owners*. New York, N.Y., Van Nostrand Rheinhold.	▪ Fort Myers Beach, FL – nonconforming provisions that do not include cost to improve structure to make more hazard resilient in threshold costs limits placed on improvements to conformities. Available online. Viewed 2/6/09. ▪ Sanibel, FL – planned development regulation allowing nonconforming development to cluster outside of hazard prone and resource protection areas. Available online. Viewed 2/6/09. ▪ Fort Myers Beach, FL - process that allows nonconforming development (density and height) to be replaced/redeveloped if hazard resiliency is improved. Available online. Viewed 2/6/09.

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   	**Create Incentives**	▪ Provide permit expeditor / ombudsman to assist permitting for more hazard resilient redevelopment in hazard prone areas. ▪ Apply FEMA's Community Rating System (CRS) program that provides flood insurance reductions for communities adopting "no adverse impact" practices in the floodplain.	▪ Adopt planned development regulations that offer development flexibility to cluster development and increase density when locating development outside of natural areas and hazard prone areas. ▪ Adopt regulations that allow transfer of density from natural and hazard prone areas to adjacent upland areas that are either not impacted by or less impacted by hazard event.	▪ Adopt regulations that establish density bonuses when redevelopment relocates outside of natural or hazard prone areas. ▪ Adopt cluster regulations that create sliding scale densities, based on the amount of resource or hazard prone area protected.	▪ Hazard Mitigation Planning Clinic, Department of City and Regional Planning, The University of North Carolina at Chapel Hill and the Risk Assessment and Planning Branch, NC Division of Emergency Management. *Tools and Techniques: Putting a Hazard Mitigation Plan to Work*. 1998. Available online. Viewed 2/6/09. ▪ Schwab, Anna K., David J. Brower and Katherine Eschelbach. *Hazard Mitigation and Preparedness: Building Resilient Communities*. Hoboken, NJ: John Wiley & Sons. 2007. ▪ Schwab, Anna K. "Increasing Resilience to Natural Hazards: Obstacles and Opportunities for Local Governments Under the Disaster Mitigation Act of 2000," in *Losing Ground: A Nation on Edge,* eds. John R. Nolon and Daniel B. Rodriguez. Environmental Law Institute. 2007. ▪ D. Godschalk, D Brower, and T Beatley, *Catastropic Storms: Hazard Mitigation and Development Management* (Duke University Press, 1989).	▪ St Lucie County, FL – HIRD cluster option and transfer of density out of natural and hazard prone areas. Available online. Viewed 2/6/09. ▪ Fernindina Beach, FL – overlay district along beachfront to provide density bonuses that incorporate mitigation techniques. Available online. Viewed 2/6/09. ▪ Lee County, FL – cluster provisions in Pine Island Plan that creates sliding scale density provision that increases density the more natural or hazard prone area protected on a site. Lee County Land Use Plan, available online. For information on the Pine Island portion of the Lee Plan, available online. Viewed 2/6/09.

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	Enact Standards	▪ Establish floodplain regulations that meet NFIP requirements. ▪ Allow minor modification of code standards for relocating out of flood hazard areas. ▪ Minimize development of public facilities within hazard prone areas. ▪ Adopt regulations that do not allow increase in densities in hazard prone areas. ▪ Adopt planned development regulations to optimize protection of hazard prone areas.	▪ Adopt floodplain regulations requiring "no net decrease" in hydrological capacity. ▪ Adopt open space set-aside standards that give highest priority to preserving and protecting wetlands, floodplains, beachfront, and riparian areas. ▪ Adopt floodplain regulations that add a minimum height or freeboard requirement of at least 1' above base flood elevation. ▪ Adopt regulations that require storage capacity to off-set fill in floodplains. ▪ Adopt regulations that require vegetative buffers around wetland and riparian areas.	▪ Establish "no adverse impact approach" to floodplains. ▪ Prohibit or substantially limit development within 100 year floodplain. ▪ Establish wetland buffers that exceed state and federal laws. ▪ Adopt riparian area setbacks. ▪ Establish setbacks along beachfront landward of secondary dunes.	▪ No Adverse Impact Status Report: Helping Communities Implement NAI (June 2002). Available online. Viewed 2/6/09. ▪ No Adverse Impact: A Toolkit for Common Sense Floodplain Management (2003). Available online. Viewed 2/6/09. ▪ Smith, Gavin. 2008. *Disaster Resilient Communities: A New Hazards Risk Management Framework.* In Natural Hazards Analysis: Reducing the Impact of Disasters, edited by John Pine. Boca Raton, Florida: CRC Press. ▪ *Integrating Hazard Mitigation into Local Planning Processes.* PAS Report. Chicago: American Planning Association. Forthcoming. ▪ Smith, Gavin. 2004. *Holistic Disaster Recovery: Creating a More Sustainable Future.* Emmitsburg, Maryland: FEMA Emergency Management Institute, Higher Education Project.	▪ Hilton Head Island, SC – planned development regulations to locate development out of natural and hazard prone areas. Available online. Viewed 2/6/09. ▪ Folly Beach, SC – open space set-aside standards that identify highest priority open space set-asides as floodplains, wetlands, other natural areas. Available online. Viewed 2/6/09. ▪ Lake County, IL – watershed development ordinance that incorporates "no adverse impact concepts." Available online. Viewed 2/6/09. ▪ Rocky Mount, NC – regulations that reduced density in floodplain areas after storm event. Available online. Viewed 2/6/09. ▪ Franklin, TN – regulations that significantly limit development in 100 Year floodplain. Available online. Viewed 2/6/09. ▪ Rock Hill, SC – riverine setbacks. Available online. Viewed 2/6/09.