

LASAFE

Louisiana's Strategic Adaptations for Future Environments





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Prepared by the Louisiana Office of Community Development Disaster Recovery Unit



FRAMEWORK

To mark Hurricane Katrina's 10-year anniversary, the eyes of the world have once again turned upon New Orleans and the state of Louisiana.

With attention comes opportunity, and Louisiana has had a unique opportunity to highlight and commemorate the Herculean efforts undertaken in the past decade to rebuild lives, infrastructure, economies, and most importantly, our way of life. **This 10-year anniversary marks an important achievement**, but it also gives our people the opportunity to take a brief step back and place the events in Katrina's aftermath into proper context.

Louisiana's Coastal Zone is under constant and increasing threat, with land loss, subsidence and sea level rise combining to form a witch's brew of vulnerability. In this sense, Hurricane Katrina was but one catastrophic example of our changing environmental landscape, and one that cannot be viewed in a vacuum. In addition to Katrina, our state has been ravaged by hurricanes Rita, Gustav, Ike and Isaac, economically crippled by the Deepwater Horizon Oil Spill and afflicted by countless smaller – but hardly insignificant – natural disasters ranging from riverine flooding to community-sized sink holes.

Likewise, our state's post-Katrina recovery efforts cannot be examined in a vacuum. Each subsequent event has presented its own set of unique challenges and lessons learned, and they have each contributed to the ever-increasing resilience of our people and industries. As the eyes of the world move on to the next item of interest, Louisiana's focus must remain fixed on the future while acknowledging – even embracing – our present and future vulnerabilities.

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Louisiana is ranked in the top five U.S. Customs vessels...


Our state recognized these vulnerabilities after Katrina, and created the Coastal Protection and Restoration Authority (CPRA). CPRA is the single state entity charged with addressing our changing coastal landscape with a goal to achieve comprehensive coastal protection through its restoration-and-protection-oriented Master Plan. The first version of Louisiana's Comprehensive Master Plan for a Sustainable Coast was released in 2007; an update was released in 2012 and further updates will be released in 2017 and in five-year intervals thereafter. Per the 2012 version of the Coastal Master Plan, **“if we do nothing more than we have done to date, our expected annual damages from flooding by 2061 would be almost ten times greater than they are today, from a coast wide total of approximately \$2.4 billion to a coast wide total of \$23.4 billion.”**

Louisiana's coast is a working coast. It supplies 90 percent of the nation's outer continental oil and gas, handles 20 percent of the nation's annual waterborne commerce and produces 26 percent (by weight) of the continental U.S. commercial fisheries landings. 500 million tons of cargo pass through the state's deep-draft ports and navigation channels, ranking first in the U.S. in total shipping tonnage. The nation's largest individual port by tonnage, The Port of South Louisiana, is headquartered in St. John the Baptist Parish. The Port of Terrebonne

has **ranked in the top five each of the last five years in U.S. Customs vessel entries while supporting 3,000 direct jobs and an additional 5,000 supplementary jobs.**

Meanwhile, Port Fourchon in Lafourche Parish is host to the Louisiana Offshore Oil Port (LOOP). LOOP is the only port in the U.S. capable of unloading Ultra Large Crude Carriers (ULCCs) or Very Large Crude Carriers (VLCCs) delivering oil to the U.S. from abroad. Over the past 30 years, LOOP has transported more than 11 billion barrels of oil to Port Fourchon and on to the nation. Activity at Port Fourchon accounts for one in every 6.2 jobs created in Louisiana, and a three week disruption in port services would lead to a 16.6 percent spike in U.S. gasoline prices and an 11.4 percent increase in natural gas prices. Such a disruption would cost the U.S. economy \$11.2 billion in sales, \$3.1 billion in earnings and more than 65,000 jobs.

Most importantly, Louisiana's coastal zone is home to more than two million people. Many of these residents have called the coastal zone home for multiple generations, cultivating a unique way of life and a unique bond with the land itself. Per CPRA, “should land loss continue unabated, the nation would face costs of approximately \$40 billion just to handle the retreat of communities inland.”

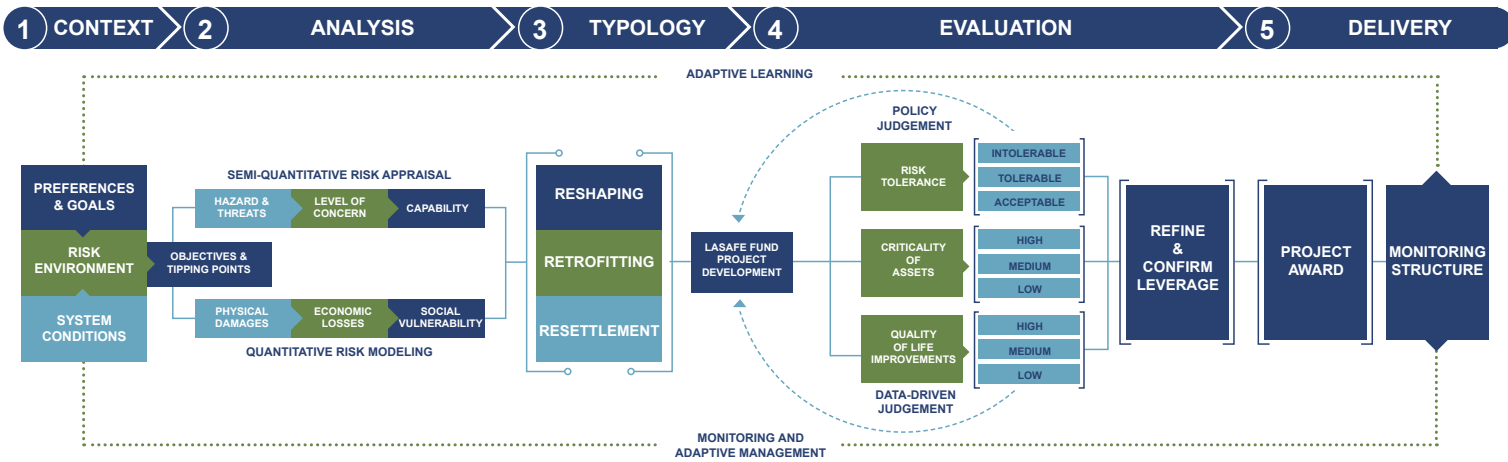


The Coastal Master Plan takes a look 50 years into south Louisiana's future and applies world class science and engineering expertise to define what is realistically achievable. Our world class, scientifically-driven ability to project future risk – both with and without future action from the Master Plan – presents Louisiana a unique opportunity to plan for future conditions under many environmental scenarios, some more optimistic and some less optimistic. But, regardless of scenario, two facts are indisputable:

First, full implementation of the 2012 Coastal Master Plan would lead to a substantial reduction – but not elimination – of projected future risk. Second, while the Coastal Master Plan relies on proven scientific methodology to curb, and in some cases reverse, environmental degradation – namely land loss, it can do so neither instantaneously nor completely. Under an ideal scenario, in which Coastal Master Plan projects are adopted and implemented in their entirety, Louisiana can hope to experience a no net land loss condition sometime between 2032 and 2041, after which it may experience net gains in land creation.

This policy framework, Louisiana's Strategic Adaptations for Future Environments – or Louisiana SAFE, is intended to complement the Coastal Master Plan. In this regard,

Louisiana SAFE fills a resilience gap in that it articulates a development strategy combining the world class science behind the Coastal Master Plan with the community-building planning and policy techniques the state has honed over its decade-long post-Katrina recovery effort. While the Coastal Master Plan focuses on techniques to reverse negative environmental trends while remaining mindful of the cultural and social uniqueness of our communities and our way of life, Louisiana SAFE takes a people-driven approach to maintain that unique way of life while remaining mindful of the future risk projections at the state's disposal.



Project Framework Structure

Louisiana SAFE is built upon a few basic ideals. First, the state is physically shrinking. Per the U.S. Geological Survey, Louisiana currently loses more than 16 square miles of land per year due to coastal erosion. If this trend can be reversed by 2041 and the state can begin to experience a net gain in land thereafter – a best-case scenario – Louisiana will not return to its current land area for many decades into the future, and the land will likely be in different places than it is now.

Thus, an interim plan is needed for protecting our people and our economic assets as they remain vulnerable and are becoming more vulnerable each day. In response, the state – and many of its constituent local communities – has implemented a bevy of risk-reduction projects, from levee systems to stormwater capacity initiatives to green infrastructure installations. These are both effective and crucial efforts, and

more cost effective. Still, the reality is there is no everlasting flow of financial resources. Not every inch of Louisiana’s land can be preserved, nor can every economic asset and community be protected. In short, our coastal zone will always be vulnerable, and in some locations, this risk will be considerable, if not overwhelming.

Louisiana SAFE is a response to the reality that our state is shrinking, and it does so by taking a three pronged approach to the future of our coastal parishes; depart from our most vulnerable geographies, fortify economic assets and maintain a community development footprint to service those assets, and finally, maximize underdeveloped areas – in which minimal risk is projected – as a catalyst for thoughtful, high-quality community development in our high-ground territories.



The strategy focuses on three typological development zones. Areas projected to experience in excess of 14 feet of flood inundation in a 100-year storm event 50 years from now are resettlement zones. Areas projected to experience between 3 feet and 14 feet of flood inundation in a 100-year storm event 50 years from now are retrofit zones. Areas projected to experience less than 3 feet of flood inundation in a 100-year storm event 50 years from now are reshaping zones. These three zones embody the retreat/fortify/maximize concepts Louisiana SAFE promotes. We know we cannot protect the entirety of the coastal zone, but we must preserve – and when possible expand – economic and community development opportunity in moderately vulnerable areas, while incentivizing population and economic growth in those areas at minimal risk.

The following sections of this framework focus on the ideals and the methodologies Louisiana SAFE employs to plan for and implement safer, stronger and smarter development strategies in resettlement, retrofit and reshaping zones.

However, above all else, Louisiana SAFE is a flexible, fluid strategy driven by and responsive to the communities within each identified zone, as well as changes to projections of risk. In this sense, while it does draw zonal lines identifying geographies relative to their projected future risk, the framework also acknowledges this is just a projection. Projections change over time, as do techniques and technologies to mitigate risk. As best available information changes, Louisiana SAFE is designed to adapt. Therefore, it is imperative to note this strategy does not suggest every community located in a resettlement zone must move, nor does it suggest each community in a retrofit zone must take drastic fortifying action or each reshaping zone grow in population or economic activity. In some cases and communities, these typologies will not be a fit. However, Louisiana SAFE does suggest our state must be proactive in developing effective strategies to retreat, retrofit and reshape when and where it is prudent to do so. Moreover, it acknowledges Louisiana's unique opportunity to position itself as a laboratory and a leader in risk-oriented community development that can be replicated and transferred throughout the world.

RESHAPE

<3' FUTURE 100 YEAR FLOOD RISK

Typically, population migration patterns are dictated by one of two macro forces. Populations are drawn to a locale on the promise of an increased quality of life, usually in the form of economic opportunity, outward social mobility, or a combination of both. Conversely, populations flee locales for inverse reasons. Economic opportunities dry up, or are relatively less abundant than in other destinations. Catastrophic events, including acute events like natural disaster or loss of a major employer or chronic deteriorating conditions such as land loss and sea level rise have a similar effect on migration patterns. In short, people are drawn to locations that are both safe and bountiful, while they are drawn away from locations plagued by risk and barrenness.

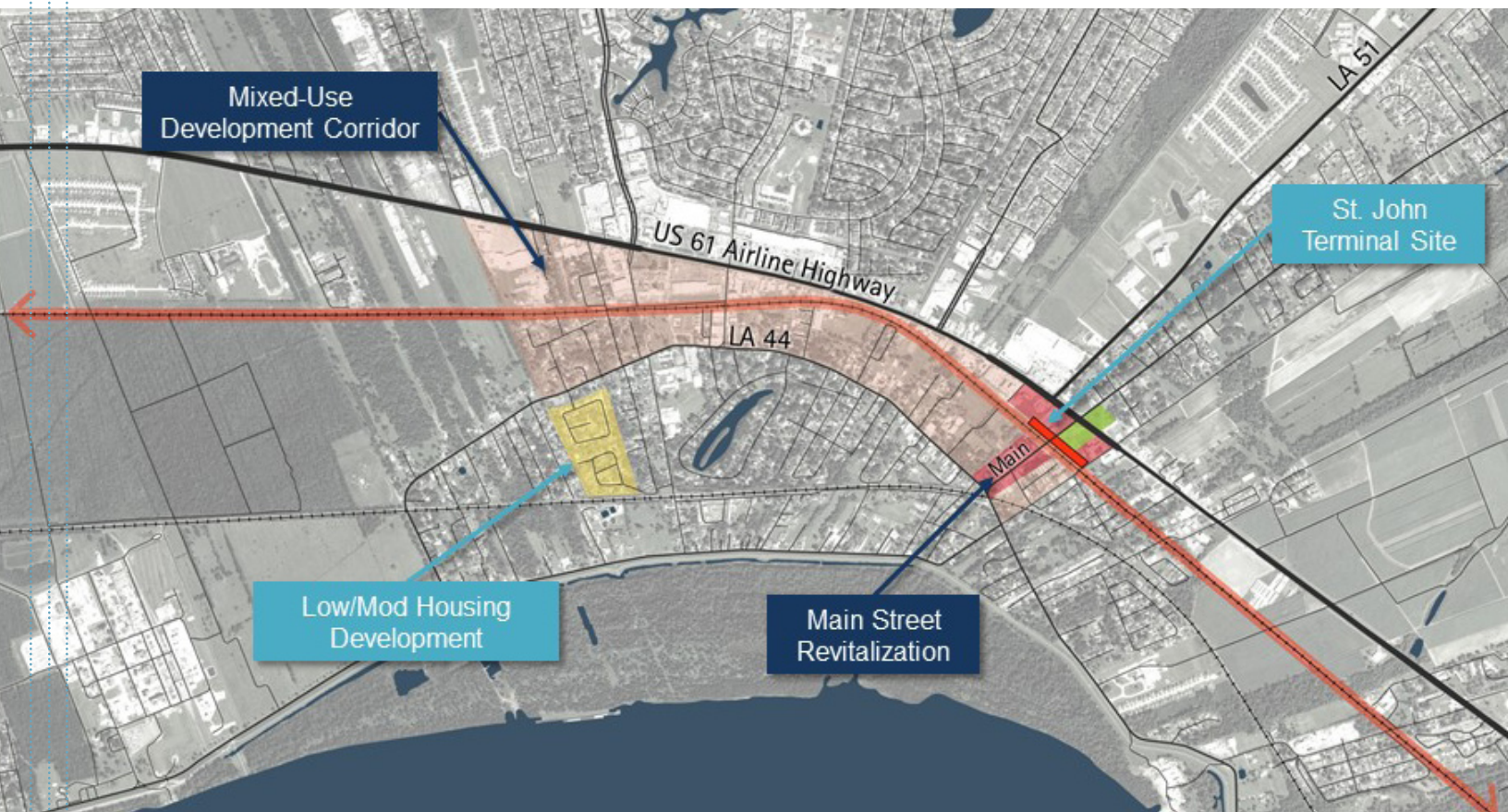
Louisiana has experienced significant population shifts from both types of catastrophic events, acute and chronic deterioration. For example, in Plaquemines Parish, an area heavily impacted by Hurricane Katrina in 2005, **total population declined 14 percent, from 26,757 to 23,042, between 2000 and 2010.**



However, Belle Chasse – Plaquemines’ largest municipality and an area within the U.S. Army Corps of Engineers-designed Hurricane and Storm Risk Reduction System (HSDRRS) – grew 28 percent, from 9,848 to 12,679, over the same period. In a general sense, this pattern was replicated throughout southeastern Louisiana from 2000 to 2010. Areas heavily impacted by Katrina declined in population, like St. Bernard (-46 percent), Orleans (-29 percent) and Jefferson (-5 percent), while higher-ground “receiver” parishes gained population, like Ascension (40 percent), Livingston (39 percent), St. Tammany (22 percent), St. Charles (10 percent), East Baton Rouge (7 percent), St. John the Baptist (7 percent) and St. James (4 percent). Two outliers to this trend, Lafourche and Terrebonne parishes, were both heavily impacted by Katrina, but also experienced population increases of 7 percent each, respectively.



However, even within these outliers, the trend remains apparent. Even in Lafourche and Terrebonne parishes, coastal places like Dulac (-40 percent), Montegut (-14 percent) and Chauvin (-9 percent) significantly lost population, while areas further upland like Chackbay (29 percent), Schriever (17 percent) and Bayou Cane (14 percent) experienced substantial gains. Mindful of event and risk-influenced migrations, Louisiana must reshape underdeveloped, high-ground corridors in anticipation of future population and economic growth. Louisiana SAFE envisions a larger-scale strategy geared toward parish-level planning and engagement designed to incentivize smart, structured and contextual development.



RESHAPE

<3' FUTURE 100 YEAR FLOOD RISK

Principles of Reshaping

- 1** Planning efforts must be driven from the needs of local, existing populations.
- 2** Implementations must both solve a current adverse condition and also increase capacity for future populations, or directly promote economic growth in a high-ground corridor.
- 3** Elimination of existing barriers to future development and future growth must be prioritized.
- 4** Immediate and future threats to existing economic and social interests must be mitigated. If these threats cannot reasonably be mitigated, they must be accounted for in land-use policies, plans and projections.
- 5** Growth opportunities should be identified and primed using sound community and economic development incentives.
- 6** Future economic and population growth projections must be scaled contextually according to the needs of and input from existing local communities; e.g., rural farmlands cannot reasonably be expected to transform into high-density urban centers.
- 7** All efforts must focus on adding value to currently unrealized opportunities.
- 8** No reconfiguration strategy may intentionally target a neighboring community, regardless of that community's future risk profile, to competitively entice, or otherwise transfer, populations or economic interests located in that community.
- 9** The community's future risk profile, regardless of how minimal projected future risk may be, must guide all design-oriented development decisions.
- 10** As ideal "receiver" communities, reshaped areas should embody worldwide best practices in water management, energy conservation, wetlands restoration and habitat preservation.
- 11** Development patterns must account for – and strive to maximize and strengthen – communal and social bonds of populations both native to the receiver community and those migrating to it from elsewhere.

RETROFIT

3' TO 14' FUTURE 100 YEAR FLOOD RISK

The value of Louisiana's Coastal Zone can neither be fully stated, nor can it be accurately measured. We cannot and will not initiate a comprehensive retreat from the coast; it simply offers too much economic and cultural value to our state and nation which, if lost, would degrade our American way of life, not just Louisiana's. It is out of necessity that we maintain communities in close proximity to vital economic activities adapting these communities so they can continue to prosper in rapidly changing and deteriorating environmental conditions.

The 2012 Coastal Master Plan highlights a few specific examples of this scenario. Hackberry, in Cameron Parish, lies adjacent to salt domes housing one of the nation's four strategic petroleum reserves, with capacity to hold more than 228 million barrels of crude. Meanwhile, the nearby Chenier Plain wetlands are deteriorating, heightening flood risk in Hackberry. Lafitte, a strategically-important fishing community in the Barataria Basin, is currently experiencing significant land loss and, with no action, may experience up to **12-feet of flooding in a 50-year storm event by 2061.**



LA Highway 1, a thoroughfare connecting Port Fourchon to inland areas and cross-country transportation corridors, regularly experiences closures during high tides and has remained underwater for days following previous storm events. In short, Louisiana constantly balances its economic and cultural interests with clear and present risks. It is an unavoidable arrangement, but one which requires thoughtful, strategic interventions to maintain a vital connection between residential corridors – the human element – and hubs of commerce and industry.

The 2012 Coastal Master Plan articulates the state's desire "to provide 100-year protection to all communities and businesses... (but) it is not feasible to do so given the inherent risk of living in a hurricane-prone area, as well as current funding levels and engineering constraints." CPRA's strategy involves restoration projects like barrier islands, hydrologic restoration projects and oyster reefs, structural protections like earthen levees, concrete walls, floodgates and pumps, and nonstructural protections through elevations, floodproofing, land use planning, building code adaptations and community education efforts.

Louisiana constantly balances its economic and cultural interests with clear and present risks.

Louisiana SAFE dovetails with and augments this framework by envisioning a medium-scaled, town and neighborhood-level approach designed to preserve community development footprints in proximity to moderately-vulnerable, high-value economic and cultural assets, and where possible, expand upon that existing value.



RETROFIT

3' TO 14' FUTURE 100 YEAR FLOOD RISK

Principles of Retrofitting

- 1** Planning efforts must coalesce around hardening of existing economic, cultural and social assets.
- 2** Where applicable, initiatives must defer to larger-scale – and longer-term – strategies like the Coastal Master Plan. For example, if a planned Coastal Master Plan project is anticipated to reduce, but not eliminate, flood risk in a particular area, Louisiana SAFE efforts may focus on current levels of risk leading up to the completion of a Coastal Master Plan project while planning for mitigations at a community's future risk profile.
- 3** Outside of the Coastal Master Plan, retrofit initiatives must defer to and plan for future conditions described by existing local and regional plans, such as parish comprehensive planning documents and regional guides, like the Greater New Orleans Urban Water Plan.
- 4** Attempt to preserve current population levels and economic activity, unless there is a demonstrable and compelling need to build growth corridors in vulnerable areas to compliment larger assets.
- 5** Retrofitting may consider the needs of particular and niche industries to preserve their ability to operate in emergent, recovery and normal conditions.
- 6** Interventions should focus on strategic, targeted nonstructural mitigations supporting vital economic interests. Such interventions may include limited development of workforce housing and elevations of existing property supporting a nearby economic asset.
- 7** Structural mitigations conducted outside of the Coastal Master Plan should be limited in scale and provide a demonstrable and quantifiable benefit for an industry or community.
- 8** Interventions should focus on land use planning, building code adaptations and education efforts to plan for current and future risk.
- 9** Strategies should utilize green infrastructure and innovative, community-level techniques to incrementally reduce risk, or at least maintain a current risk profile while enhancing resilience.
- 10** Strategies should include adaptive delivery of goods and social services, such as food, healthcare and fuel.
- 11** Strategies should include adaptive agriculture and animal husbandry.

RESETTLE

>14' FUTURE 100 YEAR FLOOD RISK

Louisiana SAFE acknowledges resettlement is both a controversial and difficult typology within which to experience and measure success. However, it is a logical component to any comprehensive policy framework for a future Louisiana. If we are to adopt and adhere to the idea of maximizing undervalued and underdeveloped space while preserving space with high value and moderate vulnerability, we must also acknowledge not all territory can be maximized or preserved; rather some will be lost.



Moreover, if we are to envision such a reality, we must also commit to techniques mindful of cultural and social bonds – they must also be mindful of long-held and deeply-rooted ties to the land itself.

A 2014 Tulane Institute on Water Resources Law & Policy issue paper succinctly summarized the Federal and Louisiana governments' track record in community resettlement:

“The Federal government has displaced individuals and communities for a wide variety of reasons – from public development projects to national security concerns – and used a variety of statutory authority. The statutes enabling the dislocation often have proven much more effective at relocating individuals than resettling entire communities; however history shows both relocation and resettlement programs have a difficult time succeeding. Both federal and local support and funding often prove unreliable or unsustainable.”

The history of population dislocation in Southeast Louisiana is generally one of failed government intervention. Some communities have been driven away by flooding. Some have disappeared as a result of public works projects. Still others have maintained community integrity in spite of a lack of government consideration and assistance. Where resettlement efforts have been undertaken, they have been curtailed or limited for political or philosophical reasons. This history has led to an ingrained public distrust of relocation or resettlement projects.”

The Tulane paper goes on to note up to 86 percent of at-risk families stand to benefit from Coastal Master Plan structural interventions; however, those outside of that number, specifically those residing in sparsely populated rural communities, remain vulnerable in their current locales. Native American communities in southern Lafourche and Terrebonne parishes are particularly at-risk.

Put plainly, Louisiana must improve upon our nation’s track record in both relocation and resettlement initiatives. Without a proactive approach, relocation will take place ad hoc, as illustrated by previously noted migration patterns following Hurricane Katrina. Whether a household uses insurance proceeds to move following a disaster event, or accepts a voluntary fair market value buyout, the outcome is the same – there is no investment in keeping communities together, nor is there a mechanism to maintain social and cultural bonds developed within our state’s most vulnerable populations.

Resettlement is painful, but in parts of Louisiana, it is also necessary. **Louisiana SAFE envisions a systems-based approach to community-led planning and group migration. It is a small-scale, targeted strategy for culturally-sensitive at-risk communities and special needs groups, including the disabled, the elderly, disaffected minority groups and very low income populations.** It is intended to capture a community’s remaining – and often rapidly dwindling – value and transfer it to an environment in which it has the opportunity to grow and ultimately thrive.



RESETTLE

>14' FUTURE 100 YEAR FLOOD RISK

Principles of Resettlement

- 1** Unless there is a clear and present risk to life, all resettlements must be community-driven and voluntary.
- 2** Resettlements must be anticipatory of future risk, but also aspirational for future communal opportunity.
- 3** Activities must include building and bridging social networks as part of the process and outcome.
- 4** Where prudent, appropriate and desirable, approaches should envision scenarios by which resettled communities retain access to abandoned lands for cultural, social or economic reasons.
- 5** All resettlement activities must lead to a demonstrable reduction in current and future risk for the participating community.
- 6** When possible, all resettlements should occur within common jurisdictional boundaries.
- 7** Communities envisioned and constructed through resettlement must embody worldwide best practices in water management, energy conservation, wetlands restoration and habitat preservation.
- 8** Communities envisioned and constructed through resettlement must take a holistic approach toward development, inclusive of cultural, social and economic growth opportunities and techniques.
- 9** All resettlements, on a defined time horizon, must envision and plan for a total residential abandonment of the original community.

Report prepared for Louisiana Office of
Community Development Disaster Recovery Unit by:

