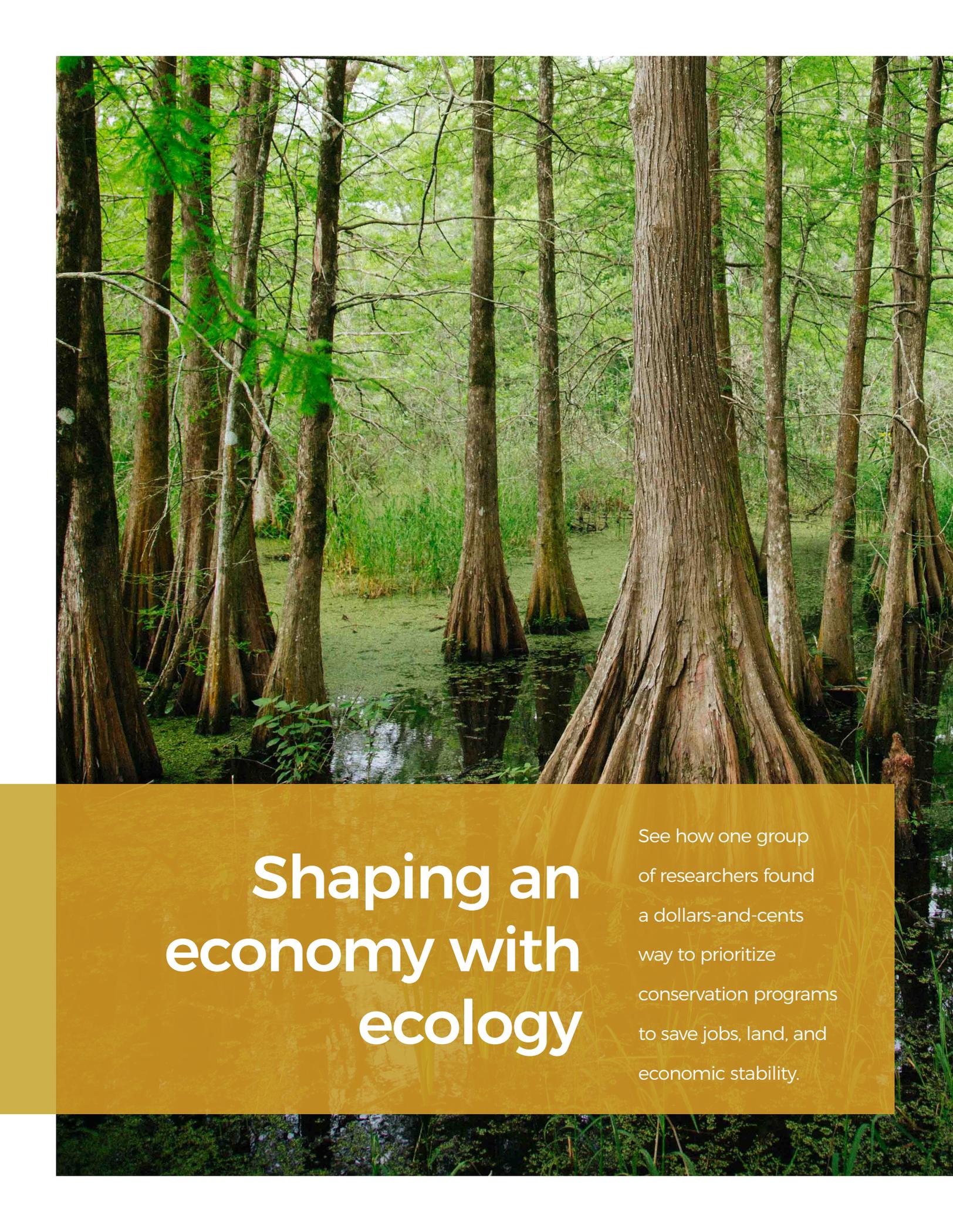


CASE STUDY

# Resiliency and Economic Impact

How One Coastal  
State Rewrote  
the Book on  
Conservation



# Shaping an economy with ecology

See how one group of researchers found a dollars-and-cents way to prioritize conservation programs to save jobs, land, and economic stability.



Photo by Kyle Glenn

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# Introduction

We had to double-check it to be sure, but it's true. Upon factcheck.org's inquiry, Torbjörn E. Törnqvist, a geology professor at Tulane University in New Orleans said, "Estimates vary a bit, but by and large the one football field per hour metaphor is very reasonable." That is to say, that's a net loss of 57,600 square feet of land along the coast of Louisiana per hour.

That's a problem. Here's how the state of Louisiana tackled it.





# Burning Questions

Hurricane Katrina lifted the veil on a multitude of infrastructure and economic vulnerabilities in Louisiana.

The protective structures surrounding New Orleans which had been breached by Katrina's brute force were first constructed as a reaction to Betsy—a hurricane which struck in 1965 and had been the first of its kind to cost more than \$1 billion in damages. After Betsy, the state had to wait 25 years until it saw a sustainable, dedicated federal plan (the Coastal Wetlands Planning, Protection and Restoration Act, 1990) for restoring wetlands as a preventative measure against significant storm surge and flooding along the coast and further inland.

Aside from the landscape being forever changed, industries and economic activity in the region remain scarred after more than a decade of restoration efforts.

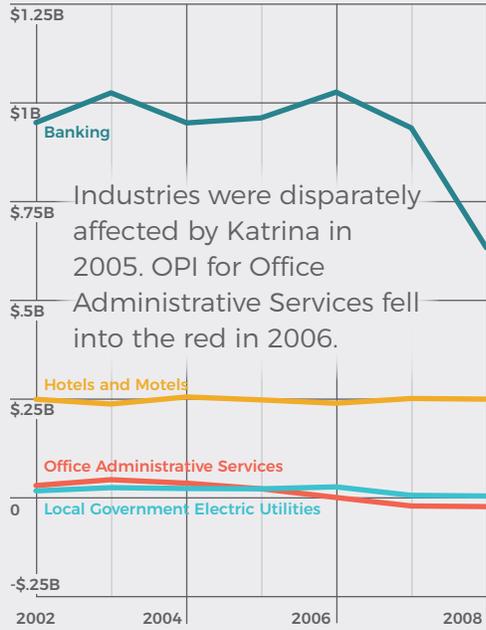
Four months after Katrina, the state legislature of Louisiana convened a special

session to address recovery and future planning. The state legislators in special session produced a plan to consolidate a wide variety of programs that spanned projects undertaken by the Department of Transportation and Development, the Louisiana Recovery Authority, the Hazard Mitigation Grant Program, the Fish Impacts and Mitigation division of the Wildlife and Fisheries Department, the Department of Environmental Quality, and the Coastal Restoration and Maintenance Program under the purview of the newly minted Coastal Protection and Restoration Authority (CPRA).

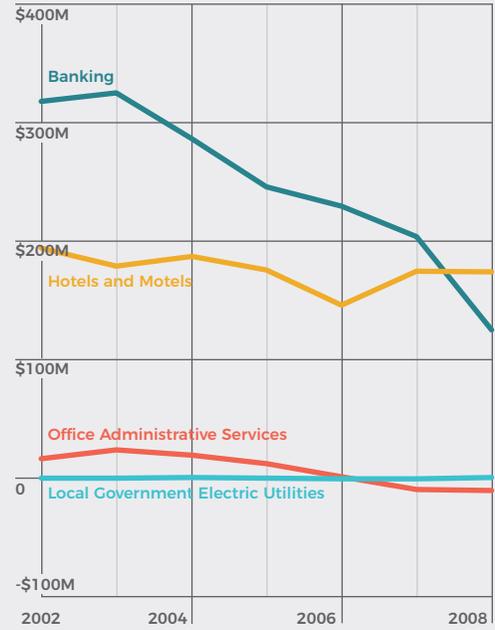
The CPRA was vested with the “authority to articulate a clear statement of priorities and to focus development and implementation efforts to achieve comprehensive coastal protection for Louisiana” ([coastal.la.gov](http://coastal.la.gov)). For Louisiana, it was the first time that a single state organization had been tasked with devising a comprehensive plan for the future of the state's coastline with all the resources of the state's various agencies and departments at its fingertips as well as the financial support of federal programs. It fell to the CPRA, then, to ask the hard questions.

**OPPOSITE:** OPI represents Gross Operating Surplus minus Proprietor Income. OPI includes consumption of fixed capital (CFC), corporate profits, and business current transfer payments (net).

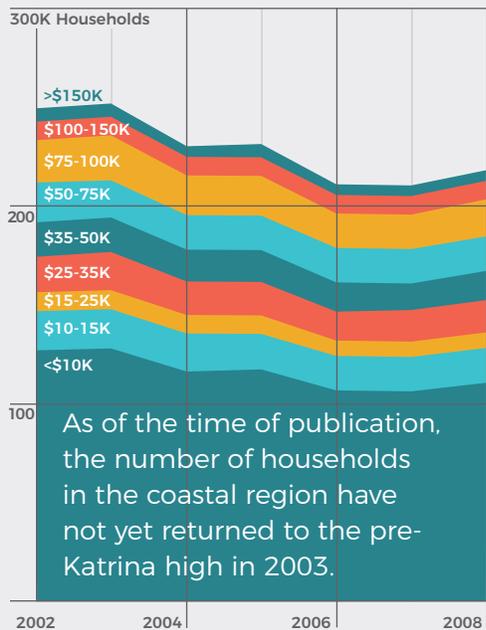
## COASTAL REGION OPI



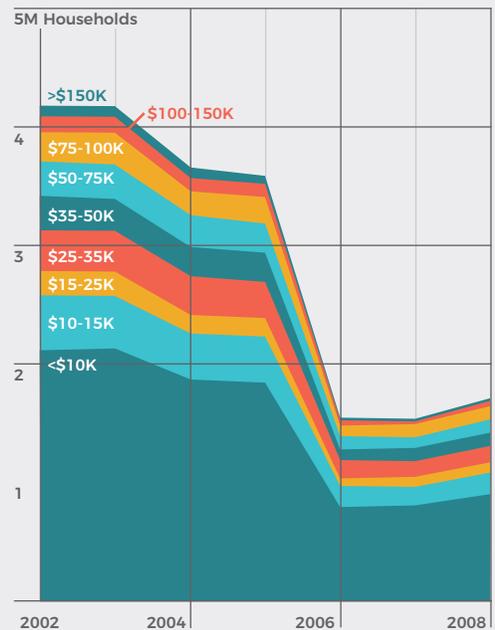
## NEW ORLEANS PARISH OPI



## COASTAL REGION HOUSEHOLDS



## NEW ORLEANS PARISH HOUSEHOLDS



## How do we prepare for the future?

Louisiana was no stranger to coastal land loss by the time Katrina made landfall. But the several successively strident storms which culminated in Katrina's knock-out punch underscored the reality that state efforts to restore coastline were lacking or misguided at worst. The question was no longer whether restoration projects were worthwhile. It was now crucial to identify where restoration projects would be most impactful for the state as a whole.

## Why allocate resources to the coast?

Louisiana had known for decades that wetlands and barrier islands served as an essential defense against oncoming storms. Strands of dunes, grass, and groves which stretched along the outer coast act as speed bumps for storms. Wetlands closer to the coast have the capacity to absorb storm surge and modulate tidal activity. Together, they can sometimes buy enough time for inland populations by slowing and cooling approaching storms, helping the weather dissipate. Besides the physical benefits to the coast, the wetlands shelter a unique ecology of species endemic to the southern United

States which maintain the health and balance of Louisiana's shoreline.

Ports and pipelines are hubs for the country. Their economic value and contribution on a national scale is undisputed and their dependence on accessible, stable waterways and coastline are a foregone conclusion. The CPRA appraised it best:

Louisiana plays a vital role in the economic infrastructure of America, with our ports carrying 20 percent of all US waterborne commerce, providing 26 percent (by weight) of commercial fisheries landings, and supplying 18 percent of our nation's oil. The impact to our nation's energy and economic security will be devastating if we fail to act.

But understanding which ports or logistical thoroughways ought receive conservation priority can be a political and financial quagmire. The CPRA would need to find a way to evaluate various future-states for storm damage and extrapolate what injury those scenarios might inflict on the state and national economies. Numbers rather than sentiment could be the incisive tool needed to cut through political disagreement and economic uncertainty. Further, different storms can affect different combinations of areas in different ways; priority lists for one disaster scenario don't necessarily apply to another.



# The Answer

With the future uncertain, the analysts were required to estimate the future state of Louisiana's coastal lands in order to evaluate the economic impact associated with the potential land loss and storm damage.

Researchers from the Rand Corporation and Louisiana State University teamed up over the course of two years to produce a study entitled "Economic Evaluation of Coastal Land Loss in Louisiana"\* under the auspices of the CPRA.

The researchers created a link between the potential of land loss and resulting economic impacts by first defining how much land would likely wash away in several future scenarios as described by models referenced by the 2012 Coastal Master Plan. The next step in the research was to quantify the economic contribution of the business and household spending activity conducted on those lands as well as the assets at risk and their replacement costs.

Counting the cost of land loss to Louisiana followed each of the various erosion scenarios but it also postulated further land loss or storm damage as a result of the coastline's shift. This added perspective on the cost of land loss coupled with the potential for damage to gradually exposed tracts of land which had historically been considered safe

gave Louisiana lawmakers a clearer picture of how much the state and nation stood to economically lose without a solid plan for conservation. Each of the studied scenarios sought to account for the ecological impacts as well, given that a significant part of the draw for tourists to Louisiana's coast are its wildlife and natural areas.

Though the scope of the study cast a wide net over the state's economic and ecological landscape, it was not without significant strictures. Primarily, the study assumed that the state's economic profile would remain unchanged from year to year throughout the timeframe of the study. Though the approach seems to ignore the potential for technology change or how markets might shift within the state's borders, it does make the results of the study easier to digest and share. And even though the results of the study are not inherently comprehensive, they do describe a range of probable outcomes which are reliable enough to inform policy making and conservation planning. The following highlights some of the study's results:

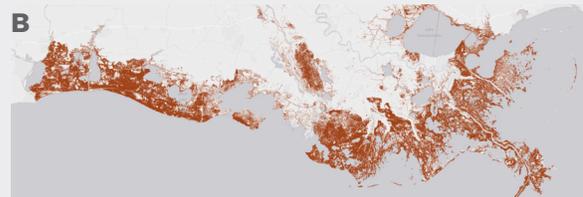
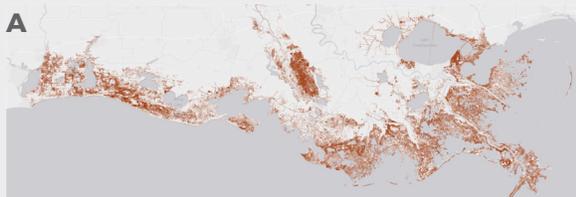
## LAND LOSS SCENARIOS

As the basis of the study, the given estimates of land loss at 25 and 50 year time horizons from Louisiana's 2012 Coastal Master Plan were used. Given current understanding of geophysical processes, a longer time horizon is expected to result in greater land loss. At each time horizon, both a "moderate" and "less optimistic" environmental scenario from the Coastal Master Plan were assessed. Finally, to factor in increased storm damage associated with land loss, the analysts used estimates of increases in flooding with and without land loss for three hypothetical storm alternatives drawn from models used in the 2012 Coastal Master Plan.

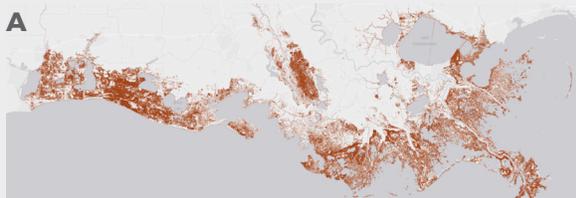
Time Horizon	Environmental Scenario
25-year	Moderate
25-year	Less Optimistic
50-year	Moderate
50-year	Less Optimistic

"Moderate" corresponds to conditions leading to relatively less land loss. "Less optimistic" corresponds to conditions leading to relatively more land loss. The less optimistic scenario assumes higher rates of sea level rise and increased subsidence, higher storm intensity and frequency, and more susceptible marsh conditions.

### Land loss at 25 years with A) Moderate Scenario, B) Less Optimistic Scenario



### Land loss at 50 years with A) Moderate Scenario, B) Less Optimistic Scenario



Source: Authors based on 2012 Coastal Master Plan projections. Red pixels denote projected land loss. Read more at [coastal.la.gov/our-plan/2012-coastal-masterplan](http://coastal.la.gov/our-plan/2012-coastal-masterplan).

## TRANSLATING LAND LOSS AND STORM DAMAGE INTO ECONOMIC IMPACTS

Creating a correlation between land morphology and economic change and then translating those changes into economic impacts followed a basic methodology. According to the study:

The analysts compiled data on capital stock and activities that currently rest on land that is predicted to be lost in a future without action. Those are “at risk” capital stock and activities. For storm damage effects, the analysts combined current economic data with storm surge and flood data, using simulation models to calculate the increase in estimated storm damage after land loss relative to the expected damage from the same storm with today’s coast. They did not simulate future changes in economic patterns of activity or population movement in Louisiana, given the level of uncertainty involved in making such predictions.

IMPLAN was used to document the economic contributions of businesses at risk from direct land loss and increased storm damage on the state of Louisiana and the rest of the country. “Using the North American Industry Classification

System (NAICS) code identified for each at-risk business, businesses were linked to IMPLAN sectors using the crosswalk provided by IMPLAN. For each IMPLAN sector, at-risk businesses whose primary output falls in that sector were aggregated by employment for each of the two future environmental scenarios at 50 years using the InfoUSA establishment dataset.

The previously reported business activity at risk was treated as the potential direct effects of land loss on the coastal Louisiana region. The defined direct effects were used to estimate the “economic activity generated by businesses directly at risk from land loss on Coastal Louisiana.” A multi-regional input-output (MRIO) model was used to estimate the impact this direct effect would have on the rest of Louisiana (without the coastal parishes) and the rest of the United States.

### Total annual output at risk from land loss

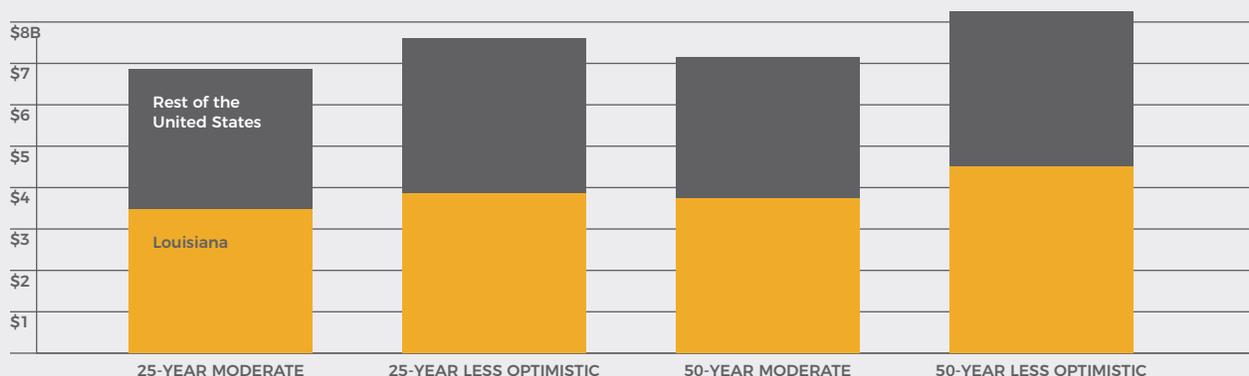




Photo by William Recinos

# Putting the Results to Work

“Every dollar we spend today on coastal restoration and protection will save us many, many more dollars in the future,”

said CPRA Board Chairman Chip Kline. “But beyond being cost-feasible, we’re talking about saving lives, families, homes, business and our way of life. This study by LSU and RAND is important in making our case to Congress and the nation that it is better for many reasons to spend now rather than later.”

## The CPRA publishes findings

The team published the study’s findings in December 2015. The CPRA quickly shared the study thereafter, issuing a press release online which outlined the top-level results.

Findings from the study include replacement costs to commercial, residential, and network infrastructure directly resulting from land loss from \$2.1 billion in a moderate environmental scenario after 25 years to \$3.5 billion in a less optimistic environmental scenario after 50 years. Direct land loss also has the potential to impact business activities in Louisiana and around the nation in a range from \$5.8 billion in a moderate environmental scenario after 25 years to \$7.4 billion in a less

optimistic environmental scenario in 50 years. These direct impacts to the economy due to land loss include disruptions at between 807 and 1,182 business structures and put at risk between 8,801 and 12,234 jobs.

The study also included discussions of the value of ecosystem services provided by coastal wetlands, commodity flows by transportation mode in coastal Louisiana, considerations on business survival post disaster, and recommendations for future research.

Among those recommendations was an evaluation of the 2012 Coastal Master Plan. The 2012 version of the plan had included quantification methods for ecological conservation related to specific species whose populations were known to be health indicators for their respective habitats. The 2012 plan relied on a handful of models which anticipated changes in freshwater sources or storm surge related to wage availability as well as extrapolating potential land morphology and ecohydrology. But what the plan lacked was adequate valuation of those tangible effects on the ecology which would translate to economic activity throughout the state and country. The study outlined several valuation models which set ranges of dollar values for the natural resources which fell under the 2012 plan’s concern. Converting observable resources to values would give the state of Louisiana the sorts of economic inputs it would need to repeat parts of the study using IMPLAN to track relative or total economic impacts over time. When the study applied these valuation models it found that “habitat values for commercial fisheries and birds are two to three times the estimates from the estimated value of capital from reduced storm damage, suggesting that ecosystem service values are far from trivial.”

## TOTAL EMPLOYMENT IMPACTS

### Jobs at risk for businesses in Coastal Louisiana

Land Loss Scenario	25-year Moderate	25-year Less Optimistic	50-year Moderate	25-year Less Optimistic
Direct Impact	8,800	9,600	9,800	12,200
Indirect Impact	3,800	4,300	4,100	5,100
Induced Impact	3,900	4,500	7,300	5,500
Total Impact	16,500	18,400	18,200	22,800

### Jobs at risk for businesses in the rest of Louisiana

Land Loss Scenario	25-year Moderate	25-year Less Optimistic	50-year Moderate	25-year Less Optimistic
Direct Impact	0	0	0	0
Indirect Impact	430	490	450	550
Induced Impact	190	210	200	250
Total Impact	620	700	650	800

### Jobs at risk for businesses in the rest of the United States

Land Loss Scenario	25-year Moderate	25-year Less Optimistic	50-year Moderate	25-year Less Optimistic
Direct Impact	0	0	0	0
Indirect Impact	6,000	6,800	6,300	7,500
Induced Impact	5,000	5,600	5,200	6,300
Total Impact	11,000	12,400	11,500	13,800

## Louisiana's state legislature responds

Five years after its inception, the Coastal Master Plan got its update with careful consideration for the “Economic Evaluation of Coastal Land Loss in Louisiana” study and even highlighted it and its authors by name throughout the plan. The CPRA published its updated plan in June 2017. And,

shortly thereafter, released appendices which included and expanded on a new focus on resource valuation and economic impact of conservation projects. This new economic lens enabled the CPRA to evaluate proposed conservation projects based on potential economic impact, contribution, or loss alongside the already well-established ecological parameters that had been implemented and refined since the original 2012 version of the plan.



# Nurturing a Healthier Coastline

The land-building crevasse project in the Pass-a-Loutre Wildlife Management Area is among the projects which saw continued investment under the 2017 Master Coastal Plan.

The project was originally hatched in 1986 with a simple but ultimately effective idea: copy mother nature's blueprints for building the Mississippi delta.

Year after year, the river water carries mud and silt from upriver to the farthest reaches of the delta where the Mississippi's payload is deposited in marshlands or into the ocean. But over time, the force of the river's flow carves new paths through the marshland and forms deltas, bypassing the land deposits which it initially created.

Conservationists identified a part of an estuary into which they punched three holes or "crevasses."

The crevasses redirected the flow of water toward an empty bay nearby. Sediment and mud flowed with the water through to the bay and created over 760 acres of new land. The state would employ the technique again and again over the course of the following 30 years leading up to Katrina with great success. And when Katrina struck, effectively wiping away acres of coastal marshland into the gulf of Mexico, conservationists were able to employ the same land restoration technique which replaced what was lost in just over ten seasons.

The completion of other conservation projects followed suit. By 2017, between federal, state, and nonprofit programs over 1,000 acres of marsh were built and more than 32 miles of shoreline were restored.

The successes of the 2017 Coastal Master Plan and its economic insights helped guide discussions on the statehouse floor concerning the budget for restoration projects in 2019. The Louisiana Legislature unanimously adopted the proposed spending plan for the coming fiscal year submitted by the CPRA.

"It says a lot about Louisiana that we can set aside any political differences to pull together on an issue as critical as this, which is to protect and restore our coast," said Johnny Bradberry, Governor's Executive Assistant for Coastal Activities and CPRA Board Chairman.



Photo by Ron Dauphin



# The Takeaway

Carefully researched and informed policy making is on the rise. Louisiana's is only one example of the many legislative bodies that are turning more and more to rigorous scientific methods to discern societal, ecological, or infrastructure priorities for a region. More legislators today have a background in the social sciences than ever before. Virginia was the first to elect a PhD economist to the United States House of Representatives.

It follows, then, that translating the legislative concerns of an area into their potential economic contribution, extrapolated into tax revenue, and then ROI for the people's investment in their government are essential in telling the story of any state-funded project.

"We are always looking for ways to make parish and state funds go farther and this program serves as an excellent model for how to partner at the state and local level to maximize project outcomes," said Johnny Bradberry, Chairman of the CPRA Board.

**Take the first step now! To start your economic impact analysis today, visit [IMPLAN.com](http://IMPLAN.com).**

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