



INCORPORATING LOCAL KNOWLEDGE INTO ECOLOGICAL RESTORATION ASSESSMENTS: CASE STUDIES FROM COASTAL LOUISIANA

National Conference on Ecosystem Restoration
New Orleans, LA
August 29, 2018

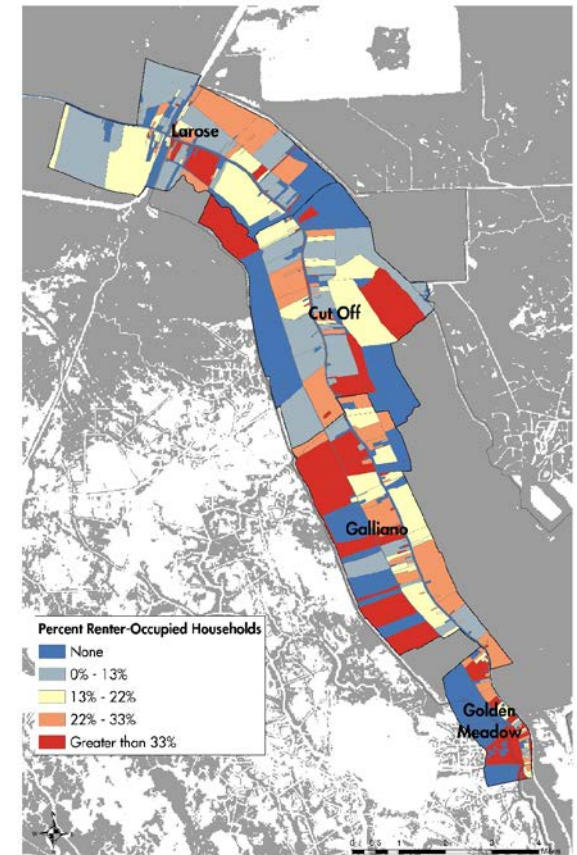
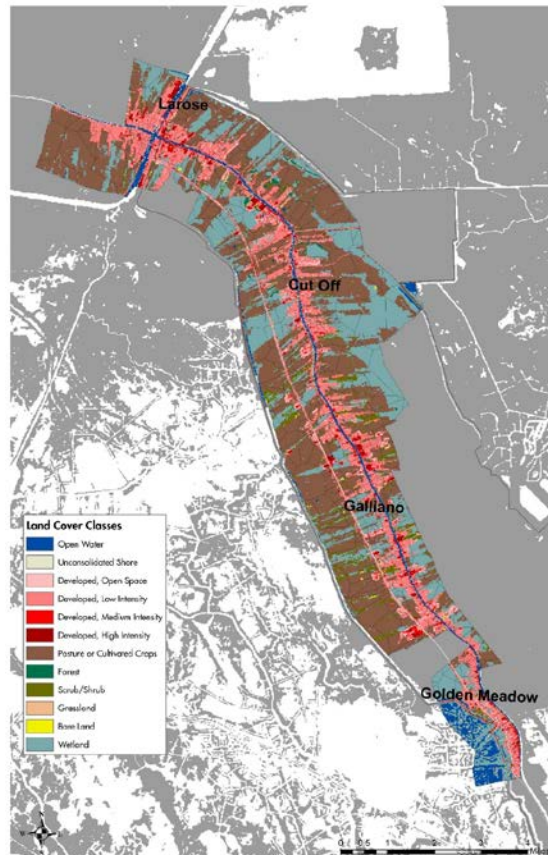


**THE WATER INSTITUTE
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INCORPORATING LOCAL KNOWLEDGE INTO ECOLOGICAL RESTORATION ASSESSMENTS

- Ecological restoration and other activities that interact with environmental systems have typically relied on scientific analysis to predict the impacts of these projects, and have operated on the assumption that good science could reveal and remedy potential problems
- Because environmental management is fundamentally a human activity, however, effective predictions of human impacts demand equal attention to the social, political, cultural, and economic systems in which environmental management takes place
- Ultimately, for coastal protection and restoration to proceed in a socially just manner, the coastal planning process will need to strike an effective balance between science-driven processes and engagement with residents and stakeholder groups who are especially vulnerable to risk as well as those who are likely to be affected by policy actions.



INCORPORATING LOCAL KNOWLEDGE INTO ECOLOGICAL RESTORATION ASSESSMENTS

Methodological advances that allow for the input of qualitative local knowledge into mathematical models have provided tangible ways to evaluate potential shortcomings of ongoing and planned restoration and protection projects

- Understanding Where and Why Ecological Restoration Matters – Utilizing **Participatory Mapping** Techniques
- Understanding What Changes – Locally Grounded **Valuation** Techniques
- Working with **Competency Groups** to Develop Natural and Nature-based Defense Assessment and Solution Tools



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UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES

Goal:

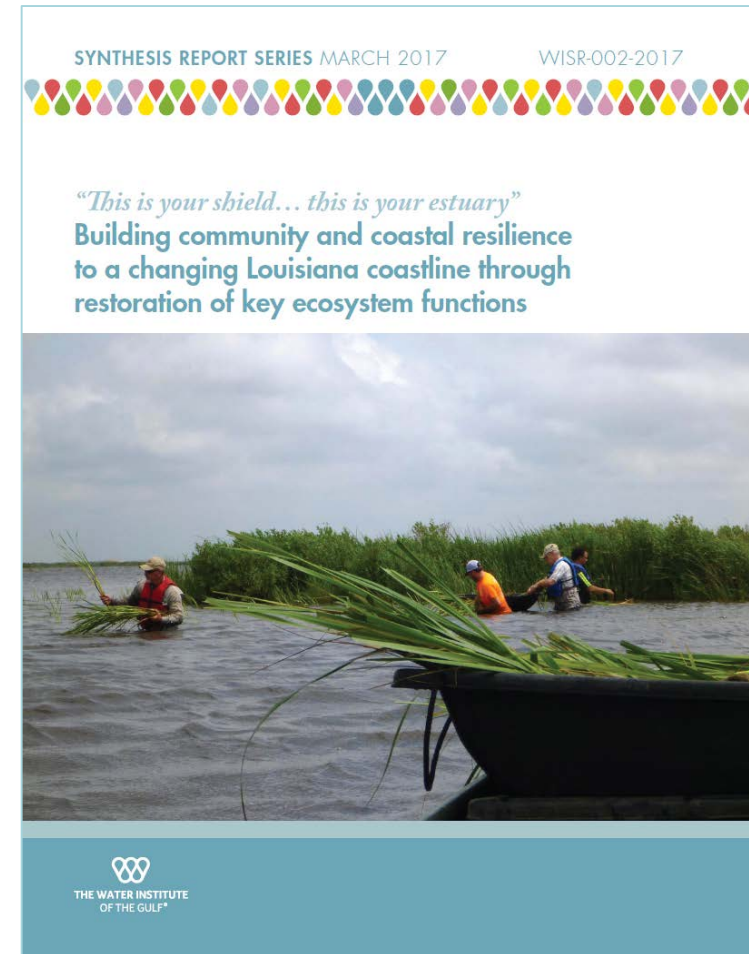
- To assess the capacity of ecosystem based approaches to provide additional non-structural protection to enhance resilience in some of Louisiana's most vulnerable coastal communities.

Activities:

- Gather and disseminate data on the ecological and cultural function of coastal ecosystems through community and science-based workshops.

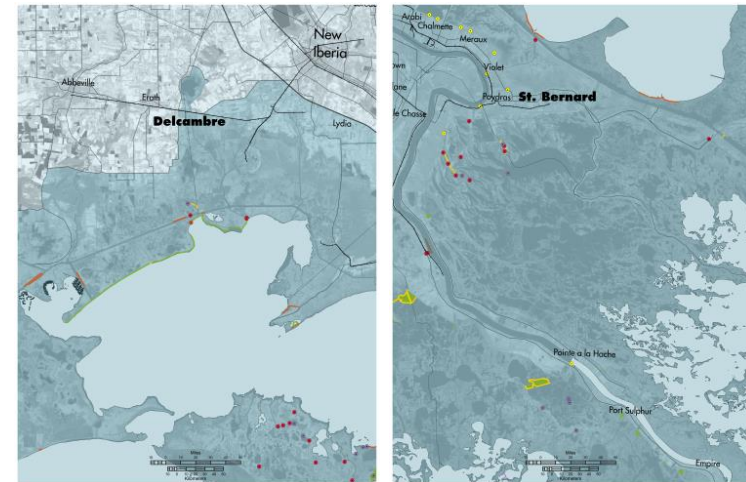
Product:

- Producing graphics and informative brochures for the wider public on the value of ecosystems services for enhancing coastal resilience



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES

In spring 2016, the Water Institute hosted several community mapping workshops in Delcambre and St. Bernard, LA. We asked residents to geographically identify and evaluate places of ecological, cultural, economic, and protective significance. Workshops will address what residents feel is under threat, and how coastal ecosystems can increase resilience of coastal communities. Qualitative and geospatial data were integrated with findings from the October 2015 workshops to create the final report and booklet.



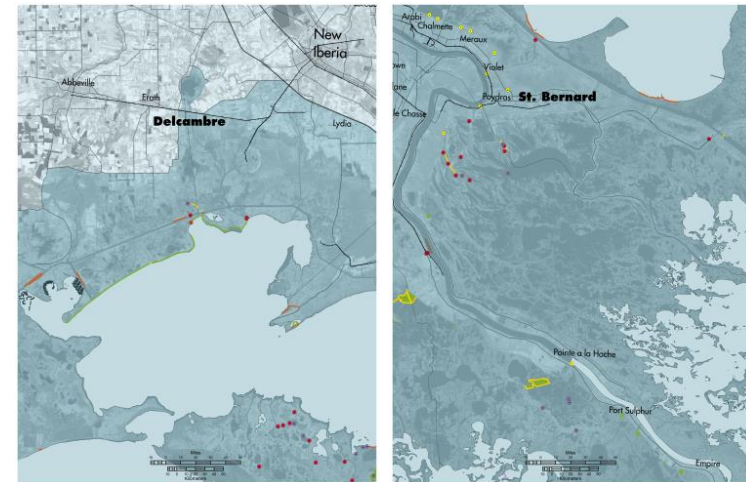
UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS – UTILIZING PARTICIPATORY MAPPING TECHNIQUES

Site selection criteria

- Two different coastal ecosystem transects – Vermillion/Iberia and St. Bernard Parishes
- Places that encompass significant economic and cultural diversity
- Communities that largely reside outside of structural flood and storm surge protection projects
- Areas that potentially benefit from the protection services ecosystems can provide

Methods

- Collaboration with community leaders to invite participants and host workshops
- Participatory mapping with a demographic cross-section of coastal communities
- Comparative coastal case studies
- Qualitative coding and analysis of mapping practices and discussions from workshops
- Peer review of findings and draft publications with community leaders and representatives



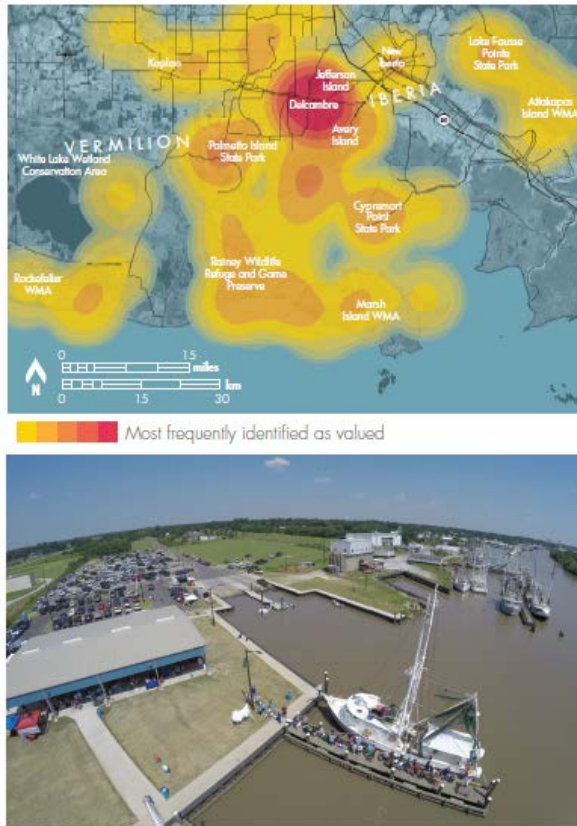
UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES

Workshop Approach

- Conducting research in place, where the community members are
- The public was invited to identify locations of value, threat, and restoration potential, both regionally and locally
- Water Institute staff were on hand to interview and speak with residents about the locations they identified
- Information was gathered on the respondent's age, occupation, and zip code



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES



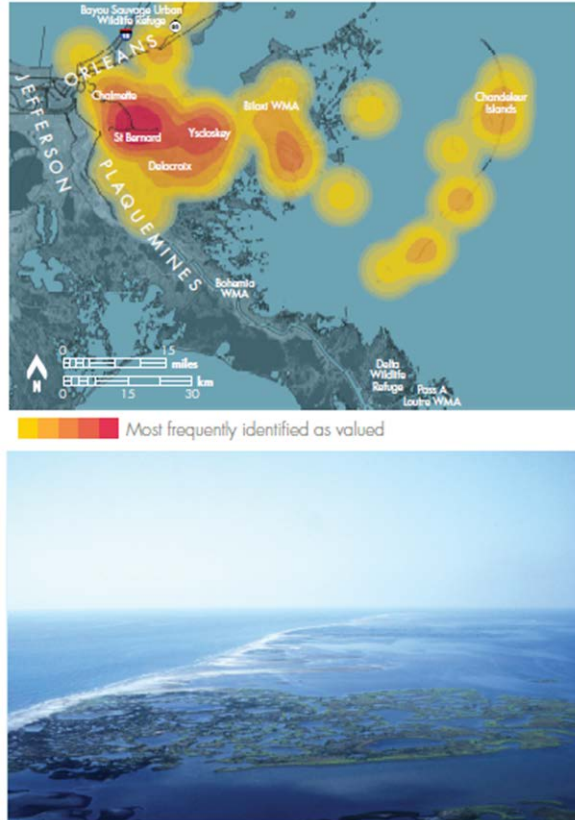
“Sometimes we go fishing or boating around in Vermilion Bay...you eat the fish that folks come in with...shrimping, crabbing...in the Intracoastal we get a lot of travelers and they stop in Delcambre as a destination...we get people from all over... tourism and ecotourism....”

Delcambre workshop participant, April 2016

COMMUNITY IDENTIFIED PLACES OF VALUE
DELCAMBRE, LOUISIANA



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES



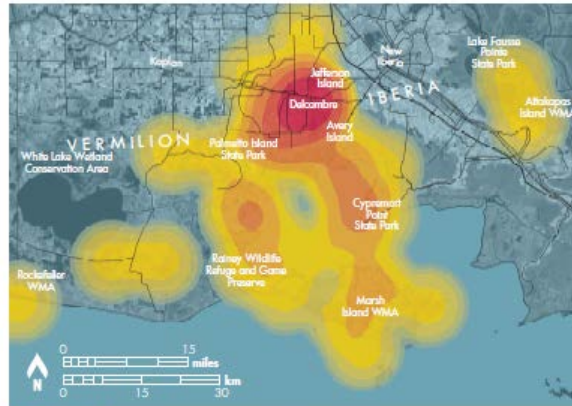
“My great-grandpa owned all of Woodland...I own 80 acres here but it’s 80 acres of water now...it was wetlands where my grandpa trapped and had a grocery store, bar room, and a seafood dock...right here.”

St. Bernard workshop participant, May 2016

COMMUNITY IDENTIFIED PLACES OF VALUE
SAINT BERNARD, LOUISIANA



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES



Most frequently identified as threatened



TOP 5 LOCATIONS OF CONCERN

LOCATION	FREQUENCY
Local bayous and canals	23
Area schools	19
Vermilion Bay	15
Town of Delcambre + Part of Delcambre	14
Avery and Jefferson Islands	6

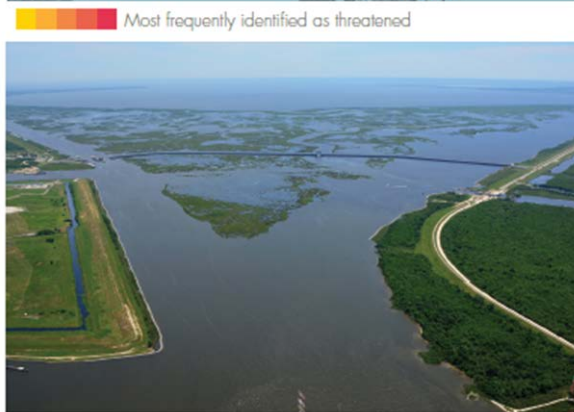
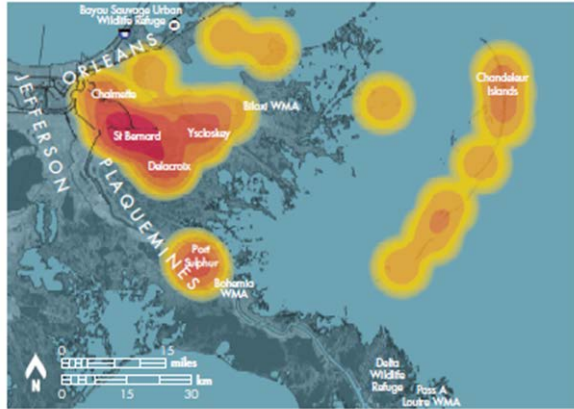
“Storm surge comes up Bayou Tigre and up the canal and up and down the town roads. Rita was a tidal wave. Ike was a gradual rise. I remember picking up people on roofs, and the next day I took pictures with the National Guard who flew over. Afterwards I couldn’t talk...”

Delcambre workshop participant, April 2016

COMMUNITY IDENTIFIED THREATS AND CHALLENGES DELCAMBRE, LOUISIANA



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES



TOP 5 LOCATIONS OF CONCERN

LOCATION	FREQUENCY
Fishing villages	29
Breton/Chandeleur Sound	23
Caernarvon	14
Lake Lery + Big Mar	13
MRGO	12
Bayou La Loutre + Bayou Terre Aux Boeufs	11

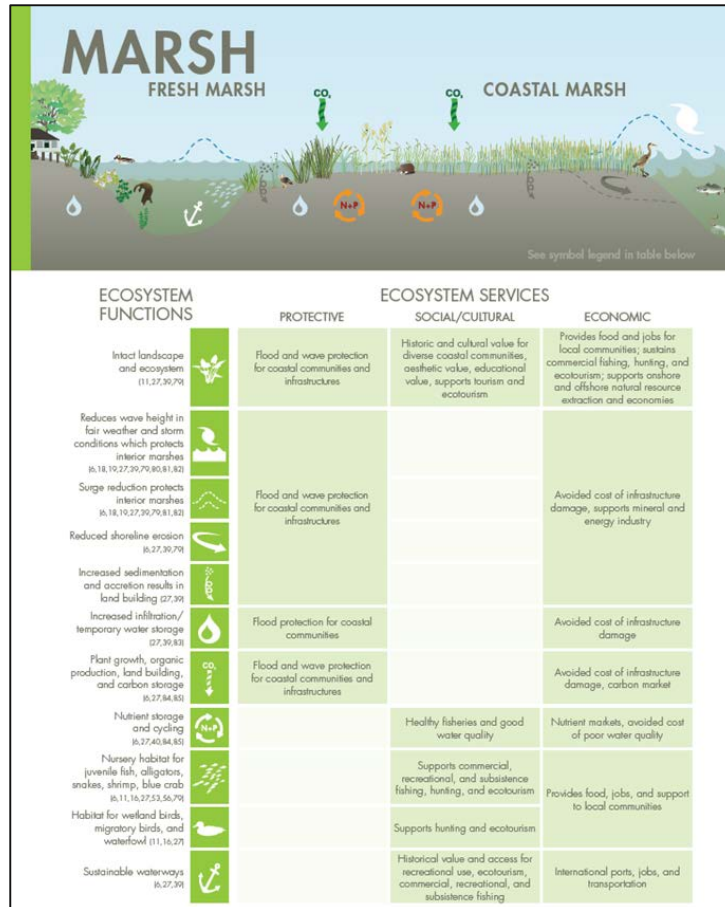
"I shrimp for a living. And I shrimp out here where there are times when I don't even get a slack tide and the reason for that is because we lost all these little islands [Chandeleur Islands] and the tide just doesn't slow down...it just comes in and goes back out...we don't get a slack tide in the bayou."

St. Bernard workshop participant, May 2016

COMMUNITY IDENTIFIED THREATS AND CHALLENGES SAINT BERNARD, LOUISIANA



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES



CONSTRAINTS ON DELIVERY OF ECOSYSTEM FUNCTIONS

A technical perspective: Marshes within coastal Louisiana are not uniform: there are large differences in physical structure and dominant plant species of fresh, intermediate, brackish and saline marshes,^{6,37,80,89} which results in large differences in the ecosystem functions provided by these different marsh types. In this document, coastal marshes includes intermediate, brackish, and saline marshes. Reduced sediment delivery to large areas of these marshes has resulted in increased marsh loss.²⁷ Hurricanes directly damage marsh,^{14,15,27,29,49} and both the track and strength of storms has a large influence on how effective marsh areas are in providing wave and surge attenuation.^{15,29}

WHAT ARE THE ECOSYSTEM-BASED RESTORATION OPTIONS?

- Plant vegetation
- Terracing
- Stop shoreline erosion using fences and Christmas trees
- Restore ridge and bayou
- Dredging
- Backfill canals
- Long-term maintenance of restoration and planting projects
- Remove nutria and hogs
- Invasive plant control
- Sediment and river diversions

HOW CAN RESTORATION HELP BUILD COMMUNITY RESILIENCE?

A community perspective: Coastal marshes are the backbone of social-cultural, economic, and physical resilience in coastal Louisiana. For many, the marsh is simply "home." The range of marsh ecosystems in Louisiana support diverse cultural traditions and economies directly tied to the range of fresh to saltwater coastal marshes. Fishing, hunting, shrimping, and foraging in these landscapes have provided sources of income, sustenance, and recreation for Louisianians for multiple generations with histories that easily predate the establishment of the state of Louisiana. Many community members would like to continue these traditions that marsh restoration could potentially sustain. Different marsh landscapes also provide significant protection as buffers between community settlements and hurricane storm surge and wind damage. There is agreement between residents and policy makers that these marshes are important for the protection and sustainability of coastal communities.

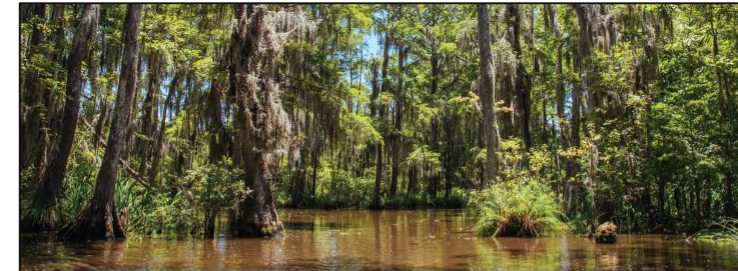
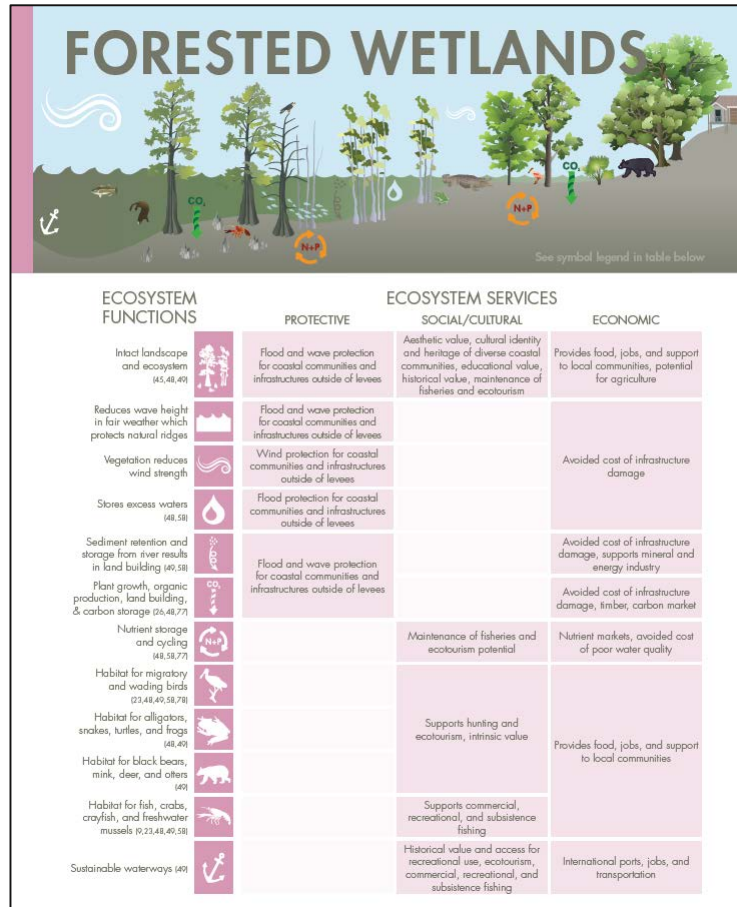
"If we rebuild the coastal marsh...the more we have out there, the more protection we have here. That is the whole reason we are flooding more...because the coastal marsh is gone."

Delcambre workshop participant, April 2016

SYNTHESIS AND REPORTING



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES



CONSTRAINTS ON DELIVERY OF ECOSYSTEM FUNCTIONS

A technical perspective: Water level,^{25,49} flow, and quality are essential in supporting intact forested wetlands that can deliver ecosystem functions. Alterations to water flow^{23,25,29,48,49} can cause water stagnation and low oxygen,^{26,28} as well as limiting drying to allow growth of new tree seedlings.²⁴ In addition, altered water flow can increase water salinity.²³ All of these changes degrade the structure of forested wetlands²⁴ and delivery of ecosystem functions. Other constraints include changes to forest structure due to historic logging^{24,25,45,48} and hurricanes resulting in tree loss.²⁴

WHAT ARE THE ECOSYSTEM-BASED RESTORATION OPTIONS?



HOW CAN RESTORATION HELP BUILD COMMUNITY RESILIENCE?

A community perspective: The maintenance and restoration of forested wetlands provides valuable storm surge and wind protection for low-lying coastal communities. They can store floodwaters from hurricanes and frequent flooding events from sustained eastern or southerly winds that periodically flood communities. Secondly, forested wetlands are deeply connected to fishing, foraging, and hunting traditions and subsistence practices that flourish with the biodiversity this ecosystem sustains. Numerous diverse coastal communities are descended from peoples who used the forested wetlands in this manner. Restoring these lands has the potential to sustain these social/cultural and economic ecosystem services and facilitate the maintenance of cultural traditions and histories that are connected to the resources of forested wetlands. Finally, many of the historic ridges that follow bayous are sites where generations of coastal families have established homes and camps. On naturally higher ground, these areas are historically and currently desirable sites to build homes for families who live off the resources of forested wetlands and surrounding marshes.

“Years and years ago this was a cypress freshwater swamp. Then they came in and dug the channel, letting all the saltwater in, saltwater that killed all the cypress and oak trees. The whole system changed from forested wetlands to a brackish marsh.”

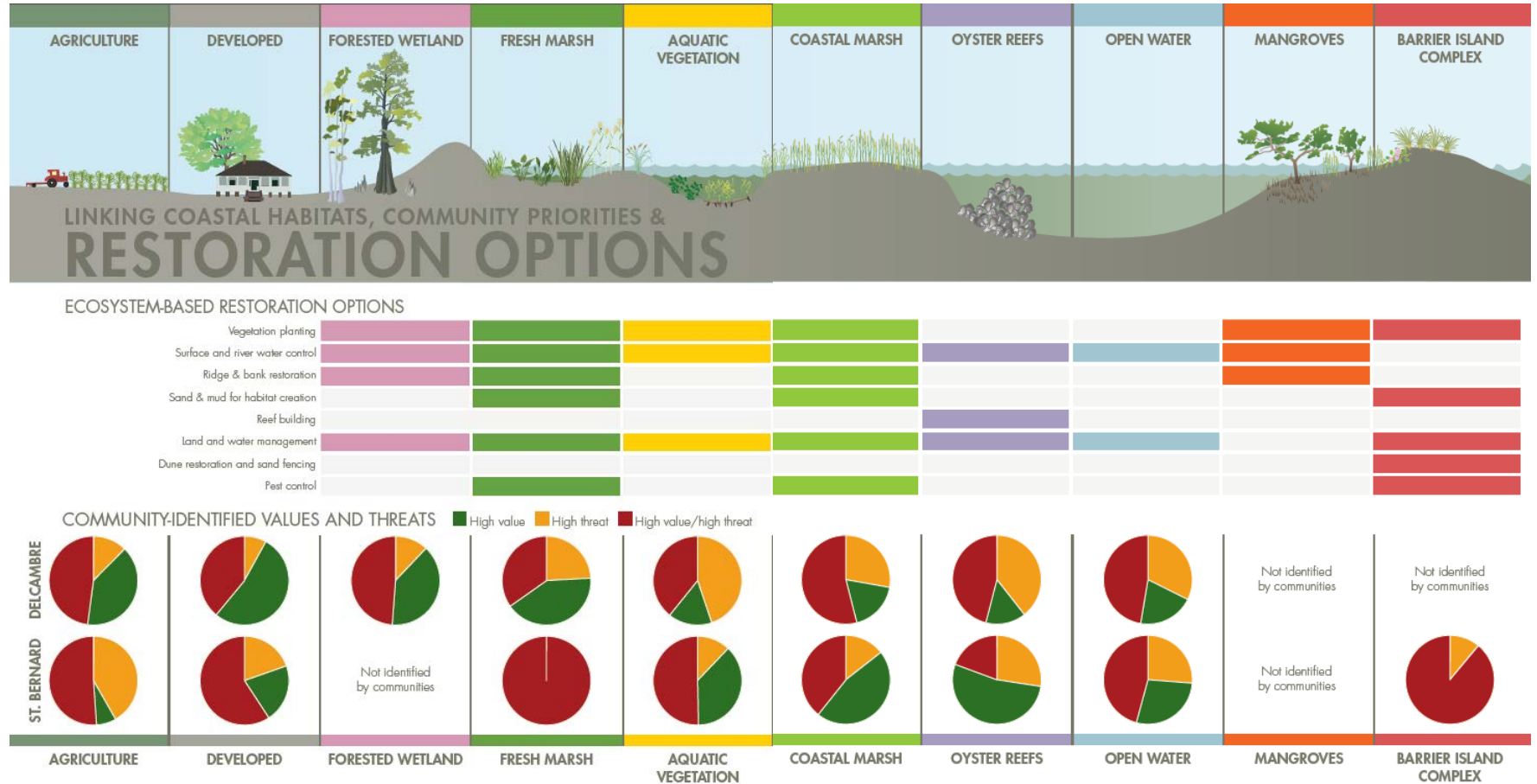
St. Bernard workshop participant, May 2016

SYNTHESIS AND REPORTING



UNDERSTANDING WHERE AND WHY ECOLOGICAL RESTORATION MATTERS - UTILIZING PARTICIPATORY MAPPING TECHNIQUES

Synthesis and Reporting:
 Linking community identified area of value and threat to habitat types present within those areas has the potential to assist in prioritizing ecosystem-based restoration options in those locations



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UNDERSTANDING WHAT CHANGES – LOCALLY GROUNDED VALUATION TECHNIQUES

Goal:

- To collaboratively analyze the social, economic, and environmental benefits of investing in reforestation efforts and assess the social value of restoration projects in the Mississippi Alluvial Valley (MAV) of Louisiana

Activities:

- Conduct a forecast Social Return on Investment (SROI) analysis designed to understand and predict the impacts and outcomes of restoration activities on key stakeholders.

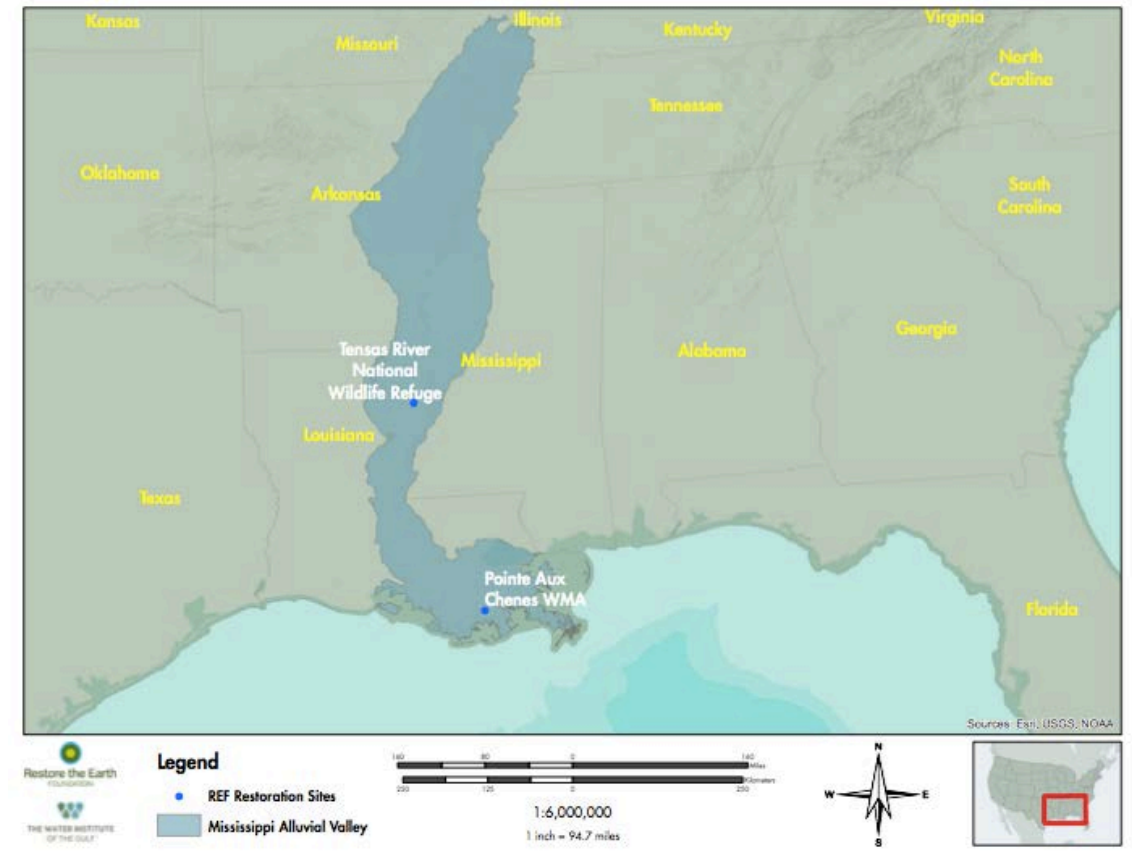
Product:

- Technical report that went through rigorous third party review and assurance by Social Value International



UNDERSTANDING WHAT CHANGES – LOCALLY GROUNDED VALUATION TECHNIQUES

In fall 2016, the Water Institute and the Restore the Earth Foundation conducted research to 'ground test' the anticipated social change that would accompany the Pointe-aux-Chenes cypress reforestation project through qualitative and quantitative research with stakeholders. This research explored the social impacts and outcomes experienced by stakeholders as they were described to The Water Institute through focus groups, meetings, and one-on-one interviews.



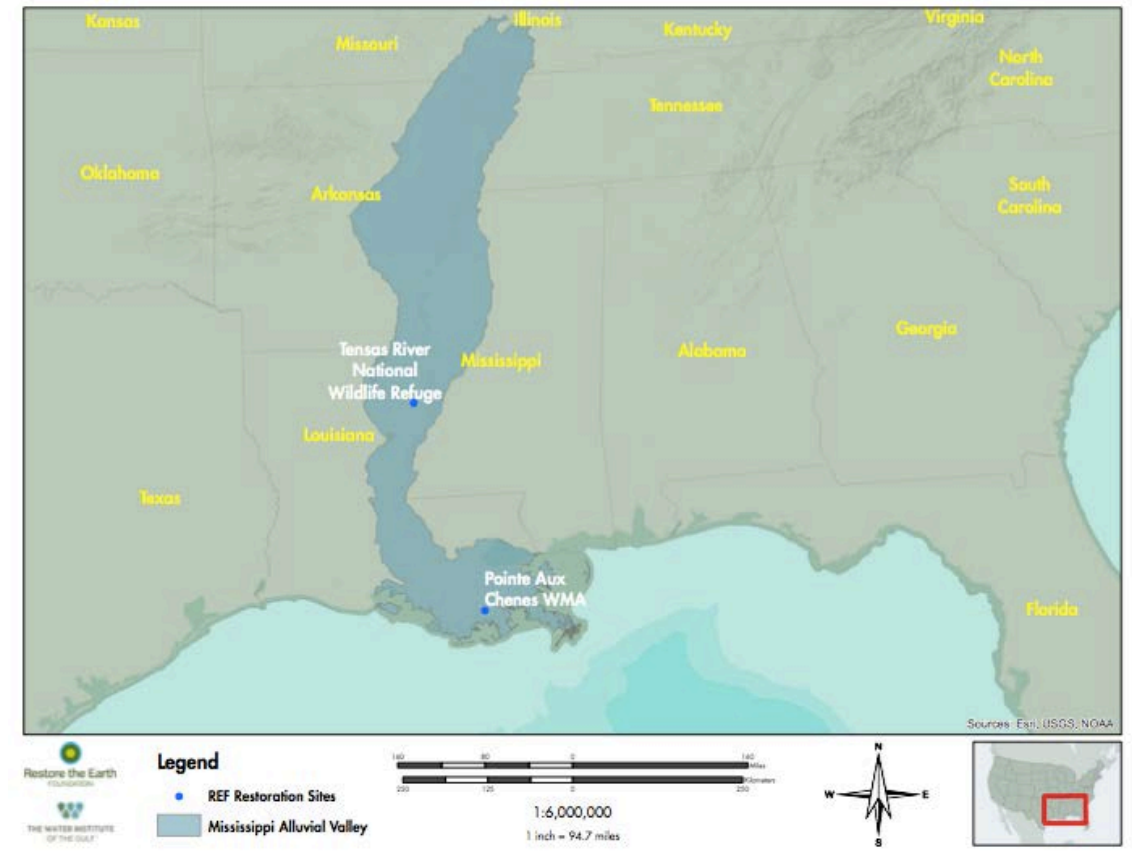
SOCIAL RETURN ON INVESTMENT (SROI) ON REFORESTATION PROJECTS IN THE MISSISSIPPI ALLUVIAL VALLEY



UNDERSTANDING WHAT CHANGES – LOCALLY GROUNDED VALUATION TECHNIQUES

Methods

- Collaboration with community leaders to invite participants and host workshops
- Identification of all potentially impacted stakeholders
- Participatory mapping with a relevant cross-section of stakeholders
- Comparative case studies
- Qualitative coding and analysis of mapping practices and discussions from workshops
- Incorporation of results into a Social Return on Investment framework, assuring that the project sponsor incorporates all potential outcomes (positive and negative) into their project valuation



SOCIAL RETURN ON INVESTMENT (SROI) ON REFORESTATION PROJECTS IN THE MISSISSIPPI ALLUVIAL VALLEY



UNDERSTANDING WHAT CHANGES – LOCALLY GROUNDED VALUATION TECHNIQUES

Qualitative Research Approach

- The Water Institute conducted **focus group** sessions for Pointe-aux-Chenes WMA and the Tensas River NWR. Focus groups were used to create an opportunity to reach several stakeholders at the same time.
- Each participant completed a short informational **survey** that gave us a more direct sense of how each stakeholder used the Pointe-aux-Chenes WMA and the Tensas River NWR.
- The Water Institute created a long-form interview guide that was used for one-on-one **interviews** with stakeholders.



SOCIAL RETURN ON INVESTMENT (SROI) ON REFORESTATION PROJECTS IN THE MISSISSIPPI ALLUVIAL VALLEY



UNDERSTANDING WHAT CHANGES – LOCALLY GROUNDED VALUATION TECHNIQUES

Interviews focused on understanding how reforestation of the Pointe-aux-Chenes WMA and the Tensas River NWR impacted local and regional communities, including:

- Economic value, particularly for regional businesses;
- Recreational value, specifically in terms of hunting, fishing, paddling, birding, and other non-consumptive uses;
- Cultural value, pertaining to local culture and history;
- Education and research value, for the general public, k-12, and university researchers;
- Ecological value, specifically in terms of habitat restoration; and
- Water quality and flood control.

Outcomes	Statements from Stakeholder Affirming Outcomes
Community services and outreach • Increased sense of community pride	"People would start to feel more pride and sense of value for the land that had a lot of love for. It could lift people out of depression. I think if it were reforested it would bring back life to the community."
Indigenous communities • Use of reforested areas for cultural rituals and traditions	"We had this huge discussion with anthropologists about cypress trees, and I have cypress baskets from my grandfather that are over 100 years old. I know how to make cypress baskets but we don't have cypress like we use to have [...] I would be so excited to be able to work with them to get our trees for our baskets. That is so important. We have baskets in all kinds of museums all over the country - there are so few."
Education and research • Sustained or increased opportunities for educational and research programs for k-12 and university students and environmental researchers	"To me this is a great area to educate people and that is more of what we need to do. Education is so important not only on a local level but so many people in this world don't know what is going on down here [land loss]."

Outcomes	Statements from Stakeholder Affirming Outcomes
Those employed directly by the reforestation project • Direct employment for local nursery and planting services	"It [the reforestation] will give me work and help the locals - I hired 4 or 5 locals to help with the plantings. That will be for 4 or 5 years."
Those indirectly employed by the reforestation project: Local business • Creates the potential of more visitors frequenting local businesses	"Those marshes come in good, now you put people to work. You bring in green jobs [...] you are putting people back to work and out of the oil fields. "
Those indirectly employed by the reforestation project: State and federal wildlife managers • Creates new areas for LDWF management and monitoring	"We have 7 of us working at this WMA [...] [reforestation] would re-work priorities for management."

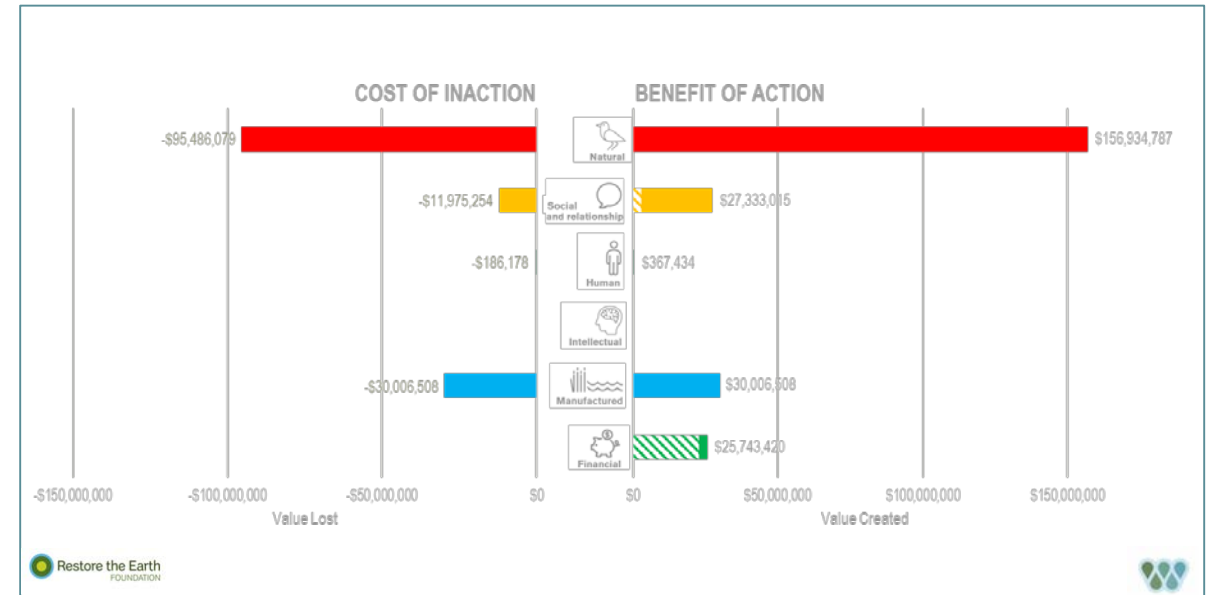
SOCIAL RETURN ON INVESTMENT (SROI) ON REFORESTATION PROJECTS IN THE MISSISSIPPI ALLUVIAL VALLEY



UNDERSTANDING WHAT CHANGES – LOCALLY GROUNDED VALUATION TECHNIQUES

SROI puts a value on the amount of change (impact) that takes place as a result of the program and looks at the returns to those who contribute to creating the change. It estimates a value for this change and compares this value to the investment required to achieve that impact, resulting in an SROI ratio:

- An investment of \$15,467,764 in the 2016 financial year creates approximately \$218,076,777 of net social impact over 40 years, resulting in an SROI ratio of 14:1
- \$25,664,585 in direct market value is returned to investors, a direct market return of \$1.66 for every dollar invested.



SOCIAL RETURN ON INVESTMENT (SROI) ON REFORESTATION PROJECTS IN THE MISSISSIPPI ALLUVIAL VALLEY



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WORKING WITH COMPETENCY GROUPS TO DEVELOP NATURAL AND NATURE-BASED DEFENSE ASSESSMENT AND SOLUTION TOOLS

Goal:

- Develop collaborative approaches through participatory modeling with communities potentially produce innovative solutions or tools for reducing coastal risk

Activities:

- Competency Group methods rely on controversy to prompt local residents to engage with science, bringing scientists and concerned public together
- Attendees: Commercial fisherman, marina owners, charter fisherman, land manager, Louisiana Sea Grant extension agent, ecologists, engineers
- Host a series of monthly meetings facilitated by social scientists

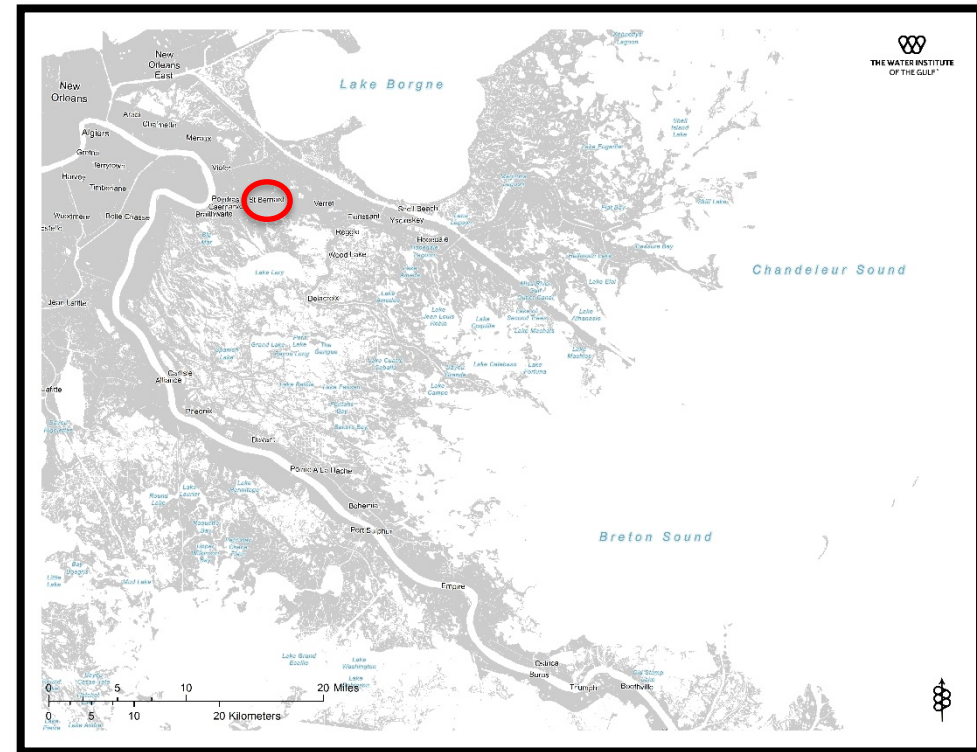


Competency Group Meeting #3, May 29, 2018



WORKING WITH COMPETENCY GROUPS TO DEVELOP NATURAL AND NATURE-BASED DEFENSE ASSESSMENT AND SOLUTION TOOLS

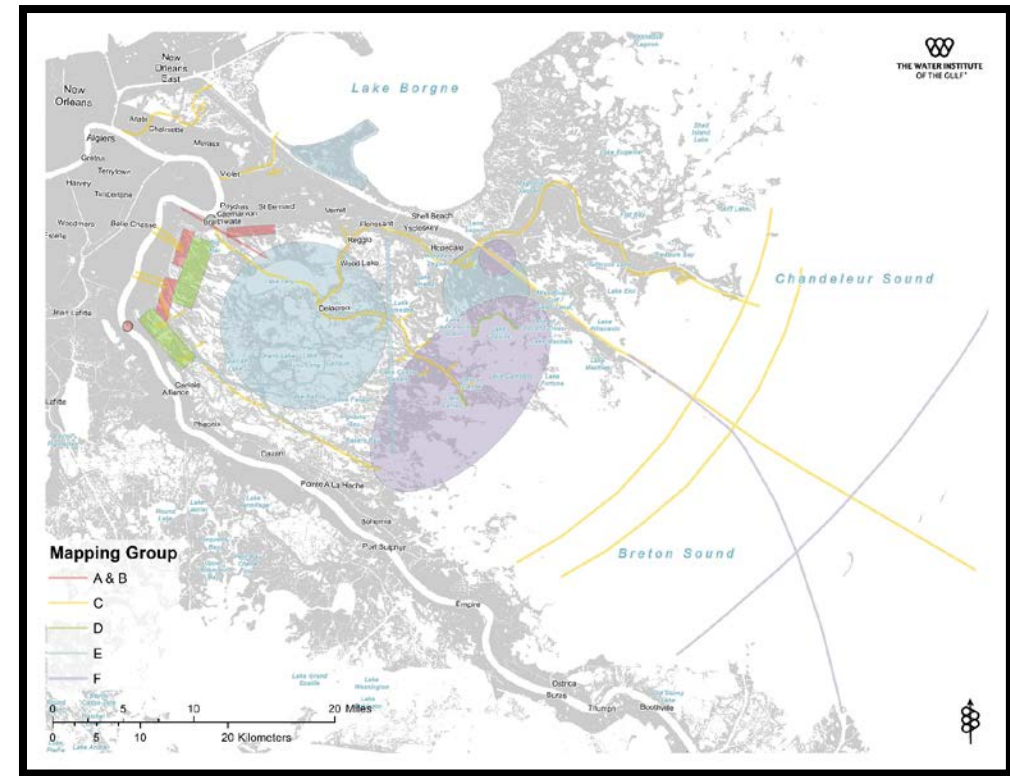
In spring 2018, the Water Institute of the Gulf began an ongoing project to co-design and 'ground test' a suite of advance ecological and hydrodynamic models for Breton Sound, developed in partnership with local resource users and TEK experts in Saint Bernard, Louisiana, a community that will be directly impacted by the large-scale sediment diversion that are part of the state's Master Plan. This research explores using collaborative approaches to modeling with communities to produce innovative solutions or tools for reducing coastal risk.



WORKING WITH COMPETENCY GROUPS TO DEVELOP NATURAL AND NATURE-BASED DEFENSE ASSESSMENT AND SOLUTION TOOLS

Scenarios summarized the hand-written notes from maps for all groups:

- Projects (Nature-based):
 - Marsh terracing
 - Marsh creation
 - Reforestation
 - Ridge restoration
 - Sand nourishment
- Future Conditions:
 - TS/Hurricane conditions
 - Sea level rise
 - Allowing more sediment into freshwater diversions
 - Alter weather patterns (rainfall and drought)



WORKING WITH COMPETENCY GROUPS TO DEVELOP NATURAL AND NATURE-BASED DEFENSE ASSESSMENT AND SOLUTION TOOLS

Overall concerns of residents were used to help guide modeling efforts:

- Wetland area for future generations
- Hydrological restoration
- Proposed sediment diversion operation
- Subsidence rates
- Water quality



Competency Group Meeting #3, May 29, 2018



WORKING WITH COMPETENCY GROUPS TO DEVELOP NATURAL AND NATURE-BASED DEFENSE ASSESSMENT AND SOLUTION TOOLS

Next Steps:

- Ecosystem model runs with combinations of projects and scenarios
- Discuss the model run output at the next competency group meeting
- Develop a methodology manual to be used to guide future research
- Write manuscripts about our results



INCORPORATING LOCAL KNOWLEDGE INTO ECOLOGICAL RESTORATION ASSESSMENTS

Conclusions:

- **Integrate local knowledge with accumulated technical scientific knowledge** to fully understand the complex linkages of environmental change, key ecosystem services, and community resilience, vulnerability, and wellbeing.
- The methods presented here represent advances in **rigorous, replicable, and accessible forms of collecting local knowledge to assess and monitor the social value of ecological restoration**, providing information to agencies and communities about social and cultural factors that need to be considered in the restoration planning process.
- Qualitative data analysis successfully classifies differences in the ways stakeholder groups potentially impacted by ecological restoration projects engage with the project sites, and identifies a suite of outcomes unique to each stakeholder group. Identifying these outcomes is **integral to defining both the specific objectives and variables needed to develop a comprehensive assessment and monitoring framework**.
- Ensuring that **key stakeholders are identified and consulted early and often in the ecological restoration planning process** will allow decision-makers to identify the most socially beneficial courses of action for local, regional, and national interests.





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THANK YOU

Scott A. Hemmerling
Director of Human Dimensions



@THEH2OINSTITUTE

301 NORTH MAIN STREET, SUITE 2000
BATON ROUGE, LA 70825

(225) 448-2813
WWW.THEWATERINSTITUTE.ORG

