



CREATING RESILIENT COMMUNITIES:

An Illustrated Guide for Integrating Hazard Mitigation and
Land Use Planning for Sustainable Coastal Communities

LSU | Coastal Sustainability Studio



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**An Illustrated Guide for Integrating Hazard Mitigation and
Land Use Planning for Sustainable Coastal Communities**

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LSU Coastal Sustainability Studio

LOUISIANA STATE UNIVERSITY

PURPOSE OF THIS GUIDEBOOK

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The completion of this work would not have been possible without the cooperation and assistance of the individuals and organizations identified above. Full responsibility for content and accuracy rests solely with the LSU Coastal Sustainability Studio and its faculty and staff.

The purpose of this manual is to provide an introduction to best practices for integrating land use and hazard mitigation to encourage resilient community development in communities threatened by climate change. The focus on opportunities to bridge these planning processes was driven by a recognition – in practice and literature – of the disconnect between the land use and hazard mitigation planning processes at the local level. The intended audience for this easy-to-understand infographic guidebook is local government staff, citizens and other community stakeholders, and educators.

The goal of this document is to enhance citizens and community awareness of opportunities to coordinate land use and hazard mitigation, and provide tools and case studies for accomplishing this at the local level. The LSU Coastal Sustainability Studio (CSS) conducted extensive research, as well as interviews with practitioners, to gain a greater understanding of these multi-faceted efforts in the hope that these examples will prove useful to communities in Louisiana and other coastal locations.

About LSU CSS

Louisiana State University's Coastal Sustainability Studio (LSU CSS) was established in 2009 to bring together varied disciplines - architecture, landscape architecture, planning, engineering, coastal sciences and others - to address complex and dynamic issues facing coastal areas, particularly in regions of the Mississippi River delta. Since then, LSU CSS has actively worked with communities to create resilient and adaptable solutions to the challenges presented by dynamic coastal environments affected by climate change.

LSU CSS website: css.lsu.edu

About LRAP

The Louisiana Resiliency Assistance Program (LRAP) is an initiative of the LSU CSS, whose mission is to collect, develop, house, and disseminate current planning efforts, resources, and local best practices to promote, assist, and build networks around resiliency planning in Louisiana. Through this effort, LSU CSS faculty and staff work directly with communities to provide training, education, and locally-generated, case-specific strategies and policies that communities can directly use.

LRAP website: resiliency.lsu.edu



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INTEGRATED PLANNING

Comprehensive plans establish policies that guide a community's day-to-day land use decisions and infrastructure spending. These policies have a major impact on whether people and property are exposed to natural and man-made hazards, and the potential injury and damage associated with them. Therefore, it is imperative that they are developed based on the best available hazard data to reduce risk and vulnerability.

Hazard mitigation plans identify policies and actions to reduce risk and future losses. These plans form the ground work for a community's long-range strategy for reducing risk. Land use is one of the biggest opportunities for risk reduction, since loss reduction strategies will range from specific mitigation projects to changes in day-to-day land use decision making. Comprehensive and hazard mitigation plans are more effective when there is coordination between the processes and products.

In addition, Louisiana's Coastal Master Plan proposes an extensive program for non-structural protection over the next 50 years. The plan addresses mitigation measures such as floodproofing and elevation, and programmatic measures such as land-use planning and implementation. These efforts are part of a larger state program of wetlands restoration and protection. Both will have implications for local communities, and must be considered in local planning.

Finally, meaningful community engagement is crucial throughout all phases of planning so that stakeholders are involved in gathering information, generating solutions, and making decisions that affect their homes and lives. An inclusive process creates a robust framework for risk-based decision making that protects lives, property, and the economy and fosters sustainable future growth.

OPPORTUNITIES TO ENGAGE THE COMMUNITY

Invest in education

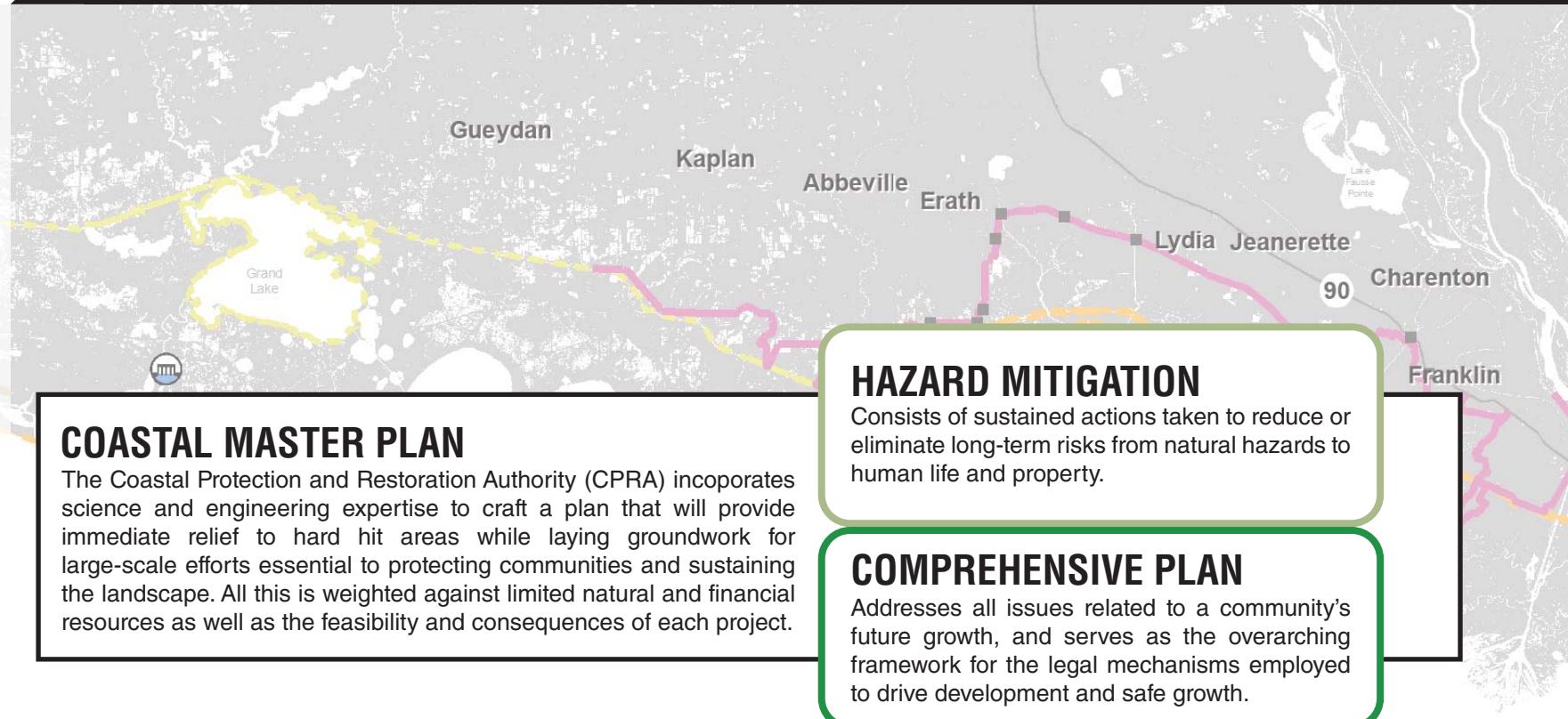
Expand reach of public meeting calls

Organize public workshops

Advertise decisions and plan

Hold public opinion polls

Incorporate innovative communication tools



LEGEND

Part of Hazard Mitigation (HM) Process

Part of Comprehensive Plan (CP) Process

Coordination Opportunity with Coastal Master Plan

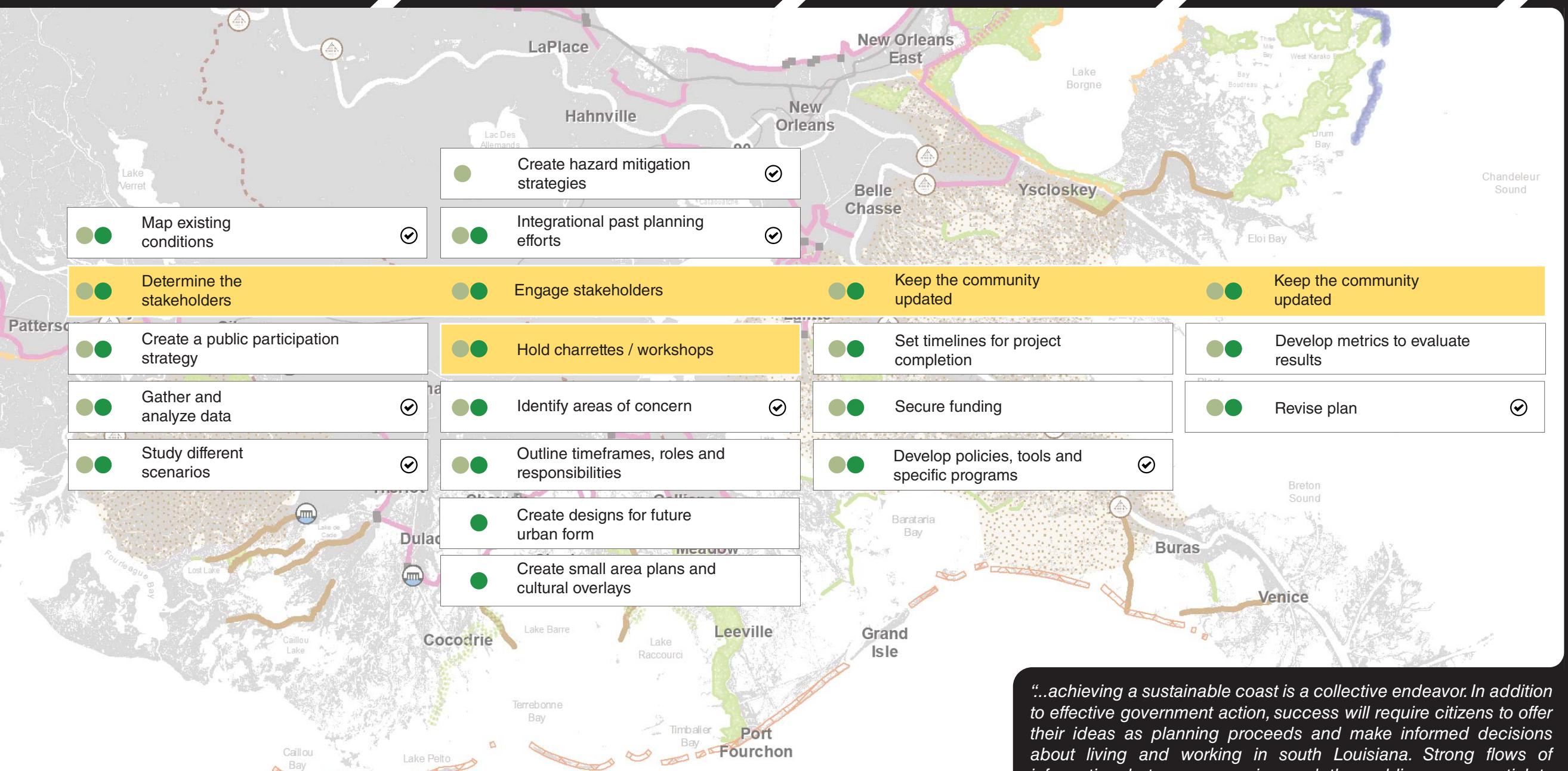
Map credit: 2012 Louisiana Coastal Master Plan

ASSESS

PLAN

IMPLEMENT

ADAPT



“...achieving a sustainable coast is a collective endeavor. In addition to effective government action, success will require citizens to offer their ideas as planning proceeds and make informed decisions about living and working in south Louisiana. Strong flows of information between agencies and the public are essential to continued progress.”

~ 2012 Louisiana Coastal Master Plan

PLAN IMPLEMENTATION

The basis for comprehensive and hazard mitigation planning comes from the government's authority to protect the health, safety, and welfare of its citizens. Land use planning is one of the few government functions addressing the welfare of the community in its entirety, with all of the complex relationships existing between use, economic development, population growth, environmental concerns, and a range of other factors. Comprehensive plans outline the community's vision and provide a road map for large-scale and long-term efforts balancing physical, social, economic, and environmental issues. Hazard mitigation plans identify policies and implementation actions that reduce risk across a range of sectors. Collectively, these plans form the groundwork for a community's long-term resilience strategy.

However, hazard mitigation and comprehensive plans are generally non-regulatory. Once the planning processes are complete, the community's other policies and programs must be amended to legally implement the vision laid out by the plan. For example, a community's zoning ordinance specifies the type, density, and character of development in hazard-prone areas. Zoning can be used to restrict development in hazardous areas identified in the hazard mitigation plan. Zoning can also be used to require special development considerations in conservation areas, which also provide much needed recreational and ecological benefits to a community. The collection of plans, policies, regulations, and programs guiding community development make up the implementation framework. The process by which this framework is developed and implemented, as well as the roles of people and agencies involved, is unique to each community.

There are several common implementation tools available to help communities implement comprehensive and hazard mitigation plans in an effective and coordinated manner. The following provides an in-depth look at opportunities for coordinating land use and hazard mitigation in ways that reduce vulnerability and improve quality of life for all residents. While these strategies are applicable and useful for any coastal community, they also closely follow the non-structural recommendations outlined in the 2012 Louisiana Coastal Master Plan.

"While it can be difficult for political leaders to take steps that may be perceived as unfriendly to economic development, proactively minimizing risk by addressing natural hazards during initial land use decision making and development is much easier and more cost effective than attempting to retrofit, modify, or improve existing development to withstand hazards."

LOCAL ORDINANCES

Once a community has a comprehensive plan in place, there are several common implementation tools. The overarching goals, as it relates to hazard mitigation, should be to keep future development out of known hazard areas, prevent hazards from affecting existing development, and strengthen existing development to resist known hazards.

ADVANTAGE

While benefits are difficult to isolate and measure individually, FEMA recognizes that integrating hazard mitigation strategies into land use regulatory tools to guide is key to reducing risk.



ARCHITECTURAL ADAPTATION

Architectural adaptation is used to modify buildings subject to hazard risk rather than to prevent the hazard from occurring. These actions directly protect people and property at risk. Ideally, adoption and/or enforcement of building codes and other local ordinances accompany the adaptation of damaged or hazard-prone structures to minimize future risk.

ADVANTAGE

A 2005 study by the Multihazard Mitigation Council (MMC) found that every \$1 spent on mitigation, including retrofitting and elevation of hazard prone structures, saves an average of \$4.

**ENVIRONMENTAL CONSERVATION**

Environmental conservation can reduce the intensity of hazard effects, and improve the quality of the environment and wildlife habitats. Parks, recreation, or conservation agencies usually implement these activities, which include erosion and sediment control, wetlands protection, dune restoration, reforestation, and beach nourishment.

ADVANTAGE

Conservation may seem to reduce the tax base, but real estate markets consistently demonstrate a 20% or more value increase for property located near park and open space areas.

**PROPERTY ACQUISITION**

Acquisition is an action undertaken locally to obtain the development rights to a piece of property. In areas with repeated flooding, voluntary acquisition is an effective method to minimize future flood losses and maximize the utility of floodplains to protect communities. Property acquisition is the only permanent form of hazard mitigation.

ADVANTAGE

Repetitive loss properties comprise 1% of insured properties, but account for 25-30% of all flood claims. Acquisition can save tax payers hundred of thousands of dollars on a single property.



LOCAL ORDINANCES

Comprehensive planning provides the “big picture” perspective of a community today, and where that community envisions going in the future. Its intent is to guide day-to-day land use decisions and capital facilities expenditures. Strong comprehensive plans consider social, economic, and environmental conditions, and contain goals, objectives, and strategies that are developed with community input. Comprehensive plans provide heightened legal support for the implementation mechanisms, such as zoning and other regulations, that support community goals and objectives.

Through the planning process, communities identify priority areas for resource protection or development. The plan may identify high hazard areas, such as those prone to flooding, as areas for limited development, while earmarking other more stable areas for higher density development. Plans and other land use ordinances can also allow developers more flexibility in arranging improvements on a parcel of land through the planned development approach, which promotes development patterns that are less at risk from hazards.



ZONING

Zoning ordinances legally determine where, what, and how development occurs on private property. Traditional zoning divides a municipality into various zones and designates a range of uses and characteristics of allowable development. Zoning is among the most effective planning tools that can be used to limit damage from natural hazards.

APPLICATION

Zoning with resiliency in mind promotes development and redevelopment patterns (i.e. type, location, density) that are less at risk from known hazards. Contemporary zoning approaches that employ a range of resilience techniques include: Mixed-use zoning, overlay zones, floating zones, form-based codes, and stormwater management in landscape standards.



VIRGINIA BEACH, VA

Photo Credit: Leslie Middleton, Bay Journal

The Virginia Beach area is experiencing the highest rates of sea level rise on the U.S. East Coast. As a result, the city has adopted zoning regulations that maintain and enhance wetlands, native vegetation, and other living shoreline habitats along waterways to protect property and reduce erosion.

BUILDING CODES

Building codes provide minimum safeguards for health, safety, and welfare with regard to building safety and fire prevention. Standard codes, such as the International Building Code (IBC), typically serve as the model. Particularly after a disaster, codes can be updated to mandate development that withstands hazards such as wind, fire, and flood.

APPLICATION

Local codes can exceed minimum life safety standards to mitigate hazards and encourage sustainability. Exceeding IBC NFIP/DFIRM elevation requirements, energy efficiency standards, materials durability, and encouraging innovative design that increases disaster resilience can all be included to minimize hazards and enhance community development.



STATE OF LOUISIANA

Following a series of devastating storms, Louisiana adopted the IBC and the International Residential Code to cover all single and two-family structures. In 2014, Louisiana became only the second state to also mandate codes for commercial buildings with specific coastal and high wind requirements.

SUBDIVISION REGULATIONS

Local ordinances specifying the standards and conditions needed to ensure orderly development of land, required improvements, and infrastructure. Originally directed at street layout and construction specifications, many now include standards for environmentally sensitive design, stormwater management, and structural hazard mitigation.

APPLICATION

Resilient subdivision ordinances regulate the division of land in ways that avoid or minimize the effects of known hazards. They often require development applicants to submit plans that identify hazards and mitigate their potential effects. This is also where incentives for creative designs that encourage conservation or minimize hazards impacts are included.



ST. LOUIS COUNTY, MO
Photo Credit: Urban Harvest STL

The Sustainable Subdivision and Zoning Ordinance Revisions project was designed to make St. Louis County more resilient and energy efficient. Codes were updated to address renewable energy, land use and transportation, stormwater management, housing choice, and local food production.

SPECIAL DISTRICTS

A local or areawide district established to accommodate a special set of uses or for specific purposes. Examples include open space, conservation, cultural, historic preservation, and planned development districts. The establishment of special districts can be used to encourage the sustainable redevelopment of depressed or hazard impacted areas.

APPLICATION

Special districts allow governments to designate an area for revitalization by creating a hub of activity. Economic development is encouraged by offering creative incentives and tax credits to private property owners. Blight reduction is encouraged by drawing investors and renewal into designated districts.



DURHAM, NC
Photo Credit: American Tobacco

Downtown Durham, NC struggled for decades after the loss of the tobacco industry. Leaders designated a historic district to encourage redevelopment of historic buildings through local support, state and federal historic tax credits, and private investment in the now thriving American Tobacco Campus.

FUNCTIONAL PLANS

Functional plans focus on specific functions or services such as stormwater management, transportation, conservation, or historic preservation. These plans may consider the entire community, have a regional focus, or be related to the boundaries of a special district. Functional plans provide multiple opportunities for hazard mitigation integration.

IMPLEMENTATION

Restoring or protecting existing natural systems can both lessen risk to nearby or adjacent communities and enhance ecosystem benefits. Wetland restoration, forest management, stream corridor restoration, and erosion control are all examples of protecting environmentally sensitive areas which in turn protect human cohabitants.



NEW YORK, NY
Photo Credit: City of New York, NY

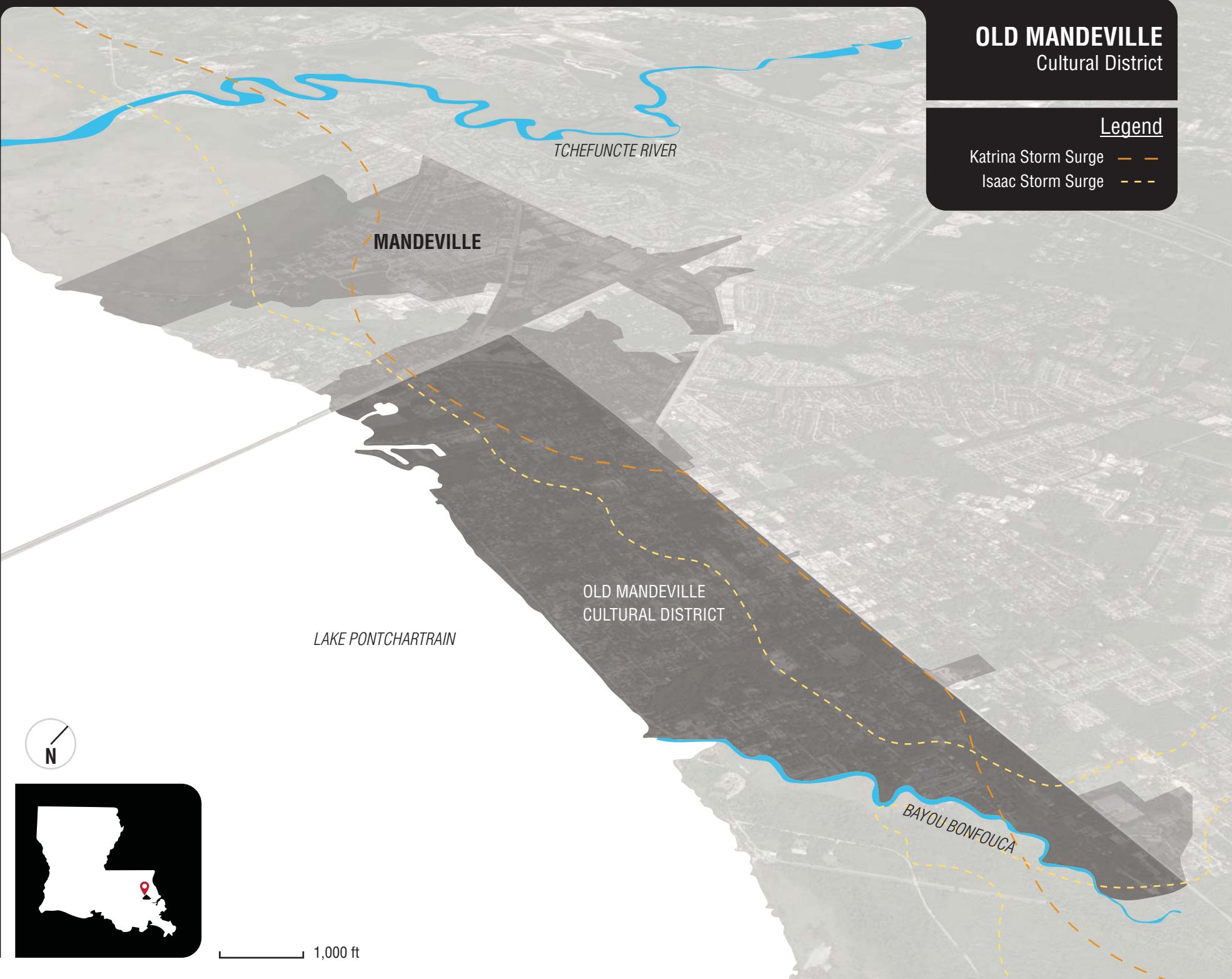
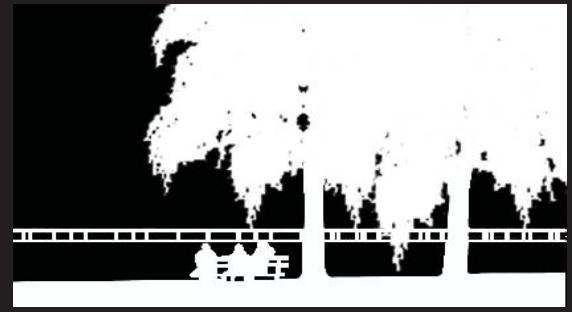
The City of New York's Waterfront Revitalization Program establishes guidelines and policies for redevelopment and new development along the coastline, including policies to minimize the loss of life, structures, and natural resources caused by flooding and erosion.

MANDEVILLE, LA

Mandeville, LA is located on the North Shore of Lake Pontchartrain in St. Tammany Parish. It is a fast-growing suburb directly across the lake from New Orleans. This historic waterfront community of more than 12,000 people cherishes its location and views, and has chosen to maintain this waterfront connection rather than building levees or a sea walls.

However, the community knows all too well the risk of storm-driven flooding after sustaining significant damage during Hurricanes Katrina (2005) and Isaac (2012). In the aftermath, hazard mitigation grants allowed many flooded homes to be elevated but these funds were generally not available to business owners. Further, post-storm BFEs make construction and restoration significantly more expensive.

To enhance the historic core, the City adopted the *Old Mandeville Town Plan* that "emphasized the critical need for a Town Center that will locate civic institutions within a mixed-use, walkable and economically thriving area." In conjunction the City worked with the State to designate the *Old Mandeville Cultural District*. This allows both residential and commercial property owners to apply for tax credits from Federal and State taxing agencies to encourage new development, sustain the cultural hub of the community, and offset the cost of mitigation measures.



LOUISIANA CULTURAL DISTRICTS PROGRAM

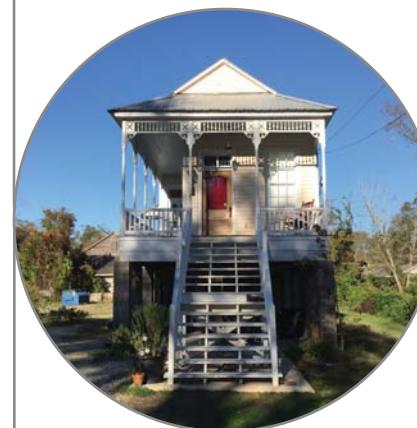
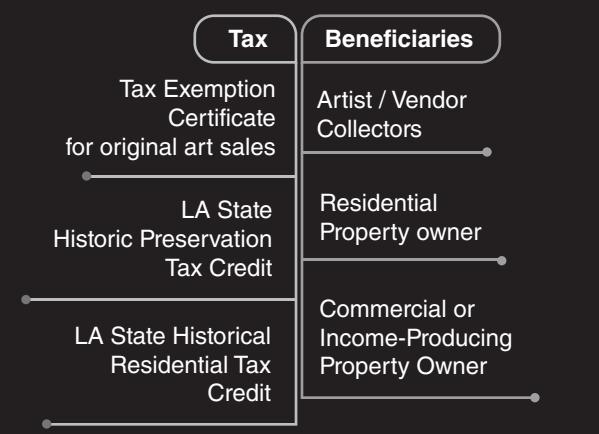
The Louisiana Cultural Districts Program was created in 2007 to spark community revitalization based on cultural activity through a range of tax incentives. Since its inception, this program has been a successful place-based, artist-based, and industry-based initiative with 78 cultural districts declared in 32 parishes. This program coordinates state and local government efforts to designate areas as Cultural Districts. This furthers the goals of community planning and encourages revitalization by creating hubs of cultural activity.

TAX INCENTIVES FOR THE COMMUNITY

Once the Cultural District is approved, community members with businesses or properties inside of the Cultural District boundaries must undertake the procedure to receive tax incentives.

Tax exemptions Certificates must be recorded and reported for each individual art work sale.

Residential and Commercial Historical building owners must apply for tax credits with the State Division of Historic Preservation



MASTER PLAN GOAL

To preserve and enhance historic and cultural resources that symbolize Mandeville's identity.

ACTION

The Old Mandeville Cultural District designation encourages the preservation and rehabilitation of significant buildings and local businesses through the creation of incentives, design review, and public improvements throughout the historic core of the City.

MASTER PLAN GOAL

To foster the development of a vibrant town center at the Trace Trailhead through public and private investment that creates active public spaces and a mix of residential and non-residential uses.

ACTION

Mandeville built the trailhead as a cultural hub next to the Tammany Trace. The trailhead features facilities, events, and a Community Market that encourage investment supported by cultural district tax credits.

MASTER PLAN GOAL

To establish high-quality, sustainable development patterns to maintain a high quality of life in Mandeville.

ACTION

Following recent hurricanes, BFE for structures in areas of Old Mandeville are 12 ft or more above existing grade. These requirements have enormous impact on the character and cost of development. Establishment of this cultural district helps to offset costs associated with new FEMA requirements.

CREATIVE INCENTIVES AND TAX CREDIT

RENOVATION PROJECTS
16
PROJECTS BEGUN IN DISTRICT DURING 2014

INSTITUTIONS TAKING ADVANTAGE OF THE SALES TAX EXEMPTION ANNUALLY*

BUSINESSES 10
ORGANIZATIONS 6
INDIVIDUAL ARTISTS 45
ART/CULTURAL EVENTS 90
RENOVATION PROJECTS 16

*2014 Cultural District Annual Report

ARCHITECTURAL ADAPTATION

While it may be impossible to eliminate all risks associated with flood hazards and storms, individuals and communities can plan for these risks and become more resilient, or better able to withstand and recover from extreme events and environmental change. FEMA administers the National Flood Insurance Program (NFIP), through which individual property owners are required to maintain flood insurance to obtain mortgages, as well as to be eligible for federal disaster assistance. At the same time, coastal communities participating in the NFIP are required to match their local codes with FEMA's requirements for flood-resistant construction for new and substantially improved buildings in designated flood zones. These standards require buildings to incorporate flood-resistant techniques below the Base Flood Elevation (BFE) in anticipation of floodwaters.

Elevating or otherwise floodproofing buildings is inarguably beneficial in floodprone areas, but it is important to recognize the challenges created by flood-resistant construction requirements both in terms of affordability and potential impacts to accessibility and urban design. The character of streets, neighborhoods, and public spaces is influenced by the buildings at their edges. While buildings and neighborhoods should be designed to survive a flood event, urban design concepts such as visual connectivity, inviting access, and neighborhood character are important functional considerations during normal non-flood conditions. While a community may participate in the NFIP, there may be local regulations such as zoning and building codes that create obstacles for building and retrofitting buildings in floodprone areas.

ADAPTATION CONSIDERATIONS

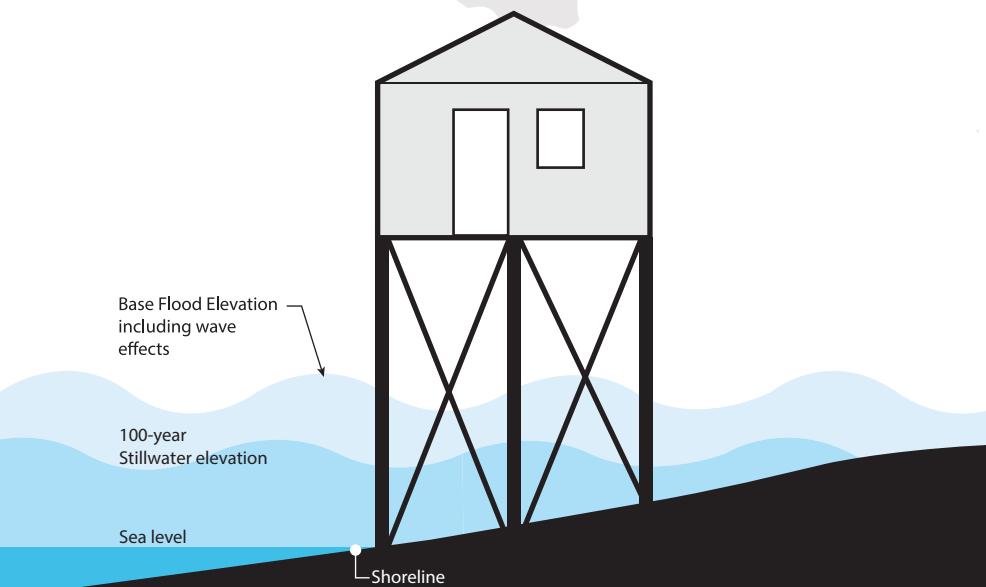
- Building Strength
- Flood Warning Time
- Flood Characteristics
- Level of Protection
- Building Location
- Operational Considerations
- Utilities and Access to Alternate Power
- Topographic and Site Considerations

BUILDING ELEVATION

This option involves raising a structure's lowest floor so floodwater can flow freely beneath. Base flood is the elevation to which water is anticipated to rise during a hazard event. Base Flood Elevation (BFE) is shown on a community's Digital Flood Insurance Rate Map (DFIRM). BFE is the regulatory requirement for elevating or floodproofing structures.

APPLICATION

Elevation is being used with increased frequency in floodprone areas. The frequency of recent flooding events have shown the value of this tried and true method. There are some downsides, however. The higher a structure is raised, the more vulnerable the roof and walls become to storm winds. Elevated structures must incorporate design elements that maintain accessibility.

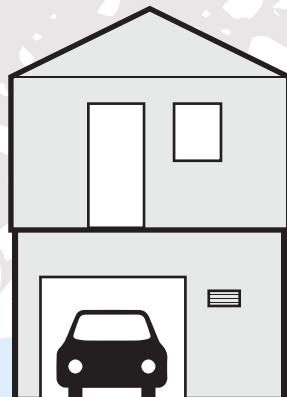


FLOODPROOFING

Floodproofing is any combination of structural or nonstructural modifications to reduce or eliminate damage to buildings in floodprone areas. Dry floodproofing makes a structure watertight below the level that needs flood protection. Wet floodproofing consists of modifying uninhabited portions of a structure to allow floodwater to flow in and out.

APPLICATION

Floodproofing measures can be used in limited situations to maintain structures in flood hazard areas. Development of a floodproofing strategy should include considerations of regulatory requirements, flood characteristics (e.g. duration, wave loads, frequency, etc.), site factors, functional use of the building, operational abilities, and economic factors.

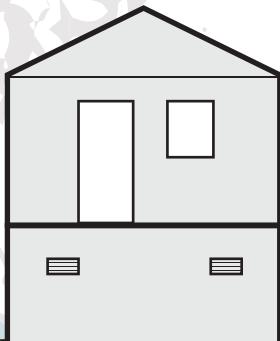


STRUCTURAL REINFORCEMENT

A local or areawide district established to accomodate a special set of uses or for specific purposes. Examples include open space, conservation, cultural, historic preservation, and planned development districts. The establishment of special districts can be used to encourage the sustainable redevelopment of depressed or hazard impacted areas.

APPLICATION

In areas where flood velocities exceed five feet per second, reinforcement measures may be required. This includes strengthening walls to withstand flood forces, using deeper footings to prevent scouring, using extra bolts to connect the sill to the foundation, or installing rods to connect the cap to the sill.



MINOR FLOOD CONTROL

Floodwalls and berms are free standing barriers that surround individual or small groups of buildings to prevent flooding. Floodwalls are freestanding, permanent structures designed to prevent flood water and debris from entering a building. Berms are small earthen levees (<4') more commonly used to protect large areas such as subdivisions or agricultural uses.

APPLICATION

Like floodproofing, small flood control measures have limited applications, and are best used under specific circumstances. Construction requires enough space between structures to accomodate the berm or floodwall. In addition, if the property is accessed through a gap or low spot in the protective barrier, this needs to be filled before a flood.

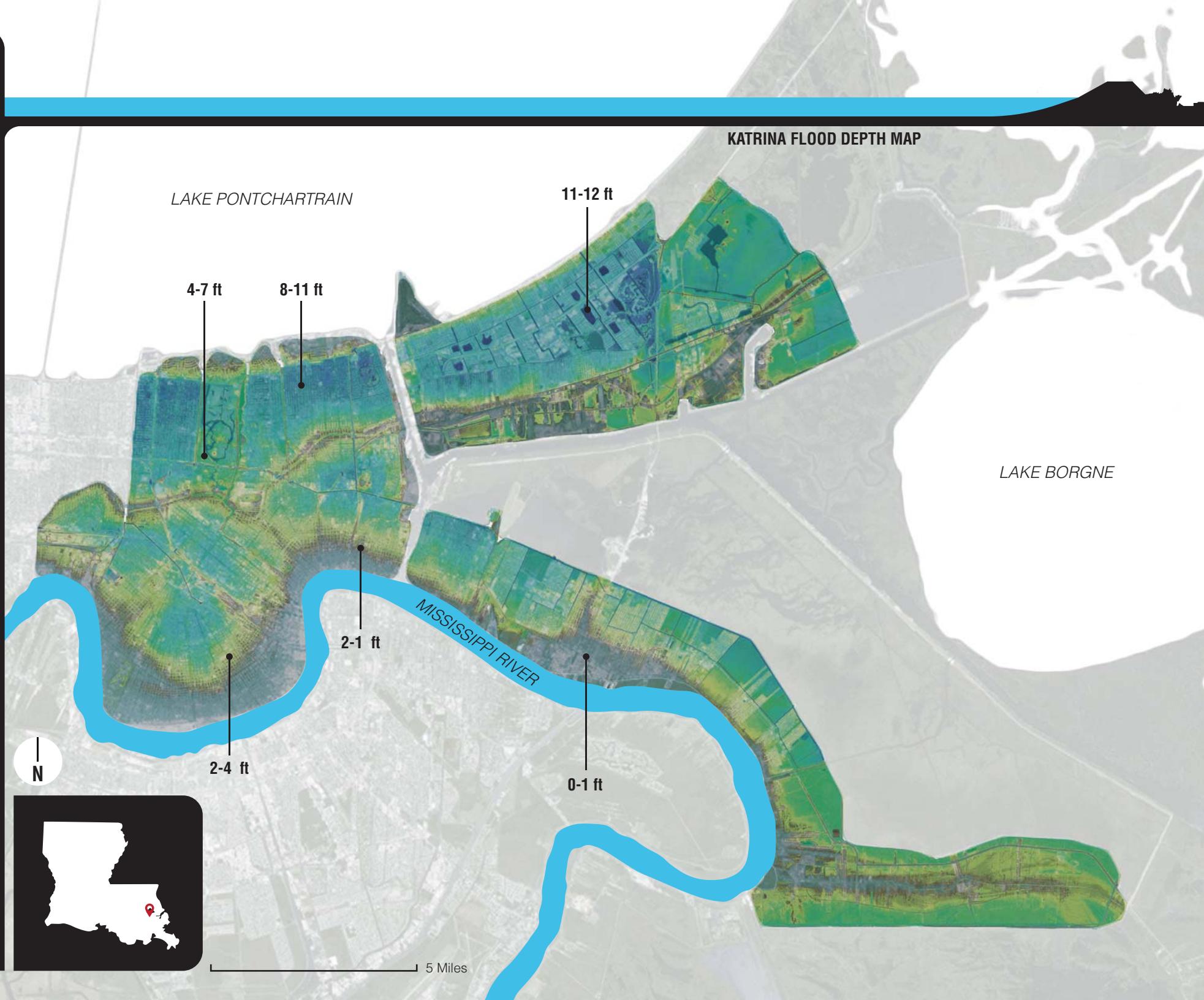


NEW ORLEANS, LA

Located in southeast Louisiana between Lake Pontchartrain and the Mississippi River, New Orleans is a major US port and the largest city in the State. New Orleans is famous for its unique architectural styles and largely intact historic neighborhoods. Although protected by levees and an extensive drainage system, much of the city is below sea level and flooding due to heavy rains and storms is a major concern.

In 2005, Hurricanes Katrina and Rita - two of the strongest hurricanes on record - hit the State. When the levees protecting New Orleans failed, approximately 80% of the densely populated city flooded. While the business district and main tourist areas were relatively undamaged, vast expanses of the City's neighborhoods were inundated. Damage varied greatly from one area to another based on elevation and housing stock.

In response, government agencies partnered to lessen damage from future flooding and meet new NFIP requirements. Of particular importance is elevating new and existing structures while maintaining the historic integrity of neighborhoods. As part of its zoning ordinance, the City crafted 'Elevated Dwelling Guidelines,' a series of best practices intended to accommodate elevation in ways that respect neighborhood character and reinforce physical relationships between buildings, streets, and landscape features. The guidelines focus on three key design features for a range of elevation heights: 1) foundations, 2) parking, and 3) stairs and porches.



AFTER KATRINA
AUGUST, 2015

FLOODED AREA IN NEW ORLEANS
80%

Many of New Orleans neighborhoods were inundated with between one and twelve feet of water, making Katrina the largest residential disaster in US history.

DAMAGED HOUSES
134K

70% of occupied housing units suffered wind and flood damage.

ESTIMATED DAMAGE COST
\$135B

Of the \$120.5B in federal spending - roughly \$75B went to emergency relief, not rebuilding. Private insurance covered less than \$30B of the total losses.

BUILDING ELEVATION COST
\$30K-\$120K
PER BUILDING

Mitigation Benefit Cost Ratio = 4
Every project dollar invested in mitigation provides \$4 benefit.



BUILDING FOUNDATION

Foundations refer to the built up portion of the structure between the ground and the finished floor elevation. Best practices developed by the City include appropriate enclosure, materials, screening, scale, and blockface cohesion.



ENTRYWAYS

Elevated structures risk losing their relationship to the street. Well-designed porches and stairways can help to mitigate this potential disconnection and help ensure elevated houses contribute to the community fabric.



PARKING DESIGN

Often times, large areas within each development site are dedicated to parking. In preparing for elevation, existing driveways and garages may require reconfiguration to provide safe access to the building.



NEW CONSTRUCTION

Whether a new structure is situated in a historic district or another setting, it is part of a distinct environment. Best practices provide guidance on how to consider overall neighborhood context when elevating.



PROPERTY ACQUISITION

Acquisition is an action undertaken by state or local governments to obtain the development rights to a piece of property. In areas plagued by repeated flooding, voluntary acquisition has long been an effective method to minimize future flood losses and maximize the utility of floodplains to protect communities. Property acquisition is the most permanent form of flood hazard mitigation.

Voluntary property acquisition programs are supported by the FEMA Hazard Mitigation Grant Program, and can provide cost-effective ways to reduce risk in flood-prone areas. For eligible communities, FEMA generally funds 75% of acquisition costs with the municipality and state contributing the remaining 25%. However, the decision to part with one's home and community is not easy, and generally acquisition programs are selectively applied. These programs commonly focus on repeatedly impacted properties that generate substantially greater long-term cost savings than continuing to rebuild after every disaster.

Acquisition programs are most effective when used in combination with other development policies such as planning, zoning, and hazard mitigation. Acquired properties are often repurposed for uses such as recreation and stormwater management. Stakeholder engagement to identify advantages, disadvantages, and community-wide strategies is crucial to the success of these efforts.

CONDITIONS THAT FAVOR AN ACQUISITION PROGRAM

>18 B.F.E.

High flood risk area

Cost of structural measures is prohibitive

Livelihood can be guaranteed in safer area

Repetitive Loss

Undeveloped floodplain

Substandard buildings located in floodplains

Severely damaged property

PRIORITIZE ACQUISITION PROPERTIES

PRELIMINARY LOCAL ASSESSMENT

- Severity of current and future risk or damage
- Property use (e.g. residential, commercial, vacant, etc.)
- Coordination with identified buy out areas
- Coordination with state and local planning efforts

Community engagement is essential early in the process. This includes working with property owners to identify potential buy out properties, and during larger community planning processes where priorities are crafted.

In the event of a disaster, FEMA and the state provide additional support for post-disaster planning. Particularly after a major hazard event, FEMA and the state work with communities to ascertain new priorities for acquisition based on hazard impacts to help communities recover as quickly as possible.

VOLUNTARY REQUEST

Property owners work closely with local agencies to determine if they want to voluntarily sell their property.

Voluntary applications are submitted to the appropriate local agency in the event of a disaster, or funds are made available through the hazard mitigation program.

State either compiles total requests and submits to FEMA, or evaluates application through pre-established acquisition program.

FEMA receives applications and evaluates to determine if the proposal is environmentally sound, within the rules, and cost-effective. Cost benefit analysis must show that every dollar spent on acquisition will result in at least one dollar saved.

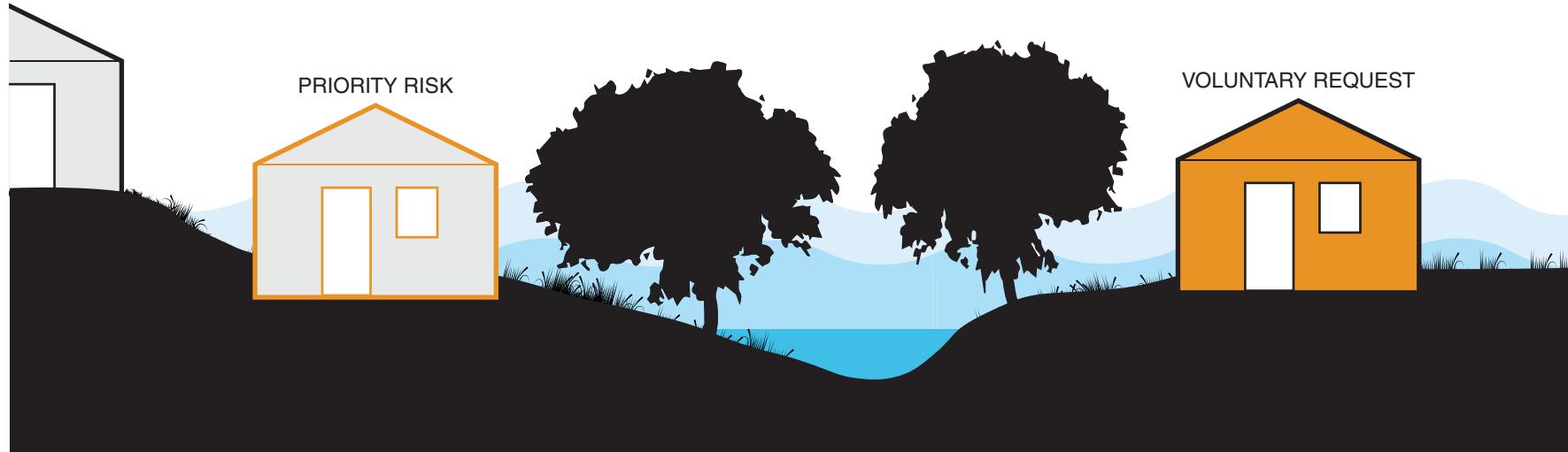
LEGEND

Community Action

Local Action

State Action

Federal Action



APPROVAL

If request meets environmental, programmatic and cost benefit criteria, the application is approved and an offer is made to the property owner. The owner reviews and either accepts, asks for a revision, or declines. Owners are entitled to the fair market value of their property before the disaster, as determined by a licensed appraiser chosen by the community. Owners are responsible for mortgages and liens, as well as moving costs.

Local authorities buy the property, acquire title, and own the land. The process can take months to initiate, but once an offer is accepted, the average closing is 45 days.

When the offer is accepted, FEMA contributes 75% of the funds, with the remainder coming from other sources.

SITE STABILIZATION

Local authorities demolish all structures and prepare site for designated use.

DESIGN OPPORTUNITIES

- Parks with picnic facilities
- Stormwater management
- Recreational facilities
- Campgrounds
- Unpaved parking lots
- Natural sites

By law the property acquired under the FEMA Hazard Mitigation Grant Program becomes public property that cannot be redeveloped, and must remain open space in perpetuity.

LONG-TERM MANAGEMENT

When coordinated with a community-based planning process, acquisition can provide new opportunities that would otherwise be difficult in developed areas. These include:

RECREATION

- Improved public health
- Opportunities for community gathering

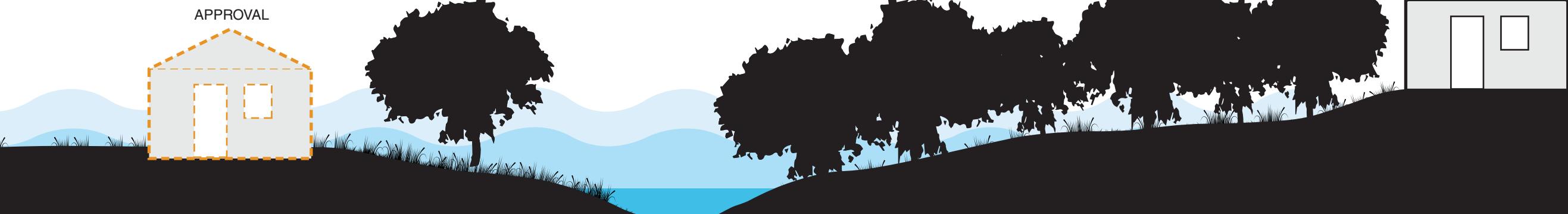
ECONOMIC BENEFITS

- Potential to catalyze adjacent redevelopment
- Practical pedestrian and bike connections
- Cost effective stormwater storage in hazard areas

ENVIRONMENTAL QUALITY

- Buffers intercept pollution to improve water quality
- Shoreline stabilization prevents erosion and subsidence
- Natural areas provide wildlife habitat

RELOCATED



BAY POINT, NJ

Bay Point is a small village in Lawrence Township along the Delaware Bay. Prior to Hurricane Sandy, the village consisted of 44 properties, including 33 primary and secondary homes and a commercial marina. The community sits on a peninsula jutting into the bay, and shoreline erosion and flooding had been a problem for years.

October 2012, Sandy struck New Jersey, damaging or destroying 346,000 homes and causing severe flooding. Winds over 100-mph and 10-ft storm surge crossed Delaware Bay, directly impacting Bay Point. As a result, 33 homes were severely damaged, 11 of which were completely destroyed. The access road and marina were also severely damaged.

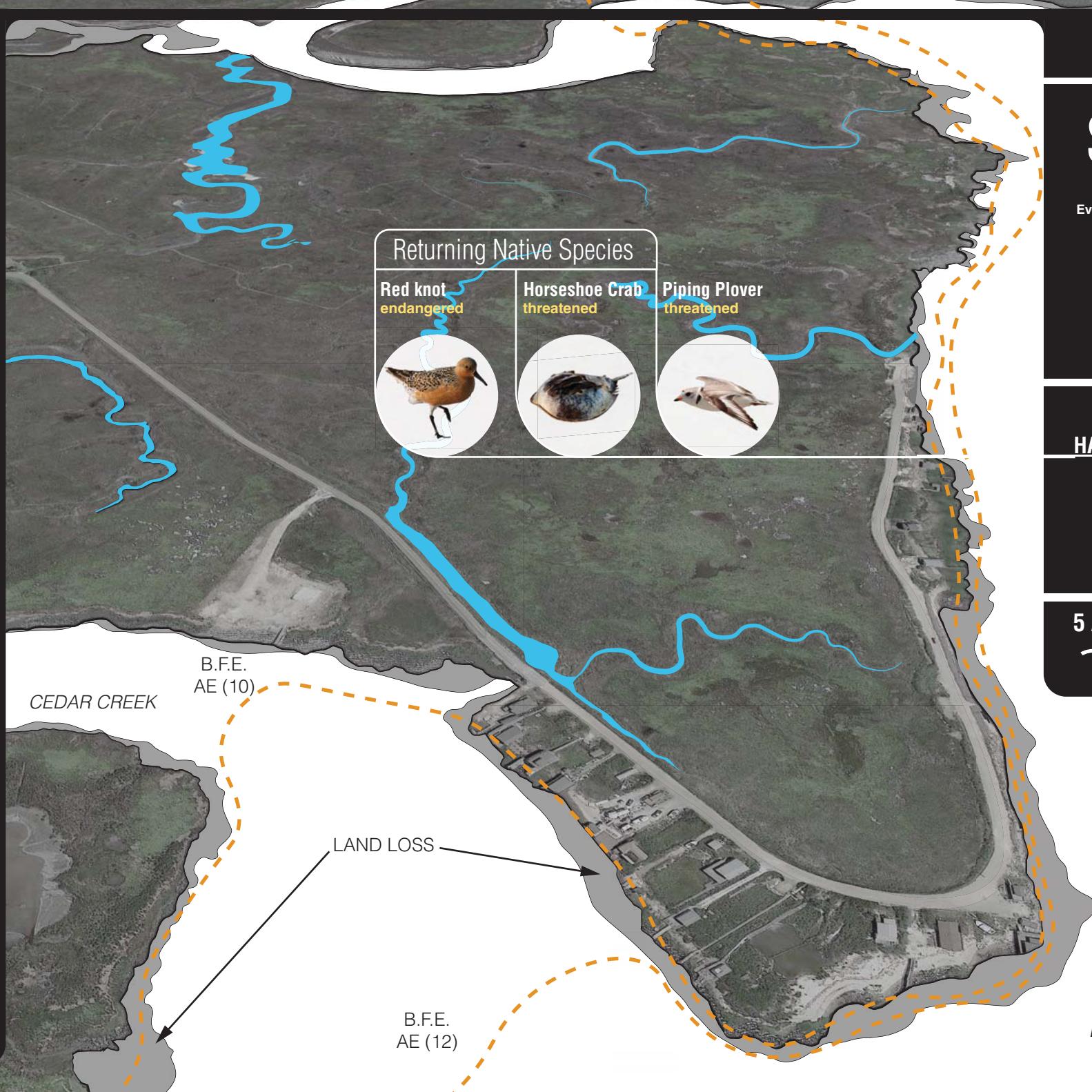
Through Blue Acres, the state offered to buy out the entire Village of Bay Point. Offers were based on pre-storm property appraisals, with a 10% bonus if all property owners accepted. To date, interest in the buy-out is nearly unanimous. All homes purchased through the program will be demolished and restoration undertaken to transfer the area back to a natural state for management by the NJ Division of Fish and Wildlife. Buyouts will reduce risk to the homeowners and help buffer inland communities by absorbing storm surge and heavy rainfall in future events.



NJ BLUE ACRES BUY OUT PROGRAM

After repeated storms caused coastal and inland flooding, the State of New Jersey recognized the need to acquire vulnerable properties. In 1995, the NJ Department of Environmental Protection established Blue Acres, a permanent floodplain mitigation program. Blue Acres is the arm of New Jersey's Green Acres land conservation program that purchases storm-damaged homes in flood-prone areas from willing sellers at pre-storm values, with the properties to be returned to open space.

Funded through a combination of federal, state and local dollars, the program established priority acquisition areas based on flood risk, and a protocol for purchasing homes from willing sellers. The program is completely voluntary; no homeowner is required to sell their property because of repetitive flooding. However, the state does incentivize buy outs of clusters or whole neighborhoods, with the land permanently preserved as open space, accessible to the public, for recreation or conservation. The goal of the Blue Acres Program is to dramatically reduce the risk of future catastrophic flood damage, and to help families move out of harm's way.



AFTER SANDY

June, 2015

BUYOUT COST

\$10.2M

Bay Point Project Benefit Cost Ratio = 8
Every project dollar invested in buy outs provides \$8 benefit

FUNDING SOURCES

HUD CDBG •
FEMA HMGP •
NJ Blue Acres •
USDA •
LOCAL •

50 ACRES HABITAT RESTORED

- Returns native species and endangered migratory birds
- Enhanced fishing and ecotourism
- Natural flood buffer
- Reduced Erosion

5 ACRES DECOMMISSIONED INFRASTRUCTURE

ENVIRONMENTAL PROTECTION

Hazards are part of the world around us. Floods, droughts, hurricanes and other events are natural phenomena that we cannot control, but result in great change in the environment. However, human activities can significantly impact the functioning of natural systems. Poorly planned development can contribute to hazard impacts from floods or droughts by removing vegetation that absorbs water, replacing it with impervious surfaces that increase quantity and speed of runoff during storms. As development increases in hazardous areas, the conversion of water retaining habitats such as wetlands reduces the ability to control water flow.

Though the occurrence of natural hazards is inevitable, their effects can be mitigated by protecting natural resources and sustaining healthy landscapes. In coastal areas, estuaries and wetlands act as physical barriers that reduce storm surge and protect adjacent property. Preserving or restoring trees mitigates the effects of heat-related hazards by reducing temperatures, thus decreasing heat-related illness and mortality. Trees and plants also act as a sponge, absorbing storm water and reducing flooding. Ideally, planners think in terms of regional systems of green infrastructure - integrated networks of wetlands, forests, and green spaces that together provide community-wide benefits. Environmental protection provides additional benefits such as increased recreational and educational opportunities, habitat for endangered species, improved environmental quality, and increased property values.

PRESERVATION

Preservation is the setting aside of natural resources to maintain them in their present condition. In areas with high flood risk, preservation is particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial.



CROSBY ARBORETUM

Picayune, MS.

Photo Credit: Mississippi State University

The Arboretum is a non-profit institution dedicated to preserving the unique and endangered Pearl River ecosystems in Mississippi and Louisiana. The facility offers educational and recreational programs, as well as 700 acres dedicated to scientific research and native plant conservancy.

RESTORATION

Restoration is the process of assisting the recovery of a system that has been degraded, damaged, or destroyed. Projects have the capacity to repair ecological damage, as well as renew economic opportunities and improve local communities. Restoration can be large or small-scale, and is a key element for sustainable development.



WALDO GIACOMINI RANCH

Marin County, CA.

Photo Credit: U.S. National Park Service

In 2006, this project was undertaken to restore 563 acres of marsh previously dyked for ranching. This public/private partnership was developed to reestablish tidal wetlands to improve local water quality, floodwater retention, and support a stable coho salmon population.

CREATION

Creation involves construction of an environmental feature (often wetlands) on a site where it did not previously exist, but where conditions exist that can produce and sustain the landscape. The most common reason for landscape creation is 1) treating wastewater, 2) mitigating loss elsewhere, and 3) providing wildlife habitat.



HUIE CONSTRUCTED TREATMENT WETLAND

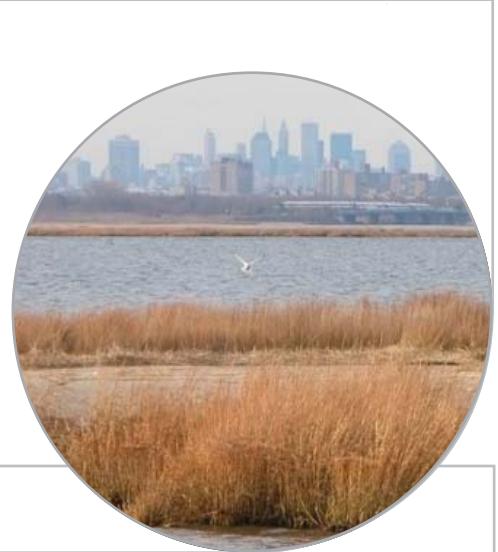
Clayton County, GA.

Photo Credit: U.S. Climate Resilience Toolkit

In 2000, Clayton County determined that urbanization had adversely impacted surface water quality and supply. To ensure adequate supply for future growth, they built densely vegetated surface flow wetlands to efficiently filter stormwater and replenish water sources.

ENHANCEMENT

Environmental enhancement is the increase of one or more of the functions performed by the landscape feature beyond what currently or previously existed. The purpose is to increase the capacity of specific functions, such as habitat for endangered species or stormwater management, to achieve a desired end goal.

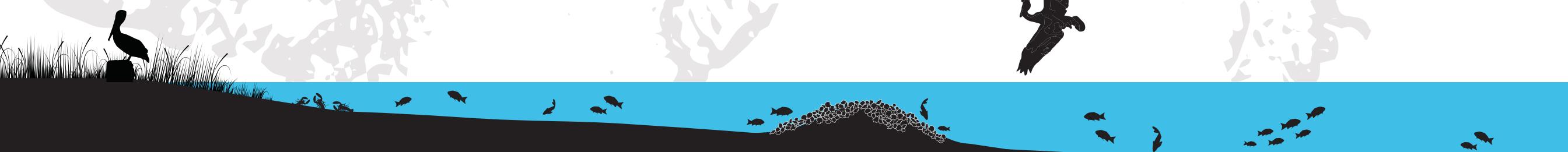


JAMAICA BAY

New York, NY.

Photo Credit: National Resources Defense Council

In 2014, the US DOI provided \$11.1M in competitive Super Storm Sandy grants to enhance Jamaica Bay in NY. Projects focused on expanding salt marsh, planting maritime forests, and seeding oyster beds to improve environmental quality and protect against future storms.



GREENVILLE, NC

Greenville is the county seat of Pitt County, located in the center of Eastern North Carolina (ENC). The city is located in the Coastal Plain, characterized by flat topography and large areas of wetlands and agriculture. The dominant landscape feature is the Tar River, which roughly divides the city in half.

In September 1999, Hurricane Floyd made landfall in ENC. Severe rain caused widespread inland flooding. In Greenville, the Tar reached 16-ft above flood stage inundating areas along the river and its tributaries for weeks. While not the first, Floyd produced the worst flooding in the region in recent memory.

After Floyd, a joint program between the City and County was developed to help move people out of the floodplain. South of the river, a combination of buy outs and conservation was employed to reduce risk and create new community amenities. The resulting Greenville Greenway is a 7-mile linear park with a variety of active and passive recreation options tailored to community needs and specific flood risk. Strategies include permanently preserved swampland and areas restored to a natural state after property buy outs.



COMMUNITY BENEFITS

Legend

Phase I

Phase II

Phase III

Greenway

Hurricane Floyd Flooding

TOTAL COST

\$27.8 M

Greenville Project Benefit Cost Ratio = 5
Every project dollar invested in buy outs provides \$5 benefit

FUNDING SOURCES

FEMA HMGP •

NC SARF •

Local Bonds •

49 BUY OUT PROPERTIES REPURPOSED

- Removed people and property from the most floodprone areas
- Estimated 5-15% property value increase within 500 feet of greenway

161 ACRES FLOODPLAIN BUYOUT

- Provides links between parks and neighborhoods
- Improved stormwater management and water quality
- Preservation of significant aquatic and terrestrial species habitat

PHASE I (2004)



Phase I included large floodplain areas that were once residential, but were part of a Floyd buy out program. In addition to the greenway, this area includes a dog park and recreation areas.



PHASE II (2011)

Phase II includes previously undeveloped low-lying areas that now serve as drainage and utility servitudes, as well as active and passive recreation areas.

CONCLUSION

Community resilience is described as the ability to adapt to changing conditions and prepare for, withstand, and rapidly recover from disruption. As coastal communities face impacts from climate change, sea level rise, and natural hazards, it is paramount to think of innovative ways to protect community assets, support current and future residents and businesses, and reduce environmental impact. Becoming more resilient is often the result of integrating hazard mitigation with other local planning efforts guiding community development.

The basis for all planning comes from government's need to protect the health, safety, and welfare of its citizens, and to do all of these things in the most economical and equitable manner. Through coordinated land use, hazard mitigation, and environmental restoration planning, local governments have the opportunity to address the welfare of the community in its entirety, with all of the complex relationships existing between use, economic development, growth, and the environment. Collectively, these plans form the groundwork for a community's long-term resilience strategy.





"Land use planning, implementation of ordinances, building codes, and education are among the important ways to protect communities from flooding."

~ 2012 Louisiana Coastal Master Plan

