

# LSU Journal of Energy Law and Resources

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Volume 9  
Issue 2 *Spring 2021*

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5-5-2022

## The Morasses of Louisiana's Coastal Wetland Restoration

E. Barrett Ristroph

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### Repository Citation

E. Barrett Ristroph, *The Morasses of Louisiana's Coastal Wetland Restoration*, 9 LSU J. of Energy L. & Resources (2022)

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# The Morasses of Louisiana’s Coastal Wetland Restoration

*E. Barrett Ristroph\**

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## INTRODUCTION

Around the world, sea level is rising. Coastlines are going underwater. Particularly in the State of Louisiana, land valued by industry and communities is disappearing. Once far-fetched, ideas of reclaiming and recreating land are not so strange anymore. Even the State of Louisiana, which ignored its coastal wetland loss for decades, has rolled out plans to rebuild the coast.<sup>1</sup> Louisiana has a serious problem: an area greater than

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\* E. Barrett Ristroph, Ph.D., J.D., is a lawyer, planner, researcher, mediator, evaluator, and the owner of Ristroph Law, Planning, and Research. She practices in Louisiana and Alaska. Many thanks to Craig Colten, Eugene Turner, Blake Gentry, Karl Schultz, Kim Voorhies Goodell, John Ristroph, and Aimee Preau for their input on this article. Any mistakes are my own.

1. See Estelle Robichaux, *The History of Coastal Restoration in Louisiana: More Than 40 Years of Planning*, RESTORE THE MISS. RIVER DELTA: DELTA DISPATCHES (Aug. 17, 2015), <http://mississippiriverdelta.org/coastal-restoration-and-louisiana-more-than-40-years-of-planning/> [https://perma.cc/XLU2-V84J] (noting that the wetland loss problem was recognized as early as 1973) (citing SHERWOOD M. GAGLIANO ET AL., *CTR. FOR WETLAND RES., LA. STATE UNIV.*,

the size of Delaware was lost between 1932 and 2016,<sup>2</sup> and coastal wetlands losses could range from 42% to 99% by 2100.<sup>3</sup>

But the question of how to restore coastal wetlands in a sustainable and environmentally just way is just as serious. This Article is an effort to address that question, based on my coastal restoration work with federal and state agencies in 2019 and 2020 and a review of scientific literature. It outlines the temporal and uneven nature of the benefits and costs of restoration and calls for a way to better assess restoration projects before and after moving forward.

### I. CAUSES OF LAND LOSS

Unlike land loss in some areas that is easily attributable to climate change and sea level rise,<sup>4</sup> Louisiana's coastal land loss story is scientifically complex. There is general consensus<sup>5</sup> that much of the historic land loss relates to a reduction in sediment deposition from the Mississippi River, oil companies, and subsidence—not sea level rise.<sup>6</sup> Not

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ENVIRONMENTAL ATLAS AND MULTI-USE MANAGEMENT PLAN FOR SOUTH-CENTRAL LOUISIANA (1973), <https://www.govinfo.gov/content/pkg/CZIC-td224-18-g34-1973-v-1/pdf/CZIC-td224-18-g34-1973-v-1.pdf> [<https://perma.cc/GF4N-V8EX>]).

2. BRADY R. COUVILLION ET AL., U.S. GEOLOGICAL SURVEY, LAND AREA CHANGE IN COASTAL LOUISIANA (1932 TO 2016) (2017), <https://pubs.usgs.gov/sim/3381/sim3381.pdf> [<https://perma.cc/GG45-C2CY>].

3. Patty Glick et al., *Potential Effects of Sea-Level Rise on Coastal Wetlands in Southeastern Louisiana*, J. COASTAL RES. (SPECIAL ISSUE 63) 211, 226 (2013).

4. E.g., Michael Oppenheimer et al., *Chapter 4: Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities*, in IPCC SPECIAL REPORT ON THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE (H.-O. Pörtner et al., eds., 2019).

5. There remains a debate about how much each of these factors contributes to land loss. See, e.g., John W. Day, Jr. et al., *Pattern and Process of Land Loss in the Mississippi Delta: A Spatial and Temporal Analysis of Wetland Habitat Change*, 23 ESTUARIES 425 (2000); Brian Palmer, *Who Should Pay to Restore the Louisiana Coastline?*, PAC. STANDARD (June 14, 2017), <https://psmag.com/environment/who-should-pay-to-restore-the-louisiana-coastline> [<https://perma.cc/98X7-4HTA>].

6. Robert H. Baumann & R. Eugene Turner, *Direct Impacts of Outer Continental Shelf Activities on Wetland Loss in the Central Gulf of Mexico*, 15 ENVTL. GEOLOGY & WATER SCI. 189 (1990); Cathleen E. Jones et al., *Anthropogenic and Geologic Influences on Subsidence in the Vicinity of New Orleans, Louisiana*, 121 J. GEOPHYSICAL RES.: SOLID EARTH 3867 (2016); Robert R. Twilley et al., *Co-Evolution of Wetland Landscapes, Flooding, and Human*

only is there less sediment coming down the river due to dam and reservoir construction and better erosion control,<sup>7</sup> there is also a levee system that spares New Orleans and the petrochemical industry corridor along the river from flooding. The levees have largely eliminated the “overbank” sediment that previously flowed from the river into adjacent wetlands.<sup>8</sup>

Levees and sediment reduction are only part of the problem. The other part concerns the oil and gas companies that have been operating in Louisiana with few constraints since 1901.<sup>9</sup> Louisiana is among the top ten oil-producing states and top five natural gas-producing states.<sup>10</sup> Dredging canals into Louisiana’s wetlands has been a long-standing practice to provide access to drill sites.<sup>11</sup> The resulting saltwater intrusion

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*Settlement in the Mississippi River Delta Plain*, 11 SUSTAINABILITY SCI. 711 (2016).

7. See Arthur J. Horowitz, *A Quarter Century of Declining Suspended Sediment Fluxes in the Mississippi River and the Effect of the 1993 flood*, 24 HYDROLOGICAL PROCESSES 13 (2010); Robert H. Meade & John A. Moody, *Causes for the Decline in Suspended-Sediment Discharge in the Mississippi River System, 1940–2007*, 24 HYDROLOGICAL PROCESSES 35 (2010); Richard H. Kesel, *The Role of the Mississippi River in Wetland Loss in Southeastern Louisiana, U.S.A.*, 13 ENVTL. GEOLOGY & WATER SCI. 183 (1989); COLIN THORNE ET AL., CURRENT AND HISTORICAL SEDIMENT LOADS IN THE LOWER MISSISSIPPI RIVER (European Research Office of the U.S. Army, 2008) (describing progressively declining sediment loads in the Mississippi since the 1950s).

8. Kesel, *supra* note 7; Paul H. Templet & Klaus J. Meyer-Arendt, *Louisiana Wetland Loss: A Regional Water Management Approach to the Problem*, 12 ENVTL. MGMT. 181 (1988); D. Elaine Evers et al., *Wetland Loss Dynamics in Southwestern Barataria Basin, Louisiana (USA), 1945–1985*, 2 WETLANDS ECOLOGY & MGMT. 103 (1992); Day, Jr. et al., *supra* note 5.

9. *History of the Industry*, LA. MID-CONTINENT OIL & GAS ASS’N, <http://www.lmoga.com/resources/oil-gas-101/history-of-the-industry/> [<https://perma.cc/TJD8-ZZZ9>] (last visited Apr. 23, 2021); *First Oil Discoveries*, AM. OIL & GAS HIST. SOC’Y, <https://aoghs.org/petroleum-discoveries/> [<https://perma.cc/6V88-TGZC>] (last visited Apr. 23, 2021).

10. *Louisiana State Profile and Energy Estimates*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/analysis.php?sid=LA> [<https://perma.cc/YKG5-3YZ8>] (last updated Apr. 15, 2021).

11. Donald Wayne Davis, *Louisiana Canals and Their Influence on Wetland Development* 122–46 (May 1973) (unpublished Ph.D. dissertation, Louisiana State University), [https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=3385&context=gradschool\\_disstheses](https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=3385&context=gradschool_disstheses) [<https://perma.cc/H7L3-PWCR>]; BRYAN PIAZZA, *THE ATCHAFALAYA RIVER BASIN: HISTORY AND ECOLOGY OF AN AMERICAN WETLAND* 180 (2014).

has slowly destroyed coastal wetlands and hastened coastal erosion.<sup>12</sup> Oil and gas companies have not restored wetland development sites despite legal requirements to do so,<sup>13</sup> and the Louisiana government has long looked the other way.<sup>14</sup> Added to the list of oil and gas damages is the 2010 Deepwater Horizon oil spill, which oiled parts of the coastline. This killed vegetation holding wetlands in place and ushered in more erosion.<sup>15</sup>

Erosion is not the only geological force at play: Louisiana is actually sinking (or subsiding). While some of the subsidence relates to natural causes (delta compaction),<sup>16</sup> much of the subsidence in the 20th century stems from oil and gas removal and the resulting decrease in reservoir pore pressure.<sup>17</sup>

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12. John Carey, *Louisiana Wetlands Tattered by Industrial Canals, Not Just River Levees*, SCI. AM. (Dec. 1, 2013), <https://www.scientificamerican.com/article/carey-louisiana-wetlands-tattered-by-industrial-canals/> [<https://perma.cc/T24J-E7JB>]; Joseph Baustian, *Restoration Success of Backfilling Canals in Coastal Louisiana Marshes 1* (May 2005) (unpublished M.S. thesis, Louisiana State University), [https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=1748&context=gradschool\\_theses](https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=1748&context=gradschool_theses) [<https://perma.cc/59YX-NYZ2>]; Eugene Turner, *Discussion of: Olea, R.A., and Coleman, J.L., Jr., 2014. A Synoptic Examination of Causes of Land Loss in Southern Louisiana as They Relate to the Exploitation of Subsurface Geological Resources*, 30 J. COASTAL RES. 1330 (2014).

13. E.g., LA. REV. STAT. § 30:29 (2019) (“Remediation of oilfield sites and exploration and production sites”).

14. See Oliver A. Houck, *The Reckoning: Oil and Gas Development in the Louisiana Coastal Zone*, 28 TUL. ENVTL. L.J. 185 (2015).

15. Amina Rangoonwala et al., *Wetland Shoreline Recession in the Mississippi River Delta from Petroleum Oiling and Cyclonic Storms*, 43 GEOPHYSICAL RES. LETTERS 11,652 (2016).

16. Krista L. Jankowski et al., *Vulnerability of Louisiana’s Coastal Wetlands to Present-Day Rates of Relative Sea-Level Rise*, 8 NATURE COMM. art. 14,792 (2017), <https://www.nature.com/articles/ncomms14792.pdf> [<https://perma.cc/SZ23-HBWV>].

17. Brendan Yuill et al., *Understanding Subsidence Processes in Coastal Louisiana*, J. COASTAL RES. (SPECIAL ISSUE 54) 23, 32 (2009); DONALD F. BOESCH ET AL., FISH & WILDLIFE SERV., U.S. DEP’T OF INTERIOR, *SUBSIDENCE IN COASTAL LOUISIANA: CAUSES, RATES, AND EFFECTS ON WETLANDS* (1983); Alexander S. Kolker et al., *An Evaluation of Subsidence Rates and Sea-Level Variability in the Northern Gulf of Mexico*, 38 GEOPHYSICAL RES. LETTERS L21404 (2011); ROBERT A. MORTON ET AL., U.S. GEOLOGICAL SURVEY, *RAPID SUBSIDENCE AND HISTORICAL WETLAND LOSS IN THE MISSISSIPPI DELTA PLAIN: LIKELY CAUSES AND FUTURE IMPLICATIONS* (2005).

All of this is not to deny the effects of climate change on Louisiana wetlands.<sup>18</sup> Sea level rise is slowly inundating wetlands and will likely become a greater factor as time passes.<sup>19</sup> The increasing severity and frequency of storms like Hurricane Katrina also has ties to climate change.<sup>20</sup> The major hurricanes that struck Louisiana in 2005 (Katrina on August 29 and Rita on September 24) and 2008 (Gustav on September 1 and Ike on September 13) destroyed an estimated 328 square miles of coastal wetlands in Louisiana.<sup>21</sup>

## II. STATE ACTION

Following Hurricane Katrina in 2005, the Louisiana Legislature created the Coastal Protection and Restoration Authority (CPRA) and tasked it with creating and regularly updating a master coastal plan.<sup>22</sup> The plan might have been doomed to unfunded purgatory until funding came in the form of the 2010 Deepwater Horizon oil spill settlement funds.<sup>23</sup> A

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18. See generally Adam Terando et al., *Southeast*, in IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME II, at 743–808 (D.R. Reidmiller et al., eds., 2018). Hurricanes also contribute to Louisiana’s land loss. H. Jesse Walker et al., *Wetland Loss in Louisiana*, 69 GEOGRAFISKA ANNALER: SERIES A, PHYSICAL GEOGRAPHY 189 (1987).

19. Sergio Fagherazzi et al., *Sea Level Rise and the Dynamics of the Marsh-Upland Boundary*, 7 FRONTIERS IN ENVTL. SCI. art. 25 (2019), <https://www.frontiersin.org/articles/10.3389/fenvs.2019.00025/pdf> [<https://perma.cc/A24V-WTS8>].

20. Thomas Knutson et al., *Tropical Cyclones and Climate Change Assessment: Part I: Detection and Attribution*, 100 BULL. AMER. METEOROLOGICAL SOC’Y 1987 (2019); James P. Kossin et al., *Global Increase in Major Tropical Cyclone Exceedance Probability Over the Past Four Decades*, 117 PROC. NAT’L. ACAD. SCI. 11,975 (2020); Matthew Collins et al., *Chapter 6: Extremes, Abrupt Changes and Managing Risk*, in IPCC SPECIAL REPORT ON THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE (H.-O. Pörtner et al., eds., 2019).

21. JOHN A. BARRAS, U.S. GEOLOGICAL SURVEY, LAND AREA CHANGE AND OVERVIEW OF MAJOR HURRICANE IMPACTS IN COASTAL LOUISIANA, 2004-08 (2009), <https://pubs.usgs.gov/sim/3080/downloads/SIMMap3080.pdf> [<https://perma.cc/BJ5D-DURD>].

22. Act No. 8, 1st Extraordinary Sess., 2005 La. Acts 2466 (codified at LA. REV. STAT. §§ 49:213.1–213.12) (the act was repealed in 2009, but the repeal did not change the status of CPRA).

23. In re: Oil Spill by the Oil Rig “Deepwater Horizon” in the Gulf of Mexico, on April 20, 2010, MDL No. 2179, 2016 WL 1394949 (E.D. La. Apr. 4, 2016)

Deepwater Horizon restoration plan created by Gulf states and federal agencies<sup>24</sup> spurred various land creation projects, mainly in the form of dredging material from one site and placing it onto an artificial island at another site.<sup>25</sup> Such projects build up land quickly, but the new land can erode or subside away in just a few decades.

A key example is Queen Bess Island, west of the mouth of the Mississippi River. In 2019, the state and federal governments spent more than \$450,000 per acre to create the island.<sup>26</sup> The projected lifespan of the island is only a couple of decades, after which the island may be underwater due to sea level rise.<sup>27</sup> While Queen Bess Island is now part of a State-managed refuge, the lands for similar projects are typically privately owned, and restoration comes with no easement or conditions to ensure that landowners will maintain the habitat.<sup>28</sup>

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(Consent Decree among BP, the U.S., and certain State plaintiffs including Louisiana).

24. See *A Comprehensive Restoration Plan for the Gulf of Mexico*, GULF SPILL RESTORATION, <http://www.gulfspillrestoration.noaa.gov/restoration-plan/ning/gulf-plan> [<https://perma.cc/9CZE-TPLM>] (last visited Apr. 23, 2021).

25. Ongoing or completed restoration projects include the Rabbit Island Restoration Project; Lake Borgne Marsh Creation; Barataria Basin Ridge and Marsh Creation; Spanish Pass Increment; Terrebonne Basin Ridge and Marsh Creation; and Shoreline Protection at Jean Lafitte National Historical Park and Preserve. Other projects may occur at a later time. See LA. TR. IMPLEMENTATION GRP., FINAL RESTORATION PLAN #1: RESTORATION OF WETLANDS, COASTAL, AND NEARSHORE HABITATS; HABITAT PROJECTS ON FEDERALLY MANAGED LANDS; AND BIRDS (2017), [http://www.gulfspillrestoration.noaa.gov/sites/default/files/FINAL%20LA%20TIG%20final%20RP%20%231\\_508.pdf](http://www.gulfspillrestoration.noaa.gov/sites/default/files/FINAL%20LA%20TIG%20final%20RP%20%231_508.pdf) [<https://perma.cc/76RR-KVRA>]; see also COASTAL PROT. & RESTORATION AUTH. OF LA., LOUISIANA'S COMPREHENSIVE MASTER PLAN FOR A SUSTAINABLE COAST (2017), [http://coastal.la.gov/wp-content/uploads/2017/04/2017-Coastal-Master-Plan\\_Web-Single-Page\\_CFinal-with-Effective-Date-06092017.pdf](http://coastal.la.gov/wp-content/uploads/2017/04/2017-Coastal-Master-Plan_Web-Single-Page_CFinal-with-Effective-Date-06092017.pdf) [<https://perma.cc/XX96-WJ8U>] (listing proposed coastal restoration projects).

26. LA. TR. IMPLEMENTATION GRP., PHASE 2 RESTORATION PLAN/ ENVIRONMENTAL ASSESSMENT #1.1: QUEEN BESS ISLAND RESTORATION 2-6 (2019), [https://www.gulfspillrestoration.noaa.gov/sites/default/files/2019-03%20LA%20Final%20QB%20RP%20EA%201.1%20031419\\_508%20Compliant.pdf](https://www.gulfspillrestoration.noaa.gov/sites/default/files/2019-03%20LA%20Final%20QB%20RP%20EA%201.1%20031419_508%20Compliant.pdf) [<https://perma.cc/T5GE-XAS3>].

27. *Id.* at app. B1.

28. *E.g.*, LA. TR. IMPLEMENTATION GRP., DRAFT PHASE II RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT #3.3: LARGE SCALE BARATARIA MARSH CREATION: UPPER BARATARIA COMPONENT (BA-207) 45 (2020), <https://www.gulfspillrestoration.noaa.gov/sites/default/files/2020-03%20LA%20Draft%20RP%203.3%20Full%20Plan%20155%20pg.pdf> [<https://perma.cc/25K7-BNSK>].

A potentially more sustainable method of building land is to divert sediment from the Mississippi River, which is a self-replenishing source of material. This method does not build substantial land early but allows for land to grow over time. The 2017 coastal restoration plan called for seven sediment diversions along the Mississippi River to send sediment, fresh water, and nutrients from the River into designated areas to build wetlands there.<sup>29</sup>

The largest proposed diversion, known as the Mid-Barataria Sediment Diversion (MBSD) system, is planned for Plaquemines Parish along the west bank of the Mississippi River, just upriver from the town of Ironton (consisting mainly of the descendants of enslaved people).<sup>30</sup> The goal is to have up to 75,000 cubic feet of water per second at various times of the year diverted to the sediment building area.<sup>31</sup> At that maximum flow, the diversion is expected to move 40,000 tons of sand, silt, and clay per day into the sediment building area. The aim is to build around 30,000 acres of land after 50 years.<sup>32</sup> The project is projected to cost \$1.4 billion in funds from the Deepwater Horizon oil spill settlement.<sup>33</sup> The engineering and construction companies involved in this and other projects stand to gain a great deal. Likewise, the City of New Orleans and the petrochemical

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29. COASTAL PROT. & RESTORATION AUTH. OF LA., *supra* note 25, at 120–21.

30. See U.S. ARMY CORPS OF ENG'RS, DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED MID-BARATARIA SEDIMENT DIVERSION, PLAQUEMINES PARISH, LOUISIANA, at 1-3 (2021), <https://www.mvn.usace.army.mil/Missions/Regulatory/Permits/Mid-Barataria-Sediment-Diversion-EIS/> [<https://perma.cc/JF3D-54PR>] [hereinafter MBSD DEIS]; Sara Sneath, *This Louisiana Coastal Community Fought to Get Running Water; Now It Might Drown*, NOLA.COM (Sept. 17, 2017, 4:00 PM), [https://www.nola.com/news/environment/article\\_82ae3bc0-bf57-519f-9121-b9ac0a44c4bf.html](https://www.nola.com/news/environment/article_82ae3bc0-bf57-519f-9121-b9ac0a44c4bf.html) [<https://perma.cc/D3NT-FRW6>].

31. COASTAL PROT. & RESTORATION AUTH. OF LA., *supra* note 25, at 121.

32. LA. TR. IMPLEMENTATION GRP., STRATEGIC RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT #3: RESTORATION OF WETLANDS, COASTAL, AND NEARSHORE HABITATS IN THE BARATARIA BASIN, LOUISIANA (2018), [https://www.gulfspillrestoration.noaa.gov/sites/default/files/2018\\_03\\_LA\\_TIG\\_Final\\_SRP\\_EA\\_508-Compliant.pdf](https://www.gulfspillrestoration.noaa.gov/sites/default/files/2018_03_LA_TIG_Final_SRP_EA_508-Compliant.pdf) [<https://perma.cc/3ZD4-95FH>].

33. Mark Schleifstein, *Mid-Barataria Sediment Diversion Could Create, Save 47 Square Miles of Land Over 50 Years*, NOLA.COM (Jan. 4, 2020, 12:44 PM), [https://www.nola.com/news/environment/article\\_fba3837c-28d8-11ea-844c-bf1ddc3a10e1.html](https://www.nola.com/news/environment/article_fba3837c-28d8-11ea-844c-bf1ddc3a10e1.html) [<https://perma.cc/U4HS-R4HZ>].

industrial complex operating along the Mississippi River upriver from New Orleans may be spared from inundation for a little longer.<sup>34</sup>

Others will fare less well. The freshwater from the diversion will reduce the salinity in the receiving waters of the Barataria Basin. As the salinity decreases, the area will no longer be a suitable habitat for species like dolphins, brown shrimp, and oysters.<sup>35</sup> Dolphins will likely die (the local population is resistant to moving).<sup>36</sup> The diversion will affect those who depend on shrimp and oyster harvest commercial and subsistence use.<sup>37</sup> The predominantly low income, minority communities (environmental justice communities) just downriver of the diversion will also likely be affected by increased flooding and storm surge.<sup>38</sup> It is still not clear how these impacts will be mitigated.<sup>39</sup> In short, the oil and gas industry will continue to drill unmitigated along the coast (a proposed \$2.5 billion crude oil export terminal is actually planned to go alongside the diversion).<sup>40</sup> But Louisiana's other major industry (seafood)<sup>41</sup> and the people along the coast stand to lose.

### III. WAY FORWARD

Louisiana residents have little control over the forces of climate change that are eroding, flooding, and storming the state. Still, as outlined

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34. Mark Fischetti, *Mississippi River Mouth Must Be Abandoned to Save New Orleans from Next Hurricane Katrina*, SCI. AM. (Aug. 20, 2015), <https://www.scientificamerican.com/article/mississippi-river-mouth-must-be-abandoned-to-save-new-orleans-from-next-hurricane-katrina/> [<https://perma.cc/C8ET-EBLT>].

35. MBSO DEIS, *supra* note 30, at 4-328, 4-349, 4-362, 4-418, 4-426.

36. *Id.* at 4-341, 4-430, 4-440, 4-468.

37. *Id.* at 4-629.

38. *Id.*

39. The statements in this paragraph are based on my experience working with state and federal agencies on coastal restoration. *See also* LOUISIANA'S SEAFOOD FUTURE, FINDINGS REPORT 2019 (2019), <https://static1.squarespace.com/static/5c311daff2e6b1bd0e619a75/t/5d9bd06ec7a1c315f1f8599e/1570492538471/LSF-FindingsReport2019.pdf> [<https://perma.cc/KU9N-EQQT>].

40. Mark Schleifstein, *Oil Export Terminal Next to Proposed Mid-Barataria Sediment Diversion Gets State's Initial OK*, ADVOCATE (Apr. 26, 2019, 9:29 PM), [https://www.theadvocate.com/baton\\_rouge/news/politics/article\\_bf113ef5-17cd-5aae-8663-873537db4583.html](https://www.theadvocate.com/baton_rouge/news/politics/article_bf113ef5-17cd-5aae-8663-873537db4583.html) [<https://perma.cc/LMX8-NQ9K>].

41. *See The Economy of Seafood*, LA. SEAFOOD, <https://www.louisiana-seafood.com/industry> [<https://perma.cc/V4TB-B59K>] (last visited Apr. 23, 2021) (“One out of every 70 jobs in Louisiana is related to the seafood industry, which as a whole has an economic impact of over \$2.4 billion annually for Louisiana.”).

in this Part, the State of Louisiana has options to reduce the anticipated harm to its residents.

#### A. Canal Restoration

First of all, oil companies should be required to restore the canals they dredged and repair the damage that can feasibly be repaired. This would be cheaper and more sustainable than creating temporary islands.<sup>42</sup> Of course, this would violate the state's "gentlemen's agreement" with the oil industry, through which environmental impacts are ignored so long as the oil and gas industry continues to produce jobs and revenues.<sup>43</sup> The 2017 Coastal Master Plan is silent on canal restoration. State legislators intimately involved in the industry have passed bills to snuff out any lawsuit that might require the industry to take responsibility for its actions.<sup>44</sup>

#### B. Vulnerability Reduction Credits

Second, prior to embarking on massive projects such as the Mid-Barataria Sediment Diversion, there is a need for more meaningful consideration of costs and benefits. If the diversion is implemented, it will temporarily reduce the effect of relative sea level rise and storm surge flooding for New Orleans and lands just north of the diversion. But wetland creation will not be visible in Barataria Bay (near the project area) for a couple of decades, and wetlands at the mouth of the Mississippi will decrease faster with the diversion than without.<sup>45</sup> Further, by the end of

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42. "The price of backfilling all canals is about \$335 million dollars, or 0.67% of the State's Master Plan for restoration and a pittance of the economic value gained from extracting the oil and gas beneath over the last 100 years." R. Eugene Turner & Giovanna McClenachan, *Reversing Wetland Death from 35,000 Cuts: Opportunities to Restore Louisiana's Dredged Canals*, 13 PLOS ONE (Dec. 14, 2018), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0207717> [<https://perma.cc/M7SQ-VBTM>].

43. Houck, *supra* note 14, at 191.

44. An example is Louisiana Senate Bill 359 (2020 Regular Session), an effort to remove the authority of coastal parishes that have sued oil companies for damage to coastal wetlands in, e.g., *Parish of Plaquemines v. Total Petrochemicals & Ref. USA, Inc.*, 64 F. Supp. 3d 872 (E.D. La. 2014) (remanding to state court for lack of subject matter jurisdiction).

45. The statements in this paragraph are based on my experience working with state and federal agencies on coastal restoration.

the century, sea level rise will likely overtake all of the lands built by the diversion and other projects.<sup>46</sup>

While federal and state agencies have worked on an environmental impact statement (EIS),<sup>47</sup> it was already a foregone conclusion that the project would move forward as described in the 2017 Coastal Master Plan, and not along the lines of any alternative included in the EIS for purposes of the National Environmental Policy Act (NEPA).<sup>48</sup> It is unclear whether the diversion is worth the financial investment, not to mention the potentially detrimental impacts to communities downriver of the project area and oyster fisheries.

The Higher Ground Foundation's Vulnerability Reduction Credit (VRC) system could be a method for assessing the benefits of projects like these and encouraging investment in projects that are likely to reduce climate change vulnerability.<sup>49</sup> The VRC system assigns each project a certain amount of credits based on the costs that the project will avoid. These costs include easily measurable monetary costs, such as property loss, as well as other costs to human well-being (measured by methods such as contingent valuation).<sup>50</sup> To encourage projects that benefit poorer, historically marginalized communities, the costs for such projects are multiplied by a factor that increases the credits.<sup>51</sup> Credits (payouts to the investors who foot the bill for the project) are assigned for a period of ten years.<sup>52</sup> After each ten-year period, the project is evaluated to determine if

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46. This statement is based on my work with federal and state agencies on coastal restoration and Jankowski et al., *supra* note 16, at 3 (suggesting that submergence of the remaining ~15,000 km<sup>2</sup> of marshland in coastal Louisiana is probably inevitable). The agencies have likely undervalued the rate of sea level rise applicable to the area. See Letter from R. Eugene Turner to U.S. Army Corps of Engineers, New Orleans District (Aug. 10, 2020) (on file with author) (containing his full comments to the EIS scoping process for the Mid-Breton Sediment Diversion project, a similar project to the Mid-Barataria Sediment Diversion Project); U.S. ARMY CORPS OF ENG'RS, NEW ORLEANS DIST., MID-BRETON SEDIMENT DIVERSION PROJECT EIS SCOPING REPORT, app. C at 556 (2020), [https://www.mvn.usace.army.mil/Portals/56/docs/regulatory/permits/EIS/2020-11-10\\_%20Mid-Breton\\_Scoping\\_Report.pdf](https://www.mvn.usace.army.mil/Portals/56/docs/regulatory/permits/EIS/2020-11-10_%20Mid-Breton_Scoping_Report.pdf) [<https://perma.cc/URY9-DWNG>].

47. MBSD DEIS, *supra* note 30.

48. 42 U.S.C. 4332(C)(iii) (2018).

49. *What are VRCs?*, HIGHER GROUND FOUND., <https://www.thehighergroundfoundation.org/concept> [<https://perma.cc/78GM-T4TA>] (last visited Apr. 23, 2021).

50. *Id.*

51. *Id.*

52. *Id.*

it achieved the anticipated benefits.<sup>53</sup> The project may then be re-credited with an adjusted amount of credits to reflect the updated value of avoided costs.<sup>54</sup>

In Louisiana's situation, each potential coastal restoration project should be fully evaluated, with all potential benefits and costs monetized for comparison. The analysis should not just be the project lifespan, which is only 20 years for islands and 50 years for diversions. A 50-year planning horizon seems quite long compared to most planning efforts but is inadequate given the likelihood of inundation a few decades later. The analysis should extend to 2100, the time when sea level rise will likely inundate restoration projects. Costs and benefits should be adjusted to avoid projects with unmitigated disproportionate impacts on environmental justice communities.

### *C. Plan for Compensation and Relocation*

If the Mid-Barataria Sediment Diversion project and others like it are to go forward, there must be mitigation measures in place to address the potential harm,<sup>55</sup> particularly in the context of environmental justice communities that may be displaced by flooding. To date, there has been little (if any) public discussion of such mitigation.

It is important to note that environmental justice communities and other coastal communities are going to face negative impacts regardless of whether the diversions take place, because sea level is rising, storm surge and community flooding is increasing, and there is more and more open water that affects the fisheries that these communities depend on. Socially vulnerable families may lack the means to leave, find better housing, or pay higher flood insurance rates. Elderly residents and people tied to their traditional lands and lifeways may want to stay put, while younger and potentially more adaptable residents have been migrating northward and inland for decades. This selective out-migration leaves an older, poorer, and more vulnerable population behind.<sup>56</sup>

Yet CPRA's coastal management plan gives no consideration whatsoever to the need to relocate coastal residents out of harm's way.<sup>57</sup>

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53. *Id.*

54. *Id.*

55. *See* *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989); 40 C.F.R. § 1502.14 (2020).

56. Craig E. Colten et al., *Social Justice and Mobility in Coastal Louisiana, USA*, 18 REGIONAL ENVTL. CHANGE 371 (2018).

57. The 2017 coastal plan devotes a single line to the issue: "In some cases, communities may want to consider retreating from flood prone areas, and analysis

This task has been left to Louisiana's Strategic Adaptations for Future Environments (LA SAFE), a partnership between the Louisiana Office of Community Development and the private Foundation for Louisiana.<sup>58</sup> Since much of the funding for LA SAFE comes from a U.S. Housing and Urban Development (HUD) grant related to the six Louisiana parishes most impacted by Hurricane Isaac in 2012, all of the entity's funding goes to projects in these six parishes.<sup>59</sup> As shown in Figure 1, Louisiana has twenty coastal parishes.<sup>60</sup> LA SAFE's 2019 adaptation plan<sup>61</sup> focuses heavily on the relocation of Isle de Jean Charles, which the state is carrying out through a one-time funding opportunity,<sup>62</sup> and little on any other relocation strategy.

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from the master plan can greatly assist those communities in planning for near-term and long-term decisions on how best to adapt." COASTAL PROT. & RESTORATION AUTH. OF LA., *supra* note 25, at 162.

58. *What is LA SAFE?*, LA.'S STRATEGIC ADAPTATIONS FOR FUTURE ENV'TS, <https://lasafe.la.gov/what-is-la-safe/> [<https://perma.cc/M3RA-3TUB>] (last visited Apr. 23, 2021).

59. The LA SAFE initiative is funded through a U.S. Housing and Urban Development long-term disaster recovery grant awarded for the six parishes most impacted by Hurricane Isaac in 2012. LA SAFE states that "this money must go to those qualifying parishes as a regulatory matter; however, it is a goal of the LA SAFE program to secure additional resources and expand the program statewide in the future." *Frequently Asked Questions*, LA.'S STRATEGIC ADAPTATIONS FOR FUTURE ENV'TS, <https://lasafe.la.gov/faqs/> [<https://perma.cc/43PL-9AJZ>] (last visited Apr. 23, 2021).

60. LA. REV. STAT. § 49:214.24 (2020).

61. LA.'S STRATEGIC ADAPTATIONS FOR FUTURE ENV'TS, OUR LAND AND WATER, A REGIONAL APPROACH TO ADAPTATION (2019), <https://s3.amazonaws.com/lasafe/Final+Adaptation+Strategies/Regional+Adaptation+Strategy.pdf> [<https://perma.cc/PSM5-QVWK>].

62. Notice of National Disaster Resilience Competition Grant Requirements, 81 Fed. Reg. 36,557 (June 7, 2016).



Figure 1: Overlay of LA Coastal Zone with LA SAFE Parishes<sup>63</sup>

CPRA should work with LA SAFE to come up with a meaningful relocation strategy for residents in all 20 parishes in the coastal zone that are likely to be in harm's way due to increased flooding, erosion, hurricanes, and sea level rise. This plan should be based on difficult conversations with residents about who would be willing to relocate, where they would be willing to relocate to, and how the receiving areas could accommodate new residents. Engagement should be on the terms of the residents, whether this means online meetings, small group meetings, or phone calls that accommodate residents' schedules.

A step in the right direction is the governor's 2018 Executive Order JBE 2018-16, establishing a Council on Watershed Management that includes CPRA, the Office of Community Development, and other state agencies.<sup>64</sup> This group will carry out a \$1.2 billion grant agreement from the U.S. HUD that will involve data collection and planning to reduce the risk of flooding.<sup>65</sup>

63. A larger full-color version of Figure 1 is available at <https://perma.cc/RW2Z-XWVK>.

64. Exec. Order No. JBE 2018-16, 44 La. Reg. 991 (June 20, 2018), <https://www.doa.la.gov/media/inxifwcb/jbe-18-16-watershed-council.pdf> [<https://perma.cc/CK9H-P9H2>].

65. *CDBG-MIT Action Plan*, LA. WATERSHED INITIATIVE, <https://www.watershed.la.gov/action-plan> [<https://perma.cc/LS72-TZU5>] (last visited Apr. 23, 2021).

*D. Meaningful Adaptive Management with Meaningful Public Participation*

The proposed diversions have been subject to extensive modeling as to how they will affect the environment, but there are still uncertainties and scientific disagreement regarding their efficacy.<sup>66</sup> If the diversions are to move forward, it is important to have a robust adaptive management plan to provide for corrective action if things go wrong. Adaptive management generally involves setting management goals, monitoring outcomes, determining impacts, and refining goals to incorporate lessons learned.<sup>67</sup>

The British Petroleum Deepwater Horizon settlement reserved a certain amount of money for adaptive management to address unforeseen contingencies that could arise with coastal restoration.<sup>68</sup> As part of the Mid-Barataria Sediment Diversion EIS and EISs for other projects, state and federal agencies are indeed developing adaptive management plans. At this point, the plans are essentially about monitoring—there are no contingency plans in the event of serious damages.<sup>69</sup> There is nothing to address the potential for contaminated river water<sup>70</sup> to upset the

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66. See R. Eugene Turner et al., *Net Land Gain or Loss for Two Mississippi River Diversions: Caernarvon and Davis Pond*, 27 RESTORATION ECOLOGY 1231 (2019) (suggesting that diversions could result in a net land loss).

67. Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 VAND. L. REV. 1, 7 (2014); Yee Huang et al., *Climate Change and the Puget Sound: Building the Legal Framework for Adaptation*, 2 CLIMATE L. 299, 309 (2011); J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems – With Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1388 (2011).

68. DEEPWATER HORIZON NAT. RES. DAMAGE ASSESSMENT TRS., DEEPWATER HORIZON OIL SPILL: FINAL PROGRAMMATIC DAMAGE ASSESSMENT AND RESTORATION PLAN AND FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT 1-24 (2016), [https://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Front-Matter-and-Chapter-1\\_Introduction-and-Executive-Summary\\_508.pdf](https://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Front-Matter-and-Chapter-1_Introduction-and-Executive-Summary_508.pdf) [<https://perma.cc/G9AG-VPDP>].

69. See MBSD DEIS, *supra* note 30, at Appendix R.

70. See Mahlon C. Kennicutt II, *Sediment Contaminants of the Gulf of Mexico*, in HABITATS AND BIOTA OF THE GULF OF MEXICO: BEFORE THE DEEPWATER HORIZON OIL SPILL, VOLUME 1, at 217 (C. Herb Ward ed., 2017); Larry B. Barber, II et al., *Organic Contamination of the Mississippi River from Municipal and Industrial Wastewater*, U.S. GEOLOGICAL SURVEY (1995) <https://pubs.usgs.gov/circ/circ1133/organic.html> [<https://perma.cc/THJ4-2GPW>] (describing contaminants in the Mississippi River).

ecosystems where it is diverted. “Adaptive management” without the political will or funding to change course is meaningless.

Restoration projects and plans take place in a state where science bends to politics,<sup>71</sup> and historically marginalized communities have little access to science and limited ability to participate in decision-making.<sup>72</sup> The public meetings—now webinars in which no questions are allowed, only comments—do little to remedy this deficit of participation.<sup>73</sup> Agencies responsible for developing the adaptive management plan ignored my recommendation that local people be involved in monitoring environmental conditions, perhaps through something as simple as a phone app (or a phone hotline for those without smartphones).

An example is the app that the group “I See Change” has been using in New Orleans to track local flooding and heat conditions.<sup>74</sup> Local residents are able to enter specific environmental observations on the site, which tracks their geographic location. No special training is required, nor are busy people expending their time at perfunctory public meetings. Having an app to monitor environmental change associated with diversions could increase the understanding of local residents and participation in the project, and it would provide knowledge that people in Baton Rouge and New Orleans would not have otherwise.

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71. See Ned Randolph, *License to Extract: How Louisiana's Master Plan for a Sustainable Coast is Sinking It*, LATERAL, Fall 2018, <https://csalateral.org/articles/andy-martin-prize/license-to-extract-louisiana-master-plan-sustainable-coast-randolph/> [<https://perma.cc/KS4E-XBW2>] (“Louisiana . . . has fostered a plan that deploys science for coastal restoration efforts that ends up rationalizing the state’s petro-economy.”).

72. See Abigail D. Blodgett, *An Analysis of Pollution and Community Advocacy in ‘Cancer Alley’: Setting an Example for the Environmental Justice Movement in St James Parish, Louisiana*, 11 LOC. ENV’T 647 (2006); Barbara L. Allen, *Environmental Justice and Expert Knowledge in the Wake of a Disaster*, 37 SOC. STUD. OF SCI. 103 (2007); Merrill Singer, *Down Cancer Alley: The Lived Experience of Health and Environmental Suffering in Louisiana’s Chemical Corridor*, 25 MED. ANTHROPOLOGY Q. 141 (2011).

73. See, e.g., *Comments Sought for Development of the Mid-Breton Sediment Diversion Environmental Impact Statement*, U.S. ARMY CORPS OF ENGINEERS (July 6, 2020), <https://www.mvn.usace.army.mil/Media/News-Releases/Article/2261305/comments-sought-for-development-of-the-mid-breton-sediment-diversion-environment/> [<https://perma.cc/AVS9-5QM2>].

74. *About*, I SEE CHANGE, <https://www.iseechange.org/about/mission> [<https://perma.cc/T4DT-K3UL>] (last visited Apr. 23, 2021).

## CONCLUSION

Louisiana and federal agencies are making use of the Deepwater Horizon oil spill settlement money to fund coastal restoration projects that will provide short-term benefits to urban centers and certain sectors of the State and potentially detrimental impacts to other sectors. Pro forma environmental assessments and impact statements are being carried out, as required by NEPA. But these analyses are carried out with a narrow lens, focused only on limited project lifetimes and project areas. They do not provide a big picture analysis of how coastal restoration and human adaptation should take place. CPRA's Coastal Restoration Master Plan should serve this function, but it does not. Rather, it is a portfolio of select projects contingent on funding from disasters such as the Deepwater Horizon Spill. LA SAFE, situated in a different silo, is contingent on grant funding and has no State-backed mandate or funding to provide for long-term adaptation. As such, coastal restoration marches on, project by project, with little thought to long-term costs and benefits or the need for community relocation.

An obvious recommendation is to simply use existing law to hold the industry responsible for restoring oil field canals. Another recommendation is to bring together CPRA and LA SAFE through the Louisiana Watershed Council to work with coastal residents to develop a plan that includes all impacts, such as how adaptation will take place over the rest of the century (using the best available data on sea level rise). The State could develop a meaningful cost-benefit analysis to select and fund certain restoration projects, along the lines of Vulnerability Reduction Credits. Likewise, there is a need for meaningful adaptive management, where the input of local residents informs the analysis of project results, and project managers are able to change the direction of the project based on this analysis. The State may or may not be able to restore coastal wetlands for longer than a few decades, but it can avoid perpetuating a morass of privileged winners and marginalized losers.