MONEY, MANDATES, AND WATER MANAGEMENT: FORESHADOWING A FLORIDA DISASTER

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Repeated failures to properly regulate, manage and maintain water resources and infrastructure creates enormous risks and consequences, across the U.S. and beyond. Applying those lessons, this study of facts, data, and law foreshadows a water management disaster in Florida. At the South Florida Water Management District, a critical regional agency, budget and staffing are now below 1996 levels. Regulatory scrutiny and enforcement have declined. Infrastructure is inadequately maintained. Rainy day reserve funds are kept at bare minimums. Important new laws are merely unfunded mandates. Florida officials must recognize the magnitude of the problems, offer meaningful leadership to restore water management finances and capabilities, and protect the public before the next flood, harmful algal bloom, or other disaster comes.

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I. AN ANGRY PUBLIC

Budgets have serious legal consequences. They reflect priorities and determine an organization's capacity to act. When it comes to water management and flood control, history shows that our budgets and our laws can fail the people.

The low-lying nation of the Netherlands learned its hardest lessons during a devastating flood in 1953 because it failed to maintain its dikes. The United States experienced its share of water management catastrophes countless times along the Mississippi River, and more recently in New Orleans, New York, California, Texas, and North Carolina. Inevitably, Florida's turn will come, and, despite a parade of new laws and unfunded mandates, the facts and data portend disaster.

The South Florida Water Management District (SFWMD) is a vitally important political subdivision of the State of Florida. With jurisdiction over an area of 18,000 square miles, and more than 8 million people, the SFWMD operates and maintains a vast water management system of canals, dikes, levees, preserves, and structures that make the Greater Everglades and Kissimmee-Okeechobee-Everglades watershed inhabitable.[1] The SFWMD has regulatory permitting responsibilities, too.[2] Managing this complex region has long been a contentious affair, with stakeholders endlessly engaged in lobbying, legislating, and litigating.[3]

In 2018, U.S. Congressman Brian Mast, representing the Atlantic coast communities near Port Saint Lucie and Stuart, Florida, questioned a plan to lease publicly-owned lands to sugar growers.[4] Concerned that nutrient-enriched discharges from Lake Okeechobee had already triggered a series of harmful algal blooms along the Florida coastlines, Congressman Mast attended a public meeting and called on the SFWMD to consider other options.[5] The SFWMD Governing Board members declined, and Congressman Mast offered a harsh critique of the agency and its leaders in a

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1. *See Quick Facts and Figures*, S. FLA. WATER MGMT. DIST., https://www.sfwmd.gov/who-we-are/facts-and-figures (last visited Sept. 23, 2019) (listing SFWMD's primary water control system mechanisms).

2. *Permits*, S. FLA. WATER MGMT. DIST., https://www.sfwmd.gov/doing-business-with-us/permits (last visited Sept. 22, 2019).

3. John Fumero & Keith Rizzardi, *The Everglades Ecosystem: From Engineering to Litigation to Consensus-Based Restoration*, 13 ST. THOMAS L. REV. 667, 673 (2001).

4. Jim DeFede, *Congressman Calls On SFWMD Members To Resign*, CBS 4 MIAMI (Dec. 10, 2018), https://miami.cbslocal.com/2018/12/10/congressman-calls-sfwmd-mambers-resign/; *see also* Ali Schmitz, *Florida Gov. Ron DeSantis Asks All SFWMD Board Members to Resign*, J. SENTINEL (Jan. 10, 2019), https://www.jsonline.com/story/news/government/2019/01/10/gov-ron-desantis-asks-sfwmd-board-members-resign-florida/2540533002/ (describing debate regarding SFWMD).

5. DeFede, *supra* note 4.

televised interview: "I think the water management district is not being beholden to the people, being responsible to the residents of the state of Florida. I think they have been derelict in their duties and I think they should be replaced."[6]

Reasonable minds may differ over the Governing Board's decision that day,[7] and Congressman Mast will not be the last person to voice frustration with the SFWMD. But, as Professors Lawrence Susskind and Patrick Field explained in their book, *Dealing with an Angry Public*, public concern with institutional actions can become a spiraling problem:

> Such anger, absent a response, may lead to smaller government and lower tax levels, but it will undoubtedly also lead to cutbacks in essential public services, rising costs associated with privatization, holes in the safety net meant to guarantee public protection to those least able to fend for themselves, enormous increases in the cost of insurance, and huge losses in the value of private property currently protected by regulation and government action.[8]

Just as Susskind and Field predicted, Florida's water managers struggle to keep pace with the demands. Jim Moran, one of the SFWMD Governing Board members, acknowledged the funding crisis during a public meeting: "We need more money, we're broke . . . . It's one thing to cut back to the bone and still be able to run efficiently, but it's another thing to have the budget so lean you are not adequately doing flood control . . . ."[9]

Aware that accidents and extreme weather events will happen, this study explores the problems and the risks facing water managers, with special emphasis on the lessons that can be learned for South Florida. Part II provides comparative context, showing the billions of dollars at stake when water management fails. Part III turns to the varied responsibilities and risks facing the SFWMD. Part IV uses the agency's own reports and data to show how funding and staffing have fallen precipitously, raising concerns about the agency's capacity to pursue its mission and fulfill its legal responsibilities. Part V offers policy options requiring local leadership and legislative reform that could make a difference. Part VI offers the author's conclusions.

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6. *Id.*

7. *See* FLA. STAT. § 373.4598(3)(a) (2019) ("Any such lease must be terminated in accordance with the lease terms or upon the voluntary agreement of the lessor and lessee. In the event of any such lease termination, the lessee must be permitted to continue to farm on a field-by-field basis until such time as the lessee's operations are incompatible with implementation of the EAA reservoir project, as reasonably determined by the lessor.").

8. LAWRENCE SUSSKIND & PATRICK FIELD, DEALING WITH AN ANGRY PUBLIC 5 (1996).

9. Kim Miller, *No Tax Increase in Water District Budget, but Opposition from Unusual Source*, PALM BEACH POST (Sept. 25, 2018), http://weatherplus.blog.palmbeachpost.com/2018/09/25/no-tax-increase-in-water-district-budget-but-opposition-from-unusual-source/.

II. BILLION DOLLAR CONSEQUENCES

The unexpected will happen in water management. When it does, water managers scramble to respond, costs are incurred, and a study follows. Inevitably, the conclusion will be that the losses and deaths could have been mitigated or avoided. A brief—albeit anecdotal—suite of case histories put matters in perspective. The cases document similar underlying issues of high risks and dire consequences and illustrate repeated failures of governments to adequately prepare.

A. The Netherlands: The Great Flood of 1953

In 1953, the levee that protected the people of the Netherlands from the North Sea failed.[10] Thousands of people died because the dikes had been poorly maintained and because military bunkers and infrastructure, which were embedded into the dikes during World War II, further compromised the dikes' integrity.[11]

Today, the Dutch possess a "never again" mentality about the flooding they once endured. Dutch engineers are continually engaging in a comprehensive effort to upgrade their infrastructure. Preparing for rising seas, the current Delta Programme represents an expensive effort: the Netherlands, a nation 16,412 square miles, with a population of roughly 17 million people, is currently investing €1.3 billion annually into upgrading its water management regime, for an anticipated total of €17.5 billion (or roughly $19.8 billion).[12] The costs of realistic water defense are measured in billions. While many other stories could be told from elsewhere on Planet Earth, this article focuses on similar risks and events in the United States.[13]

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10. Herman Gerritsen, *What happened in 1953? The Big Flood in the Netherlands in Retrospect*, 363 PHIL. TRANSACTIONS ROYAL SOC'Y 1271, 1276 (2005).

11. *Id.* at 1271, 1275.

12. DELTA PROGRAMME 2019, CONTINUING THE WORK ON THE DELTA: ADAPTING THE NETHERLANDS TO CLIMATE CHANGE IN TIME 77 (2018); *see also Facts and Figures*, holland.com/global/tourism/information/facts-figures.htm (last visited Oct. 27, 2019) (noting population and surface area of the Netherlands).

13. This article uses the Netherlands as an international example because of its low-lying geography and use of technology, which made it a useful comparison with Florida. However, countless other examples of looming water management crises exist in the world. India, for example, is at risk of running out of water, while simultaneous dealing with massive flooding and water quality pollution problems. *See, e.g.*, Raj Bhagat Palanichamy, *How Does a Flood-Prone City Run Out of Water? Inside Chennai's "Day Zero" Crisis*, WORLD RES. INST. (June 25, 2019), https://www.wri.org/blog/2019/06/how-does-flood-prone-city-run-out-water-inside-chennai-day-zero-crisis (referencing the devastating 2015 Chennai flood caused by poor management during dry conditions that killed hundreds and displaced many more); Jessie Yeung et al., *India Has Just Five Years to Solve Its Water Crisis, Experts Fear. Otherwise Hundreds of Millions of Lives Will be in Danger*, CNN (July 3, 2019), https://www.cnn.com/2019/06/27/india/india-water-crisis-intl-

B. Southeast Louisiana: Hurricane Katrina in 2002

During Hurricane Katrina in 2005, the levees failed and devastated the New Orleans region.[14] More than 1,800 people died, thousands more were displaced, and property damages exceeded $40 billion.[15] In the ensuing litigation, victims and courts pointed to Congress and the U.S. Army Corps of Engineers.[16] The construction, operation, and failure to maintain the 76-mile-long navigational channel known as the Mississippi River-Gulf Outlet (or MR-GO) caused the disaster.[17] The Army Corps knew of the risks, but Congress failed to fund the necessary changes, as a court opinion explained:

> [B]y 2004, the Army Corps no longer had any choice but to recognize that a hurricane inevitably would provide the meteorological conditions to trigger the ticking time bomb created by a substantially expanded and eroded MR-GO and the resulting destruction of wetlands that had shielded the St. Bernard Polder for centuries.
>
> In August 2005, when Hurricane Katrina struck the St. Bernard Polder, the Army Corps was still discussing whether to close the MR-GO and whether Congress would fund the closure. Neither Congress nor the Army Corps had the opportunity to correct the situation before the MR-GO induced substantially increased storm

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hnk/index.html (discussing how around 100 million people across India are on the frontlines of a nationwide water crisis and how 21 cities are poised to run out of water by next year). Similar stories about water risks and the desperate need for adaptations could be told about China and South Africa. *See, e.g.*, Katelyn Newman, *China's Water Problems Run Deep: While Its Southern Taps Won't Run Dry, China's North Faces Pollution and Distribution Challenges*, U.S. NEWS & WORLD REP. (April 20, 2018), https://www.usnews.com/news/best-countries/articles/2018-04-20/chinas-history-of-water-problems-parallels-south-africas-day-zero (discussing China's massive South-to-North Water Diversion Project intended to redistribute resources from the country's water-rich south to its water-poor north); Christian Alexander, *Looking Back on Cape Town's Drought and 'Day Zero,'* CITY LAB (April 12, 2019), https://www.citylab.com/environment/2019/04/cape-town-water-conservation-south-africa-drought/587011/ (discussing South Africa's effort to stave off Day Zero and long-term efforts to diversify their water resources).

14. *See Hurricane Katrina*, HISTORY (Nov. 9, 2009), https://www.history.com/topics/natural-disasters-and-environment/hurricane-katrina-1-video (describing the effects of Hurricane Katrina).

15. *Hurricane Katrina Statistics Fast Facts*, CNN (Aug. 8, 2019), https://www.cnn.com/2013/08/23/us/hurricane-katrina-statistics-fast-facts/index.html.

16. Campbell Robertson & John Schwartz, *Decade After Katrina, Pointing Finger More Firmly at Army Corps*, N.Y. TIMES (May 23, 2015), nytimes.com/2015/05/24/us/decade-after-katrina-pointing-finger-more-firmly-at-army-corps.html.

17. St. Bernard Parish Gov't v. United States, 121 Fed. Cl. 687, 690-91 (2015).

> surge that caused catastrophic flooding on private property—as well as the loss of human life.[18]

Despite these facts, the Army Corps may eventually escape liability based on the doctrine of sovereign immunity.[19] Still, the deadly consequences of Katrina forced changes. To benefit a Southeast Louisiana region of 4,000 square miles and 1.5 million people, and to reduce the risk of hurricane and storm damage in metropolitan New Orleans, the U.S. Army Corps of Engineers embarked on the largest civil works project in history—investing $14 billion dollars.[20] At a local level, the City of New Orleans recognized the risks and pursued a referendum in 2017 to create a "rainy day" fund, a City Charter Amendment, and created the Savings Fund of the City of New Orleans.[21] Once again, the evidence shows that water infrastructure needs huge amounts of money, with costs in the billions.

C. New York: Hurricane Sandy in 2012

When Hurricane Sandy hit New York and New Jersey in October 2012, it had been downgraded to a post tropical cyclone with 80-mile-per-hour winds.[22] Still, the nine-foot storm surge inundated coastal communities.[23] Neighborhoods burned, nuclear power plants shut down, and the energy and transportation grids suffered lasting damage.[24] More than 40 people died, and direct damages totaled $19 billion.[25] The Federal Emergency Management

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18. *Id.* at 747.

19. *See* St. Bernard Parish Gov't v. United States, 887 F.3d 1354, 1362 n.6 (Fed Cir. 2018) (indicating that another group of plaintiffs lost in a tort action due to the government's immunity from liability).

20. U.S. ARMY CORPS OF ENG'RS, 1 COMPREHENSIVE ENVIRONMENTAL DOCUMENT PHASE I GREATER NEW ORLEANS HURRICANE AND STORM DAMAGE RISK REDUCTION SYSTEM ES-1 (2013), https://www.mvn.usace.army.mil/Portals/56/Users/194/42/2242/CED%20Volume%20I%20Compiled.pdf; *see also Regional Overview*, NEW ORLEANS REG'L PLAN. COMM'N, http://www.norpc.org/regional_overview.html (last visited Sept. 12, 2019) (providing additional statistics).

21. NEW ORLEANS, LA., CODE § 6-201(2)(a), (b) (2019); ADMINISTRATION OF MAYOR LATOYA CANTRELL, CITY OF NEW ORLEANS 2019 OPERATING BUDGET 18 (2018).

22. *Hurricane Sandy,* NAT'L WEATHER SERV., https://www.weather.gov/okx/hurricanesandy (last visited Sept. 11, 2019).

23. *See id.* (explaining record tide levels resulting from Hurricane Sandy storm surge occurring near the time of high tide along the Atlantic Coast).

24. *Hurricane Sandy Fast Facts*, CNN (Oct. 29, 2018), https://www.cnn.com/2013/07/13/world/americas/hurricane-sandy-fast-facts/index.html.

25. *Lower Manhattan Coastal Resiliency*, N.Y.C. ECON. DEV. CORP. (Apr. 8, 2019), https://www.nycedc.com/project/lower-manhattan-coastal-resiliency.

Agency (FEMA) estimated total costs at $70.2 billion.[26] Subsequent analysis attributed the problems to regulatory and planning missteps:

> The storm caused significant flooding and erosion in most of the areas the [FEMA Mitigation Assessment Team] visited. Flooding caused widespread damage to structures, critical facilities, and infrastructure. Most damage to low-rise buildings resulted from inundation, and oceanfront low-rise buildings were damaged by wave action, erosion, and scour. Many low-rise one- and two-family dwellings in coastal areas were of older construction that pre-dates community adoption of floodplain regulations. Very few of these homes were elevated to the appropriate base flood elevation (BFE). Most damage to mid- and high-rise buildings resulted from the inundation of mechanical, electrical, plumbing, and other critical systems. Many of these systems were not elevated to or above the BFE. In addition to building damage, utility outages were widespread.[27]

FEMA recommended numerous changes including modifying the building codes and standards; changing local ordinances and enhancing inspections; reevaluating flood zones, elevating residential construction; more resilient building techniques; and improved mechanical, electrical, plumbing, and fuel storage.[28] Since then, New York and New Jersey have engaged in substantial—and costly—planning efforts to make their communities more resilient to rising seas and future storms.[29] Efforts to modify regulatory standards are underway.[30] Plans exist for new infrastructure.[31] Five years after Sandy, upgrading just three New York City hospitals has consumed

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26. *FEMA Fact Sheet: Mitigation Assessment Team Results – Hurricane Sandy*, FED. EMERGENCY MGMT. AGENCY (June 19, 2018), https://www.fema.gov/mat-results-hurricane-sandy.

27. FED. EMERGENCY MGMT. AGENCY, MITIGATION ASSESSMENT TEAM REPORT: HURRICANE SANDY IN NEW JERSEY AND NEW YORK ii (2013).

28. *Id.* at ii-v.

29. Michael R. Bloomberg, *Forward* to CITY OF N.Y., PLANYC A STRONGER, MORE RESILIENT NEW YORK (2013); DAVID M. KUTNER, N. J. FUTURE, IN DEEP: HELPING SANDY-AFFECTED COMMUNITIES ADDRESS VULNERABILITY AND CONFRONT RISK 3, 7 (2015).

30. JAMES P. COLGATE, N.Y.C. DEP'T OF BLDGS., NEW YORK CITY AFTER SUPERSTORM SANDY REGULATORY REFORM 2 (2014).

31. *See* Bloomberg, *supra* note 29, at 4 ("In our vision of a stronger, more resilient city, many vulnerable neighborhoods will sit behind an array of coastal defenses. Waves rushing toward the coastline will, in some places, be weakened by offshore breakwaters or wetlands, while waves that do reach the shore will find more nourished beaches and dunes that will shield inland communities. In other areas, permanent and temporary floodwalls will hold back rising waters, and storm surge will meet raised and reinforced bulkheads, tide gates, and other coastal protections.").

$1.1 billion.[32] After Sandy, New York City approved a disaster recovery budget of $10.5 billion to rebuild and increase the climate resilience of the city's subway system.[33] Another $500 million investment will protect a few neighborhoods in lower Manhattan from surging seas.[34] Over time, the pursuit of resiliency in New York City will require many, many billions of dollars.

D. California: the Oroville Dam in 2017

Due to heavy winter rains in February 2017, the emergency spillway at the Oroville Dam in California—the tallest dam in the nation—suffered major damage and nearly failed.[35] With a watershed of 3,200 square miles, the water supply for millions of people was at risk, and 180,000 people were forced to evacuate.[36] Investigators blamed the problem on long-term systemic failures of a California agency to properly construct, operate, and maintain its infrastructure.[37] Estimated repair costs for this structure reached $1.1 billion.[38]

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32. Patrick McGeehan & Winnie Hu, *Five Years After Sandy, Are We Better Prepared*?, N.Y. TIMES (Oct. 29, 2017), https://www.nytimes.com/2017/10/29/nyregion/five-years-after-sandy-are-we-better-prepared.html.

33. N.Y. CITY ECON. DEV. CORP., LOWER MANHATTAN CLIMATE RESILIENCE STUDY 13 (2019).

34. *Id.* at 8.

35. *See* CAL. DEP'T OF WATER RES., LAKE OROVILLE SPILLWAY INCIDENT: TIMELINE OF MAJOR EVENTS FEBRUARY, https://water.ca.gov/LegacyFiles/oroville-spillway/pdf/2017/Lake%20Oroville%20events%20timeline.pdf.

36. Patrick May, *The Oroville Dam Story: By the Numbers,* EAST BAY TIMES (Feb. 13, 2017), https://www.eastbaytimes.com/2017/02/13/the-oroville-dam-story-by-the-numbers/; *Upper Feather River Watershed*, SACRAMENTO RIVER WATERSHED PROGRAM, www.sacriver.org/aboutwatershed/roadmap/watersheds/feather/upper-feather-river-watershed (last visited Oct. 27, 2019).

37. *See* JOHN W. FRANCE ET AL., OROVILLE DAM SPILLWAY INCIDENT S-1–S-3 (2018) ("The Oroville Dam spillway incident was caused by a long-term systemic failure of the California Department of Water Resources (DWR), regulatory, and general industry practices to recognize and address inherent spillway design and construction weaknesses, poor bedrock quality, and deteriorated service spillway chute conditions."); *see also* Dale Kasler, *Final Verdict on Oroville Dam: 'Long-term Systemic Failure,'* THE SACRAMENTO BEE (Jan. 5, 2018), https://www.sacbee.com/news/california/water-and-drought/article193151499.html (attributing incident to complex interaction of common factors).

38. Ryan Sabalow & Dale Kasner, *Oroville Dam Repairs Now Exceed $1 Billion and 'May Be Adjusted Further' as Work Continues,* THE SACRAMENTO BEE (Sept. 5, 2018), https://www.sacbee.com/news/state/california/water-and-drought/article217824370.html.

E. Texas: Hurricane Harvey in 2017

In August 2017, Hurricane Harvey hit Texas as a Category 4 storm, dousing Houston and eastern Texas with 40 inches of rain.[39] The storm produced catastrophic flooding, displaced more than 30,000 people, and caused estimated damages exceeding $125 billion.[40] Afterward, Zurich Insurance Group and the American Red Cross Global Disaster Preparedness Center contributed to a comprehensive study that reached two critical conclusions.[41] First, the study authors embraced government regulation as an inexpensive way to achieve water management benefits: **"Invest in regulation, coordinated floodwater detention and neighborhood drainage.** The collective impact of these efforts could significantly reduce city flooding at a fraction of the cost of large infrastructure projects, while at the same time laying the groundwork needed to maximize the operational flexibility and success of larger efforts."[42] Second, the authors called for budgetary investment into flood infrastructure:

> **Not acting now to build flood resilience in Houston and Harris County will potentially be very costly in the future.** Hesitancy on the part of leadership to take bold and potentially controversial action and unwillingness on the part of residents to self-tax and act is rapidly leading Houston back onto a business-as-usual trajectory. What appears to have been pushed aside is the reality that lack of action could be very costly for Houston in the future, in ways that could reverberate throughout the entire economy and region.[43]

After Harvey, the Harris County Flood Control District, which serves as local sponsor of U.S. Army Corps of Engineers projects, launched a voluntary buyout program for homeowners located in the floodplains.[44] In 2018, 85% of voters approved a $2.5 billion bond empowering the Harris County Flood Control District to build at least 230 projects over the next 10 to 15 years.[45] Flood control costs, as usual, reach well into the billions.

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39. ISET-INT'L ET AL., HOUSTON AND HURRICANE HARVEY: A CALL TO ACTION 3 (2018).
40. *Id.*
41. *See generally id.* at 5 (summarizing the comprehensive study).
42. *Id.* (emphasis in original).
43. *Id.* (emphasis in original).
44. *Home Buyout Program*, HARRIS CTY. FLOOD CONTROL DIST. (Aug. 2, 2019), https://www.hcfcd.org/hurricane-harvey/home-buyout-program/.
45. Zach Despart, *Harris County Voters Pass $2.5 Billion Flood Bond One Year After Harvey*, HOUS. CHRON. (Aug. 25, 2018), https://www.houstonchronicle.com/news/houston-weather/hurricaneharvey/article/Harris-County-voters-pass-2-5-billion-flood-bond-13182842.php.

F. North Carolina: Hurricane Florence in 2018

When Hurricane Florence hit North Carolina in September 2018, the public suffered once again. More than 1 million people in low-lying coastal Carolina were ordered to evacuate,[46] more than 600,000 homes received wind or water damage,[47] and Moody's estimates a loss to economic output of up to $2 billion.[48] Due to North Carolina's agricultural economy and water management infrastructure, the water-quality issues associated with the disaster were pronounced:

> Polluted flood waters swamped coal ash ponds at power plants. Rising waters engulfed private septic systems in back yards. The unwholesome mix inundated hog waste lagoons on farms. And the torrent overwhelmed municipal waste water treatment plants in towns large and small.
>
> In some cases these waste-handling facilities took on so much water they experienced structural damage and partially collapsed, disgorging their contents into the flood.[49]

The consequences of the flooding and the water-quality concerns were extraordinary, and the pollution flowing downstream became visible from satellites in space.[50] Drinking-water wells, waterbodies, and shellfish farms were seriously contaminated.[51] The drainage system required $57.5 million for debris removal, and $23.6 million for damages to 19 dams.[52] Additional

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46. *See* Richard Faussett*, As Hurricane Florence Threatens the Carolinas, 1 Million Ordered to Evacuate*, N.Y. TIMES (Sept. 10, 2018), https://www.nytimes.com/2018/09/10/us/hurricane-florence.html (reporting Governor McMaster called on more than a million residents in eight coastal counties to evacuate and head inland).

47. Clyde Hughes, *Carolinas Still Reeling from Florence Six Weeks After Storm*, UPI (Oct. 30, 2018), https://www.upi.com/Top_News/US/2018/10/30/Carolinas-still-reeling-from-Florence-six-weeks-after-storm/9071540835136/?ur3=1.

48. Patti Domm, *Hurricane Florence Damage Estimated at $17 Billion to $22 Billion and Could Go Higher – Moody's Analytics*, CNBC (Sept. 17, 2018), https://www.cnbc.com/2018/09/17/moodys-hurricane-florence-damage-estimated-at-17-to-22-billion.html.

49. John Murawski, *Hurricane Florence Bathed North Carolina in Raw Sewage. New Figures Show It Was Even Worse Than We Thought*, NEWS & OBSERVER (Dec. 27, 2018), http://www.govtech.com/em/disaster/Hurricane-Florence-Bathed-North-Carolina-in-Raw-Sewage-New-Figures-Show-it-was-Even-Worse-than-we-Thought.html.

50. Aristos Georgiou, *Pollution from Hurricane Florence is So Bad You Can See It from Space*, NEWSWEEK (Sept. 25, 2018), https://www.newsweek.com/pollution-hurricane-florence-so-bad-you-can-see-it-space-1137656.

51. Murawski, *supra* note 49.

52. ROY COOPER, HURRICANE FLORENCE RECOVERY RECOMMENDATIONS 24, 40 (Oct. 10, 2018).

costs of repairing, replacing, and upgrading water and sewer infrastructure were estimated at $100 million.[53] A post-disaster assessment report estimated that the economic damage approached $13 billion, and acknowledged the massive water-quality concerns but labeled costs as "unknown."[54] A report to Congress estimated damage as $17 billion.[55]

G. Disaster Relief: Priceless

Collectively, these examples remind water managers and policy makers that major crises will occur, especially if infrastructure is poorly maintained. Countless more examples could be cited, especially along the Mississippi River region, which suffered one of the greatest floods in human history in 1927, and nearly two dozen more thereafter.[56] These water management events can involve surging seas, massive rainfalls, or widespread flooding, which can harm water quality, damage water supplies and related infrastructure, and kill people. Admittedly, budgeting, calculating, and tracking expenditures for disaster mitigation, response, and relief can be complicated.[57] Nevertheless, when the inevitable disasters happen, state and territorial leaders have been able to turn to the federal government for emergency funding and recovery assistance that enable the communities to recover and continue to exist.[58]

FEMA has codified the process for seeking federal disaster assistance.[59] FEMA also has an approval and auditing process that ensures public assistance funds are properly spent.[60] All those funds come from the Disaster Relief Fund, "one of the most-tracked single accounts funded by

53. *Id.* at 34.

54. *Id.* at 3, 38.

55. *See* Letter from Roy Cooper, Governor, N.C., to N.C. Cong. Delegation (Nov. 28, 2018) (listing financial need in North Carolina); Letter from Henry McMaster, Governor, S.C., to S.C. Cong. Delegation (Nov. 16, 2018) (estimating South Carolina's damages at an additional $607 million).

56. *See Mississippi River Flood History 1543-Present,* NAT'L WEATHER SERV. (Aug. 10, 2019), https://www.weather.gov/lix/ms_flood_history (listing 22 different major floods since the Great Mississippi River Flood of 1927).

57. *See* PEW CHARITABLE TRUSTS, WHAT WE DON'T KNOW ABOUT STATE SPENDING ON NATURAL DISASTERS COULD COST US: DATA LIMITATIONS, THEIR IMPLICATIONS FOR POLICYMAKING, AND STRATEGIES FOR IMPROVEMENT 2 (2018) (discussing how many states experience difficulties tracking relief spending).

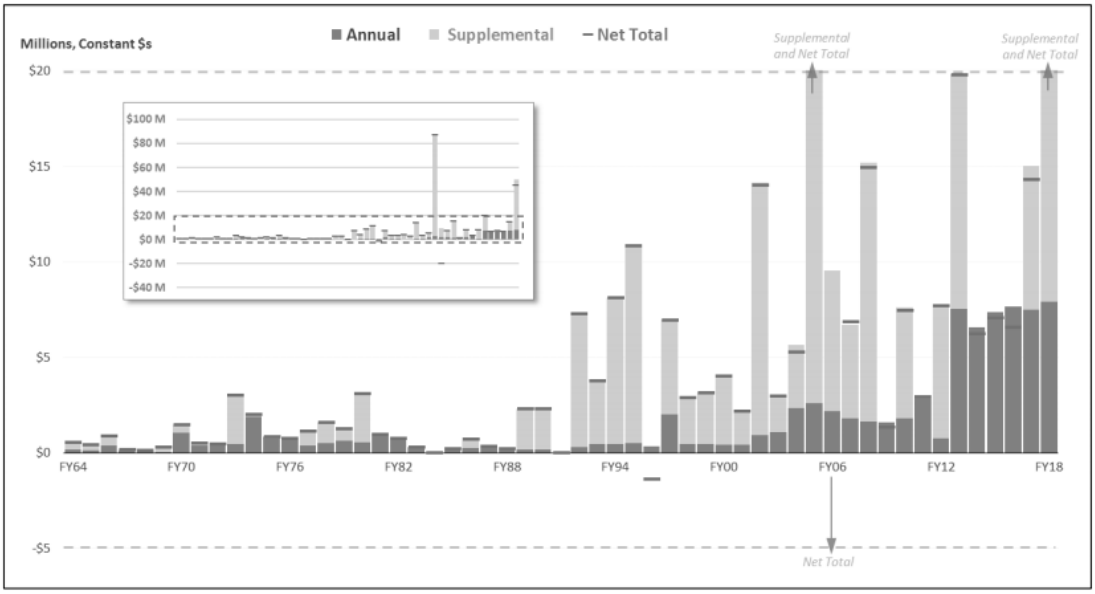
58. *See generally* Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42.U.S.C. §§ 5121–5207 (2018) (identifying the responsibilities of the federal government during disasters).

59. *See generally* 44 C.F.R. pt. 206 (2018) (codifying procedure for federal disaster assistance declared on or after November 23, 1988).

60. FED. EMERGENCY MGMT. AGENCY, PUBLIC ASSISTANCE PROGRAM AND POLICY GUIDE, FP-104-009-2, 5–6 (2018).

Congress."[61] If a major disaster strikes and the Disaster Relief Fund balance is low, funding of the response and relief efforts may depend on further Congressional appropriations.[62] A 2019 Congressional Research Service analysis, reproduced below, shows that federal disaster funding dramatically increased between 1964 and 2018.[63] Still, for now, the federal government offers a partial backstop when the states fall short—albeit one funded by massive deficit spending.[64]

Figure 2. FY2018 Dollar Disaster Relief Appropriations, FY1964-FY2018



Source: CRS Analysis of appropriations laws.

Ideally, some of these expenses could be avoided or minimized. As the examples above demonstrate, better environmental regulation and zoning, funding for infrastructure maintenance and upgrades, or disciplined financial

61. WILLIAM L. PAINTER, CONG. RESEARCH SERV., R45484, THE DISASTER RELIEF FUND: OVERVIEW AND ISSUES 1 (2019).

62. *See id.* at 10–11 (explaining that general disaster relief activities by the federal government under the Stafford Act may be funded by: ad hoc annual appropriations, such as to the Disaster Relief Fund; supplemental appropriations, often ad hoc for a specific event; or continuing appropriations, when annual appropriations work remains unresolved at the beginning of the new fiscal year).

63. *Id.* at 15.

64. *See* Demian Brady, *Budget for Disasters to Prevent a Budget Disaster*, NAT'L TAXPAYERS UNION FOUND. (May 23, 2019), https://www.ntu.org/foundation/detail/budget-for-disasters-to-prevent-a-budget-disaster (highlighting how federal emergency spending is at times added to the deficit).

management with adequate reserves for emergency response might have reduced costs. Yet, history suggests that water managers lack the vision needed. To the dismay of insurers and disaster managers, people assume that disaster relief will come to the rescue.[65]

It is irresponsible for our local and regional institutions to rely entirely on disaster relief. As the scale of disasters grow, disaster response becomes even more difficult, and the relief might take a long time to come (if ever).[66] Even if the disaster response comes, the process takes time, and people with insufficient assets get left behind.[67] And, as a political matter, Congress could stop delivering the massive amounts of funding. Consider recent events in the Caribbean. After Hurricanes Irma and Maria struck in September 2017, Puerto Rico received $4 billion in federal grants, but the Government Accounting Office says it needs $132 billion more to rebuild its energy, water, and housing systems.[68] Similarly, the two storms damaged more than half of the U.S. Virgin Islands' housing units and its hospitals, schools, and water and wastewater facilities.[69] By April 2019, "FEMA obligated approximately $1.8 billion for 583 public-assistance projects," whereas the U.S. Virgin Islands suffered an estimated $10.7 billion in total damages.[70] In other words, for Puerto Rico and the U.S. Virgin Islands, the disaster relief funding was insufficient.[71] Policy disagreements with the White House also delayed relief funding after President Donald Trump opposed waiving the requirement that Puerto Rico contribute matching dollars to cost-share in the

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65. *See* Eric Roston*, U.S. Spends Billions on Disaster Aid Over Investing in More Lasting Preparedness*, INS. J. (June 12, 2019), https://www.insurancejournal.com/news/national/2019/06/12/528943.htm (discussing Congressional reliance on disaster relief spending instead of pushing for preparatory measures).

66. Elizabeth F. Kent, *"Where's the Cavalry?" Federal Response to 21st Century Disasters*, 40 SUFFOLK U. L. REV. 181, 181 (2006) (quoting Department of Homeland Security Secretary Michael Chertoff: "The unusual set of challenges of conducting a massive evacuation in the context of a still dangerous flood requires us to basically break the traditional model and create a new model, one for what you might call kind of an ultra-catastrophe.").

67. *See* John K. Pierre & Gail S. Stephenson, *After Katrina: A Critical Look at FEMA's Failure to Provide Housing for Victims of Natural Disasters*, 68 LA. L. REV. 443, 460 (2008) (detailing shortcomings of federal disaster response); Melissa H. Luckman et. al., *Three Years Later, Sandy Survivors Remain Homeless*, 32 TOURO L. REV. 313, 313 (2016) (noting that a "few inches of water can damage a home for years, and long after the event, people may remain homeless.").

68. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-19-256, PUERTO RICO HURRICANES: STATUS OF FEMA FUNDING, OVERSIGHT, AND RECOVERY CHALLENGES (2019) (reporting Puerto Rican estimates $132 billion in funding from 2018 through 2028 will be needed to repair and reconstruct the infrastructure damaged by the hurricanes).

69. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-19-662T, EMERGENCY MANAGEMENT: FEMA'S DISASTER RECOVERY EFFORTS IN PUERTO RICO AND THE U.S. VIRGIN ISLANDS 2 (2019).

70. *Id.* at 2, 9.

71. *See* Charley E. Willison et al., *Quantifying Inequities in US Federal Response to Hurricane Disaster in Texas and Florida Compared with Puerto Rico*, BMJ GLOB. HEALTH 1 (Jan. 18, 2019) (noting that the funding for Puerto Rico was less robust and slower than other efforts).

disaster relief.[72] Some organizations continued to lobby against Congressional efforts to pass supplemental disaster relief appropriations.[73]

As the examples above have shown, the existence of a community is priceless, but the cost of responding to emergencies and rebuilding routinely reaches multi-billion-dollar figures. Yet disaster management has financial limits, even when public safety is at stake.[74] Disaster relief is not guaranteed.

III. CHAOS MANAGEMENT: THE REALITIES OF SOUTH FLORIDA

South Florida knows about both water management and costly disasters. Public and private actors who were incentivized by governmental programs to build drainage systems that enabled human-development activities shaped Florida's early history.[75] Over time, the burdens of maintaining those systems necessitated a growing role for government and disaster relief. In the future, as Florida confronts the established risks of hurricanes, floods, and droughts—all likely to be intensified by warming oceans and rising seas—the role of government and its interaction with the stakeholders becomes ever more important.

A. History: From Speculation to Water Governance

The headwaters of the Everglades began just south of Orlando, Florida, where waters eventually gathered and flowed downstream along the Kissimmee River, a meandering river prone to exceeding its banks.[76] That

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72. *See, e.g.*, Statement of Administration Policy on H.R. 268 — Supplemental Appropriations Act, 2019 (Jan. 16, 2019) ("The Administration strongly objects to language waiving non-Federal cost shares for Puerto Rico and the U.S. Virgin Islands for Hurricanes Maria and Irma. Cost shares are critical to ensure that work with impacted jurisdictions is collaborative and that both partners have incentives to operate efficiently and control costs.").

73. Press Release, Nat'l Taxpayers Union, Representatives Should Oppose Updated Supplemental Spending Bill (May 9, 2019) (on file with author).

74. *See* Kate Lyons, *The Night Barbuda Died: How Hurricane Irma Created a Caribbean Ghost Town*, (Nov. 20, 2017), https://www.theguardian.com/global-development/2017/nov/20/the-night-barbuda-died-how-hurricane-irma-created-a-caribbean-ghost-town (noting delay in necessary financial investment to restore Barbuda despite some health concerns); *see also* Joe Pike, *Antigua and Barbuda: One Year After Irma*, TRAVEL PULSE (Sept. 14, 2018), https://www.travelpulse.com/news/destinations/antigua-and-barbuda-one-year-after-irma.html (describing the rebuilding process notably with funding from China and the European Union); Tracey Minkin & Sid Evans, *These 8 Caribbean Islands Hardest Hit by the 2017 Hurricanes Are Ready for Your Return*, COASTAL LIVING (Oct. 31, 2018), https://www.coastalliving.com/travel/caribbean-islands-comeback (noting that it took more than a year for the first hotel to reopen).

75. *See* MATTHEW C. GODFREY & THEODORE CATTON, RIVER OF INTERESTS: WATER MANAGEMENT IN SOUTH FLORIDA AND THE EVERGLADES, 1948–2010 1 (2011) (documenting the history of flood initiatives in the Everglades ecosystem from a federal perspective).

76. *Id.* at xi; *see also Everglades National Park Florida History and Culture*, NAT'L PARK SERV. (Apr. 14, 2015), https://www.nps.gov/ever/learn/historyculture/index.htm.

river drained into Lake Okeechobee, a shallow but very large freshwater lake.[77] Then circled by wetlands, the lake spilled over its boundary during peak wet seasons so that waters slowly flowed southward through the Everglades.[78] Eventually, the waters reached Florida Bay at the peninsula's end.[79]

Florida's settlers replumbed the Greater Everglades ecosystem. In 1881, a wealthy Philadelphian named Hamilton Disston purchased the rights to four-million acres of wetlands in Florida.[80] By constructing canals to drain the land, Disston sought to gain access and clean title to the upland properties, but his efforts ultimately failed.[81] Over time, many other resourceful Floridians and land speculators sought to build water management infrastructure to make the inland areas of Florida accessible to farmers and developers, but in 1926 and 1928 a pair of hurricanes flooded the lands and killed thousands of people who had settled in the region.[82] That proved to be a turning point.

Taking great interest in the region, the federal government enacted the River and Harbors Act of 1930 and further authorized the Army Corps of Engineers to construct 67.8 miles of levees along the south shore of Lake Okeechobee and 15.7 miles along the north shore.[83] The consequences of another major hurricane in 1947 convinced Congress to pass the Flood Control Act of 1948, which authorized a Central and South Florida Project (C&SF Project) to provide additional flood-damage reduction and water-control benefits.[84] By the late 1960s, a new "Herbert Hoover Dike" surrounded Lake Okeechobee.[85]

The State of Florida also provided its own impetus for changes in water management. Although the U.S. Army Corps of Engineers built part of the flood-control system, in 1949, the Central and Southern Florida Flood Control District, a regional governmental entity within the State of Florida, emerged as the local sponsor responsible for operating and maintaining the

77. GODFREY, *supra* note 75, at xi.

78. *Id.*

79. *Everglades National Park Florida History and Culture*, *supra* note 76.

80. Christopher F. Meindl, *On the Eve of Destruction: People and Florida's Everglades from the late 1800s to 1908*, 63 J. HIST. ASS'N S. FLA. 5, 7 (2003).

81. *Id.* at 8–9.

82. James C. Clark, *1926 and 1928 Hurricanes Were a Costly and Deadly One-Two Punch for Florida,* ORLANDO SENTINEL (Oct. 6, 1994), https://www.orlandosentinel.com/news/os-xpm-1994-10-16-9410120696-story.html.

83. *See About Herbert Hoover Dike*, U.S. ARMY CORPS OF ENG'RS, https://www.saj.usace.army.mil/Missions/Civil-Works/Lake-Okeechobee/Herbert-Hoover-Dike/ (last visited Sept. 27, 2019) (describing Rivers and Harbors Act of 1930).

84. *Id.*

85. *Id.*

system.[86] Later, Florida enacted the Florida Water Resources Act of 1972, extending the robust process for water management statewide.[87] The comprehensive statutory scheme created five state water management districts,[88] with the South Florida Water Management District assuming the responsibility to operate and manage the Everglades system and to continue the role as local sponsor of the C&SF Project.[89] Florida had modernized water law; rather than just an appendage of property law, it became a thoughtful and important modern policy tool.[90]

More recently, scholars have described the bifurcated system of water governance and the overlays of competing and conflicting state and federal authority as a "rigidity trap."[91] Instead of visionary policy, ecological, economic, political, or social crisis triggers changes.[92] Technology, flood events, or human (mis)management of the region causes change in abrupt, disjunctive, and unpredictable steps.[93] For example, since 1988, the state and federal governments, along with various agricultural and environmental activist groups, have been ensconced in complex litigation trying to find solutions to the water quality violations created by the system.[94] Court orders change the status quo.

Nonetheless, the water management districts inarguably must perform an essential and long-term role in the management of the greater Everglades

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86. *See* FLA. STAT. § 373.149 (2019) (noting it shall not affect chapter 25270 of the Laws of Florida creating a flood control district).

87. FLA. STAT. § 373.013; *see also* FLA. STAT. § 373.016 (expanding water resources management).

88. FLA. STAT. § 373.069(1).

89. *See* FLA. STAT. § 373.149 ("Existing districts preserved. The enactment of this act shall not affect the existence of the Central and Southern Florida Flood Control District created by chapter 25270, 1949, Laws of Florida"); FLA. STAT. § 373.1301 ("South Florida Water Management District as local sponsor.").

90. Christine A. Klein et al., *Modernizing Water Law: The Example of Florida*, 61 FLA. L. REV. 403, 418-19 (2009).

91. Lance H. Gunderson, et al., *Escaping A Rigidity Trap: Governance and Adaptive Capacity to Climate Change in the Everglades Social Ecological System*, 51 IDAHO L. REV. 127, 131 (2014).

92. *Id.* at 155 ("Environmental governance of the Everglades has had limited success because of entrenched organizational hierarchies, as well as the inability to resolve disagreements associated with implementation of federal and state law. Moreover, attempts at collaborative management have, in the end, resorted to an adversarial, litigation model for resolving uncertainties. This legal and organizational rigidity limits the experimentation necessary for environmental governance in light of our current understanding of the dynamics of social-ecological systems.").

93. *Id.* at 129.

94. *Id.* at 134 ("But litigation spawned and swamps the modern era of Everglades' restoration. The lawsuit filed in 1988, in which the United States sued the South Florida Water Management District, cited the adverse water quality effects of water management upon Everglades National Park and the Loxahatchee National Wildlife Refuge. In other words, the state governmental entity charged with responsibility to operate the regional flood control system was sued by the federal government for the consequences of operating the system that the federal government had designed, built and approved.").

watershed.[95] To govern water resources in the state, each water management district implements Chapter 373 of the Florida Statutes through its governing board, and with the assistance of the Florida Department of Environmental Protection.[96] These agencies have broad powers over state waters.[97] For example, in a declaration of policy, the Florida Legislature acknowledged that "waters in the state are among its basic resources" and that the SFWMD and Department of Environmental Protection shall "manage those resources in a manner to ensure their sustainability[.]"[98] The Legislature further noted that its policy was to manage, utilize, and conserve water resources to promote public health, safety, and welfare.[99] Some statutes are specific to regions or ecosystems, such as the Kissimmee River, Lake Okeechobee, or the Everglades.[100] Other parts separately address the regulation of ground waters, wells, surface waters, and springs.[101] As explained by the former Chairman of the SFWMD, Federico Fernandez, these sometimes-competing duties are commonly distilled into four concepts: (1) flood control; (2) water supply; (3) water quality; and (4) ecosystem protection.[102]

Responsible water management is expensive. The construction, operation, and maintenance of canals and other structures, and the

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95. *See id.* at 129–130 ("Such transformations are characterized by different ecological conditions (indicated by the designation of an endangered species, such as the Cape Sable sparrow) or institutional configurations (such as the creation of South Florida Water Management District).").

96. FLA. STAT. § 373.016(2) (2019) ("In implementing this chapter, the department and the governing board shall construe and apply the policies in this subsection as a whole").

97. FLA. CONST. art. II, § 7.

98. FLA. STAT. § 373.016(1)–(2) (2019).

99. *Id.* § 373.016(3) (declaring that it is the policy of the Legislature: (a) To provide for the management of water and related land resources; (b) To promote the conservation, replenishment, recapture, enhancement, development, and proper utilization of surface and groundwater; (c) To develop and regulate dams, impoundments, reservoirs, and other works and to provide water storage for beneficial purposes; (d) To promote the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems; (e) To prevent damage from floods, soil erosion, and excessive drainage; (f) To minimize degradation of water resources caused by the discharge of stormwater; (g) To preserve natural resources, fish, and wildlife; (h) To promote the public policy set forth in s. 403.021; (i) To promote recreational development, protect public lands, and assist in maintaining the navigability of rivers and harbors; and (j) Otherwise to promote the health, safety, and general welfare of the people of this state.)

100. *See, e.g.*, Everglades Forever Act, FLA. STAT. § 373.4592 (2019) (protecting the Everglades ecological system); Northern Everglades and Estuaries Protection Program, FLA. STAT. § 373.4595 (2019) (protecting and restoring surface water resources and achieve and maintain compliance with water quality standards in the Lake Okeechobee watershed, the Caloosahatchee River watershed, and the St. Lucie River watershed).

101. *See, e.g.*, FLA. STAT. §§ 373.203–373.250 (2019) (permitting of consumptive uses of water); FLA. STAT. §§ 373.302-373.342 (regulating wells); FLA. STAT. §§ 373.403–373.468 (managing and storing surface waters); Florida Springs and Aquifer Protection Act, FLA. STAT. §§ 373.801–373.813 (2019) (protecting springs).

102. *See, e.g., Welcome to SFWDM.com,* S. FLA. WATER MGMT. DIST., https://web.archive.org/web/20181224103141/https://www.sfwmd.gov/who-we-are/chairmans-message (last captured Nov. 9, 2018).

implementation of environmental regulations, require funds and people. While the state provides some funding, local governing boards also possess the discretion to impose *ad valorem* taxes on property to raise necessary funds for local benefits.[103] A series of statutes also set maximum rates and a public process for passing the budget.[104] Recent budget decisions, however, have impaired the SFWMD's ability to perform.

B. Risk Management: The Duty to Prepare and Respond.

Pursuant to its statutory scheme, and as history shows, the SFWMD has an important role in managing waters on a daily basis, and on implementing routine regulatory requirements. By definition, water management also includes the management of risks such as floods and droughts and operating complex systems that may fail catastrophically. [105] In our changing world, the risk calculus is becoming increasingly complex, especially for the low-lying land mass of South Florida that remains highly vulnerable to hurricanes, water quality turmoil, and rising seas.

1. Hurricanes

A breach of the Lake Okeechobee dike devastated the Everglades Agricultural Area in the 1920s and killed thousands.[106] While Hurricane Andrew was intensely damaging and bulldozed a 22-mile wide strip of land 25 miles to the south of Miami, it missed the urban core of South Florida and the water management infrastructure.[107] In contrast, during the 2004 season, Hurricanes Charley, Frances, Jeanne, and Ivan collectively caused more than $45 billion in damage and dumped 30 inches of rain on the region, stressing

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103. FLA. STAT. § 373.503(1) (2019).

104. *See generally* FLA. STAT. §§ 373.470–373.591 (2019) (mandating taxation processes and district budgets).

105. *See* Amahia Mallea, *As Flood Risks Increase Across the U.S., It's Time to Recognize the Limits of Levees,* GOV'T TECH. (July 17, 2019), http://www.govtech.com/em/preparedness/As-Flood-Risks-Increase-Across-the-US-Its-Time-to-Recognize-the-Limits-of-Levees.html (providing that many U.S. cities rely on levees from protection from floods and that most of these levees need repair).

106. Christine DiMattei, *Remembering the 1928 Storm That Unleashed "Lake O"*, WLRN (June 1, 2015), http://www.wlrn.org/post/remembering-1928-storm-unleashed-lake-o.

107. *Historical Vignette 055 - The Corps Came to the Aid of Florida in the Aftermath of Hurricane Andrew*, U.S. ARMY CORP OF ENG'RS (Aug. 2002), https://www.usace.army.mil/About/History/Historical-Vignettes/Relief-and-Recovery/055-Hurricane-Andrew/ ("The hurricane cut a broad path of destruction 22-miles wide, devastating the areas from Biscayne Bay to the Everglades. It leveled thousands of homes and other buildings, destroyed public utilities, ripped up trees, and left millions of cubic yards of debris. Its fierce winds tore down most of south Florida's power lines, leaving 1.4 million customers without electricity. It was one of the worst natural disasters of the century, killing twenty people and leaving a quarter of a million people homeless.").

the flood-control systems and sending Lake Okeechobee water levels dangerously high once again.[108] Hurricane Irma threatened the dike again in 2017.[109] Research suggests that extreme rainfall events of this type will increase in frequency, and short-duration storms lasting less than a day are increasing the magnitude and frequency of flash floods.[110] Experts even fear a future with "Category 6" hurricanes.[111] With 40 percent of all U.S. hurricanes hitting Florida, Miami remains the most vulnerable city in the world.[112] A recent analysis by Swiss Re Group warns of its own stunning calculations: insured losses of $100 to $300 billion.[113]

2. The quartet of climate risks, including rising seas

In 2009, an internal SFWMD report outlined a critical quartet of factors related to climate change that presented new risks for water management.[114] These were: (1) rising seas; (2) temperature and evapotranspiration; (3) rainfall, floods and drought; and (4) tropical storms and hurricanes.[115] Above all else, the report emphasized that the "only certainty is the uncertainty of the wide-ranging projections."[116] Ultimately, the report recommended that water managers needed to be especially attentive to the subject:

> Over the next two years, more work is needed to understand the current trends and uncertainties in climate projections, and to develop tools for understanding the exact vulnerabilities of the water management system and regional water resources. During this period

108. Press Release, Randy Smith, S. Fla. Water Mgmt. Dist., 1980-Today: Restoring the South Florida Ecosystem (July 21, 2009).

109. Craig Pittman, *Lake O Hits Highest Level Since 2005, Raising Concerns Its Dike Could Fail*, TAMPA BAY TIMES (Oct. 5, 2017), https://www.tampabay.com/news/environment/water/lake-o-hits-highest-level-since-2005-raising-concerns-its-dike-could-fail/2339994.

110. S. Westra et al., *Future Changes to the Intensity and Frequency of Short-Duration Extreme Rainfall*, 52 REVS. GEOPHYSICS 522, 548 (2014).

111. David Fleshler, *The World Has Never Seen a Category 6 Hurricane. But the Day May Be Coming*, SUN SENTINEL (July 6, 2018), https://www.sun-sentinel.com/news/florida/fl-reg-hurricanes-climate-20180703-story.html.

112. *Frequently Asked Questions*, NOAA, https://www.aoml.noaa.gov/hrd/tcfaq/E19.html (last visited Oct. 8, 2019); *see also* Jennifer Kay, *Swiss Re: Miami Is More Vulnerable to Hurricanes Like Andrew*, INS. J. (Aug. 10, 2017), https://www.insurancejournal.com/news/southeast/2017/08/10/460775.htm. (discussing Miami's vulnerability).

113. Kay, *supra* note 112.

114. INTERDEPARTMENTAL CLIMATE CHANGE GRP., S. FLA. WATER MGMT. DIST., CLIMATE CHANGE AND WATER MANAGEMENT IN SOUTH FLORIDA 2 (2009).

115. *Id.* at 5.

116. *Id.* at 19.

> and beyond, appropriate adaptation strategies will be developed and implemented.[117]

Ten years later, as the climate risks accumulate, the passive study continues.[118] Meanwhile, SFWMD staff keep warning that the risk of droughts rises as rates of evapotranspiration rise.[119] The water managers must store extra water for the worst dry seasons and quickly dump the excess if an intense wet season follows. This is a difficult balancing act.

Perhaps the greatest threat from the perspective of a water manager is sea-level rise. Tidal fluctuations are already flooding some areas of the Florida Keys.[120] Local flooding has risen by 400 % since 2006.[121] These tides cause salt water to push into ground water, jeopardizing drinking water sources.[122] These risks will continue to climb and can compromise the ability of the flood control system to drain water out to the oceans. Because canals rely on gravity, if the tailwater is elevated, water drains more slowly, and flooding grows higher and lasts longer.[123] The Southeast Florida Regional Climate Change Compact—a joint effort of four Florida counties relying upon expert technical input—projects up to 10-inches of sea level rise by 2030.[124]

In South Florida, the regional Lake Worth Drainage District (LWDD) manages a 200 square mile region of Palm Beach County and operates a system with 500 miles of canals, 1,000 miles of rights-of-way, and 20 major

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117. *Id.*

118. *See, e.g.*, JEFFREY R. KIVETT, S. FLA. WATER MGMT. DIST., IMPACT OF SEA LEVEL RISE ON DISTRICT OPERATIONS: IMPACTS AND ADAPTATIONS 1–13 (2015) (assessing future adaptations to future impacts from sea level rise); EDWIN WELLES, FLOOD AND DROUGHT RISK MANAGEMENT UNDER CLIMATE CHANGE: METHODS FOR STRATEGY EVALUATION AND COST OPTIMIZATION, PERFORMANCE PROGRESS REPORT 1–2 (2015) (using "robustness analysis" and other methods to analyze climate change impacts in SFWMD).

119. WOSSENU ABTEW, S. FLA. WATER MGMT. DIST., EVAPOTRANSPIRATION IN THE EVERGLADES AND ITS WATERSHED 26 (2012); Wossenu Abtew et al., *Pan Evaporation and Potential Evapotranspiration Trends in South Florida,* 25 HYDROLOGICAL PROCESSES 958, 968 (2011).

120. RHONDA HAAG, CLIMATE CHANGE & SEA LEVEL RISE: IMPACTS IN THE FLORIDA KEYS 7 (2018), https://apps.sfwmd.gov/webapps/publicMeetings/viewFile/14331 (presenting at the SFWMD Governing Board Meeting).

121. *See* Shimon Wdowinski, *Increasing Flooding Hazard in Coastal Communities Due to Rising Sea Level: Case Study of Miami Beach, Florida,* OCEAN & COASTAL MGMT., March 2016, at 3 ("Our analysis indicates that significant changes in flooding frequency occurred after 2006, in which . . . tide-induced events increased by more than 400%").

122. *See* MIAMI DADE CTY. OFFICE OF RESILIENCE, REPORT ON FLOODING AND SALT WATER INTRUSION 49 (2016) (identifying the risks of salt water intrusion).

123. *See* JOEL VANARMAN, FLA. ENVTL. INST., EVALUATING THE EFFECTS OF SEA LEVEL RISE ON FLOOD PROTECTION IN URBAN AREAS (2015) (reviewing how sea level rise will affect canals and other flood control infrastructure).

124. SEA LEVEL RISE WORK GRP., UNIFIED SEA LEVEL RISE PROJECTION: SOUTHEAST FLORIDA 1 (2015).

and numerous minor water-control structures.[125] Mr. Tommy Strowd, a licensed professional engineer, is the LWDD's incoming executive director, and previously served as a lead engineering official at the SFWMD, including a brief period as its acting-executive director.[126] In an interview, he considered the costs of adapting South Florida's regional water management infrastructure to rising seas:

> The South Florida Water Management District has a whole bunch of coastal flood control structures along the lower east coast of Florida that operate by gravity to spill inland flood waters to tide. If sea levels rise by just 12 inches, we will need new pumping facilities to move flood waters off the land and into the ocean.
>
> I estimate that as many as two dozen structures would need to be upgraded in order to maintain the flow capacities required to provide flood protection for the urban and agricultural areas in south Florida. It would be expensive, maybe as much as $10 to $20 million dollars per structure. And that is just for the capital costs. These structures need fuel to operate, too. That could run as high as 10 to 12% of the capital costs. And all that is just for the coastline.
>
> If weather patterns change significantly, and we have a crisis event like a pump station failure, flood damages could easily be measured in tens of millions of dollars, too. Throw in a major storm, and a levee failure in a community near the Everglades, and we could be talking about hundreds of millions of dollars. Those are just the scary possibilities.[127]

In other words, the capital costs of preparing the SFWMD for rising seas—if just 20 structures required an average of $15 million of investment—could reach $300 million. Operating costs for these structures are another $30 million annually. None of this accounts for the large-scale crisis that comes with a major hurricane or drinking water calamity; rather, this expense is

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125. *Who We Are,* LAKE WORTH DRAINAGE DIST., http://www.lwdd.net/about-us/who-we-are (last visited Oct. 3, 2019).

126. Christine Stapleton, *Pipeline? Water Management District Exec the Third to Head to Lake Worth Drainage District*, PALM BEACH POST (Mar. 25, 2014), https://www.palmbeachpost.com/news/state--regional-govt--politics/pipeline-water-management-district-exec-the-third-head-lake-worth-drainage-district/RZFxIXp9tMt3E8g5UU1jkN/.

127. E-mail from Tommy Strowd, Dir. of Operations & Maint., Lake Worth Drainage Dist., to Keith Rizzardi, Professor of Law, St. Thomas Univ. Sch. of Law (Feb. 16, 2019, 2:02 PM) (on file with the publisher).

merely to adapt and upgrade the system in a resilient way that allows it to function despite the changing baseline elevations of the ocean.

3. Harmful algal blooms

While climate change and rising seas may seem distant or abstract, toxic algae presents an immediate risk to South Florida. Harmful algal blooms (HABs) occur when tiny algae organisms grow out of control, and they occur in every U.S. coastal state.[128] NOAA has acknowledged that HABs produce toxic or harmful effects on people, fish, shellfish, marine mammals, and birds, and can be debilitating or even fatal.[129] Medical literature correlated toxic algae exposure with the development of ALS.[130]

In both 2005 and 2016, massive outbreaks of cyanobacteria occurred on Florida's shores.[131] Journalists photographed bright green waves lapping on the sand.[132] The Florida Department of Health posted public health warnings.[133] When it happened again in 2018, state and federal officials acknowledged that discharges of nutrient enriched waters from Lake Okeechobee were a contributing factor.[134] Governor Rick Scott issued an Executive Order that called the situation an emergency:

> WHEREAS, the release of water from Lake Okeechobee and increase in algae blooms, including overwhelming amounts of cyanobacteria (blue-green algae) which can produce hazardous toxins, has unreasonably interfered with the health, safety, and welfare of the State of Florida and its residents; and

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128. *Harmful Algal Blooms,* NAT'L OCEAN SERV., https://oceanservice.noaa.gov/hazards/hab/ (last updated Aug. 30, 2019).

129. *Id.*

130. Nathan Torbick et al., *Assessing Cyanobacterial Harmful Algal Blooms as Risk Factors for Amyotrophic Lateral Sclerosis*, 33 NEUROTOXICITY RES. 199, 199 (2018).

131. *Cyanobacteria (Blue-Green Algae)*, FLA. FISH & WILDLIFE CONSERVATION COMM'N, https://myfwc.com/research/wildlife/health/other-wildlife/cyanobacteria/ (last visited Sept. 12, 2019).

132. *See* Tyler Treadway, *Algae Blooms Return to St. Lucie River; Lake Okeechobee Discharges Will Make Them Stay*, TREASURE COAST NEWSPAPERS (Aug. 21, 2018), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2018/08/21/blue-green-algae-blooms-back-st-lucie-river/1050046002/ (showing photographs of algae affected water).

133. Tyler Treadway, *Highly Toxic Blue-Green Algae at Dam Where Lake O Waters Enter St. Lucie River*, TREASURE COAST NEWSPAPERS (Aug. 29, 2018), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2018/08/29/dep-highly-toxic-blue-green-algae-dam-leading-st-lucie-river/1131439002/.

134. BARRY H. ROSEN ET AL., SCI. INVESTIGATIONS REP. 2018–5092, UNDERSTANDING THE EFFECT OF SALINITY TOLERANCE ON CYANOBACTERIA ASSOCIATED WITH A HARMFUL ALGAL BLOOM IN LAKE OKEECHOBEE, FLORIDA, 1–3 (2018).

> WHEREAS, the toxic algae blooms have resulted in an increasing threat to our environmental and fragile ecosystems, including our rivers, beaches, and wildlife; and
>
> WHEREAS, the toxic algae blooms have led to the issuance of health advisories, closure of recreational areas, and economic losses in adjacent communities . . . .[135]

Governor Scott's Order designated the Florida Department of Environmental Protection as lead agency and required Florida agencies to "enter into agreements with any and all agencies of the United States Government as may be needed to meet the emergency."[136] The Order also provided budget authority for fund transfers needed to pay for the emergency.[137]

As summer ends and waters cool, the algal bloom emergencies end—the effects will linger. Even after beaches reopen, the declining water quality puts the fishing, boating, and tourism communities at risk.[138] Worse yet, in the absence of solutions, the harmful algal blooms are destined to return. The Center for Disease Control warns that blooms are becoming more frequent as temperatures warm and the levels of nutrients in our waters increase.[139] Thus, as harmful algal blooms reoccur and perceptions change, Florida's reputation as a tourist destination will be eroded, and the entire state economy and tax structure will decline. A 2018 study commissioned by Visit Florida evaluated out-of-state visitor spending at Florida-based businesses at $112 billion, noting the world-renowned beaches as part of the draw.[140] As much as 23 percent of Florida's state sales tax revenue—$4.9 billion in 2014—comes from tourism.[141] Use of the beaches and waterfront has been the top-ranked activity enjoyed by tourists coming to Florida.[142] The long-term economic risks of Florida's declining water quality are extraordinary.

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135. Fla. Exec. Order No. 18-191 2 (2018).

136. *Id.* at 3.

137. *Id.* at 4–6.

138. Mary Ellen Klas, *Fix Water Quality or Florida Tourism Will Suffer, Fishing and Boating Industries Warn*, MIAMI HERALD (Mar. 15, 2017), https://www.miamiherald.com/news/politics-government/state-politics/article138755918.html.

139. *Be Aware of Harmful Algal Blooms*, CTR. FOR DISEASE CONTROL & PREVENTION (July 5, 2019), https://www.cdc.gov/habs/be-aware-habs.html.

140. OXFORD ECON., THE ECONOMIC IMPACT OF OUT-OF-STATE VISITORS IN FLORIDA 2016 CALENDAR YEAR ANALYSIS 3 (2018).

141. *Tourism Fast Facts*, https://www.visitflorida.org/about-us/what-we-do/tourism-fast-facts/ (last visited Sept. 25, 2019).

142. *See* VISIT FLA., QUARTERLY REPORT JANUARY-MARCH 2016 22, 64 (2016) (noting that beach and waterfront activities are top activities for tourists).

C. Finances: Paying the Bill

Budgeting for water management contains vast amounts of discretion. Pursuant to Florida law, the SFWMD acts as local sponsor for the regional flood control system, and bears responsibility for operations and maintenance expenses of this system.[143] With more than $5 billion in capital assets, including more than $2 billion in water-control structures, canals, levees, buildings, and equipment,[144] those costs exceed $160 million annually.[145] In addition to managing its capital assets, SFWMD decides how to manage its regulatory responsibilities.[146] Unanticipated costs will arise, too, because the statutory budget hearing process explicitly notes the Agency's ability to plan for spending in an emergency to prevent a disaster:

> In the event of a disaster or of an emergency arising to prevent or avert the same, the governing board is not limited by the budget but may expend funds available for the disaster or emergency or as may be procured for such purpose. In such an event, the governing board shall notify the Executive Office of the Governor and the Legislative Budget Commission as soon as practical, but within 30 days after the governing board's action.[147]

Importantly, the budget process allows the SFWMD to maintain a budget that includes a reserve fund:

> The tentative budget must be based on the preliminary budget as submitted to the Legislature, and as may be amended by the district in response to review by the Legislature pursuant to ss. 373.503 and 373.535, as the basis for developing the tentative budget for the next fiscal year as provided in this subsection, and must set forth the proposed expenditures of the district, to which may be added an amount to be held as reserve.[148]

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143. *See* FLA. STAT. § 373.1501 (2019) (identifying SFWMD as local sponsor of identified projects); FLA. STAT. § 373.0693(10)(c) (2019) ("The local effort required in connection with construction, operation, and maintenance of the cooperative federal project referred to as the Central and Southern Florida Flood Control Project, which remains after the upper St. Johns portion is transferred to the St. Johns River Water Management District, shall be funded by tax levies on all taxable property within the Okeechobee Basin.").

144. S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT II-14 (2017).

145. *Id.* at III-2.

146. *See infra* Part IV B.

147. FLA. STAT. § 373.536(4)(d) (2019) (requiring a district budget and hearing thereon).

148. *Id.* § 373.536(5)(e).

Thus, the statutory scheme in Chapter 373 of the Florida Statutes anticipates that water managers will budget for emergencies and disasters and make reserve funds available. Ultimately, these funds are necessary to protect people and property; water management officials can exercise their authority and immediately employ "any remedial means to protect life and property," and take "such other steps as may be essential to safeguard life and property."[149]

While the state budget responsibilities are clear, South Florida's water managers should know to be cautious when it comes to federal emergency and disaster funding. After Hurricanes Charley, Frances, Jeanne, and Wilma effected the region in 2004–2005, the SFWMD sought and obtained federal funds to repair various flood control structures, including damaged levees.[150] But, federal auditors declared the expenses ineligible in 2011, demanding that the agency repay $18.4 million.[151] FEMA said that it lacked authority to fund permanent repairs of the levees, and that funding of the projects should have come from the U.S. Army Corps of Engineers Levee Rehabilitation Program or the Natural Resources Conservation Service's Emergency Watershed Protection Program.[152] On appeal, a federal court eventually sided with the SFWMD because FEMA lacked the authority to de-authorize expenses that it had previously approved.[153] The SFWMD's experience with FEMA is not unique. FEMA has engaged in similar "deauthorization" disputes with many other Florida cities and counties.[154] Floridians (and others) should know that FEMA funds are not guaranteed.

D. Politics: Satisfying the Stakeholders

With or without FEMA's help, the water managers have been given the authority to protect people from harm and to exercise powers as necessary in times of crisis. Water management is a serious responsibility, and pursuant to Florida's open-meeting and public-record laws, the decision-making

149. FLA. STAT. § 373.439 (2019).

150. Christine Stapleton, *Audits: South Florida Water Management District Should Repay FEMA $18 Million*, PALM BEACH POST (Nov. 16, 2012), https://www.palmbeachpost.com/weather/hurricanes/audits-south-florida-water-management-district-should-repay-fema-million/Zy5OyqeYzQBVMg3fjG6FfP/.

151. S. Fla. Water Mgmt. Dist. v. Fed. Emergency Mgmt. Agency, No. 13-80533-CIV, 2014 WL 4805856, at *4 n.9 (S.D. Fla. Sept. 18, 2014).

152. *Id.* at *3.

153. *Id.* at *7.

154. Letter from Grover C. Robinson, IV, President, Fla. Ass'n of Counties. & Lori Moseley, President, Fla. League of Cities, to Brad Kieserman, Acting Adm'r for Recovery, Fed. Emergency Mgmt. Agency (Oct. 24, 2014).

process takes place in a highly public and transparent way.[155] A wealth of information is made publicly available, and monthly governing board meetings, agendas, and documents are readily accessible.[156]

Given the risks, a large array of stakeholders participate in the water management process. These include: agricultural and utility interests concerned about water supply availability; boaters; fishermen; environmental interest groups focused on water quality, wildlife, and recreational issues; local governments and citizens concerned about regional drainage and flood control; taxpayer advocacy groups demanding smaller government; and countless other citizens. State governors have routinely organized or appeared at SFWMD events, especially those related to the Florida Everglades.[157] With 8 million people in the region—a number that keeps growing[158]—there are certainly many votes at stake.

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155. *See* FLA. ATTN'Y GEN., GOVERNMENT-IN-THE-SUNSHINE MANUAL 1 (2018) (establishing the public right of access to governmental proceedings).

156. *DBHydro (Environmental Data)*, S. FLA. WATER MGMT. DIST., https://www.sfwmd.gov/science-data/dbhydro (last visited Sept. 26, 2019); *Governing Board,* S. FLA. WATER MGMT DIST., https://www.sfwmd.gov/who-we-are/governing-board (last visited Sept. 26, 2019).

157. *See, e.g.*, Laura Parker, *Candor by Gov. Chiles Aids Everglades Cleanup*, WASH. POST (May 31, 1991) https://www.washingtonpost.com/archive/politics/1991/05/31/candor-by-gov-chiles-aids-everglades-cleanup/e40f4928-f824-47dc-9461-017ae71dddc8/?utm_term=.93dd3d2b266a (reporting Governor Lawton Chiles showed up in court to push for settlement of Everglades litigation); *see also, e.g.*, Michael Grunwald, *Jeb in the Wilderness*, POLITICO, (Mar. 2015), https://www.politico.com/magazine/story/2015/03/jeb-bush-everglades-115655_Page5.html; (reporting Governor Jeb Bush tried to accelerate the Everglades restoration); Jim Loney, *Florida Off for U.S. Sugar Came as a Big Surprise,* REUTERS (June 24, 2008), https://www.reuters.com/article/us-usa-sugar-interview/florida-offer-for-u-s-sugar-came-as-a-big-surprise-idUSN2436313220080624 (reporting Governor Charlie Crist made global news with a proposed $1.75 billion land acquisition proposal intended to benefit the Everglades restoration); Damien Cave, *For the Everglades, a Dream Loses Much of Its Grandeur*, N.Y. TIMES (Aug. 12, 2010), https://www.nytimes.com/2010/08/13/us/13everglades.html (reporting Crist's proposal was eventually downsized but still substantial enough to make national news); Kwik, *Some Nerve! Gov. Scott Travels to State Job Site to Revel in Employee Layoffs*, DAILY KOS (June 23, 2011), https://www.dailykos.com/stories/2011/6/23/987975/- (reporting on Governor Scott's subsequent different approach as he appeared at the agency headquarters to announce massive layoffs); Regan McCarthy, *700-Million Cut from Water Management Districts*, WFSU NEWS, https://news.wfsu.org/post/700-million-cut-water-management-districts (last visited Oct. 27, 2019) (indicating that Governor Scott cut $700 million from the water management district budgets); Rob Wile, *South Florida's Population Saw Huge Growth this Decade. That Could Soon Reverse*, MIAMI HERALD (April 18, 2019), https://www.miamiherald.com/news/business/article229321644.html.

158. *See* S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-15 (showing the growing population served by the SFWMD, which reached 8,253,146 in 2016).

IV. DECONSTRUCTING AN AGENCY: DOLLARS AND DATA

Hard lessons of history, already learned by the Netherlands, New Orleans, New York, California, Texas, North Carolina, and South Florida, establish the importance of managing, maintaining, and investing in water resources infrastructure. Water managers know the crisis will come. But, there is always room for disagreement over how, exactly, to manage water resources, and how much to spend.

In South Florida, however, the SFWMD has become less attuned to its physical and financial risks, and less responsive to the public concerns. A review of the SFWMD's own publicly available documents reveals a historic deconstruction of the agency, its resources, and capacity. The citizens of South Florida have been placed in a highly vulnerable position.

The following pages of this article relied extensively upon the SFWMD's own documents, especially the Comprehensive Annual Financial Reports (CAFRs).[159] A second important document used for this analysis was the annual South Florida Environmental Report (SFER), in which the SFWMD consolidates its required and voluntary reporting of water quality and project-related data, and subjects it to rigorous peer review.[160] These documents help to reveal how recent years have changed the agency.[161]

Of special note, these changes cannot be characterized as a simple byproduct of a swinging political pendulum. Lawton Chiles, a Democrat, was governor from 1990 to 1998,[162] but Florida has been led by Republican governors and legislatures ever since: Governor Jeb Bush served from January 1999 to January 2007; Governor Charlie Crist served from January 2007 to January 2011; Governor Rick Scott served from January 2011 to January 2019.[163] This article does not consider data related to the new

159. The author compiled data from multiple sources, including the SFWMD's CAFR reports, U.S. Bureau of Labor Statistics' Inflation Calculator, and the SFWMD's SFER reports, to establish these figures. A copy of the raw data and the author's calculations are on file with the publisher.

160. *See* S. FLA. WATER MGMT. DIST., SOUTH FLORIDA ENVIRONMENTAL REPORT (2019) (compiling the 2019 SFER's three volumes, its data-rich appendices, a consolidated project database, and a highlight report).

161. *See* S. FLA. WATER MGMT. DIST., ENFORCEMENT OUTPUT (current through Feb. 9, 2019) (on file with the publisher) (tracking enforcement cases from 2000 to present in a comprehensive regulatory database maintained by the Water Resources Department and obtained via a public records request).

162. *Chiles, Lawton Mainor, Jr,* BIOGRAPHICAL DIRECTORY OF THE U.S. CONG., http://bioguide.congress.gov/scripts/biodisplay.pl?index=c000356 (last visited Oct. 9, 2019).

163. *Florida Governors*, FLA. DEP'T OF STATE, https://dos.myflorida.com/florida-facts/florida-history/florida-governors/ (last visited Sept. 25, 2019); *see also Charlie Crist*, FLA. DEP'T OF STATE, https://dos.myflorida.com/florida-facts/florida-history/florida-governors/charlie-crist/ (last visited Oct. 29, 2019) (noting Governor Crist served as a Republican Governor, later becoming an independent, and

administration of Governor Ron DeSantis. The data shows that the district budget, staffing, regulatory enforcement and emergency reserves have all reduced dramatically in the last decade.

A. Lower Revenues

For past administrations, funding of the SFWMD served as a way to accomplish projects to benefit South Florida's flood control and water quality. After Lawton Chiles led the effort to settle a protected lawsuit between the state and federal government over water quality violations in the Everglades, [164] the Everglades Forever Act secured dedicated funding sources. The Act required the construction of the Everglades Construction Project, consisting of a vast system of wetland treatment marshes. [165] A portion of the toll revenue from Alligator Alley, the highway running east-west across the Everglades, was dedicated to these projects. [166] An Agricultural Privilege Tax (which was modified over time) required a payment of approximately $25 to $35 per acre.[167] The Act also included an *ad valorem* tax of $0.0001 per dollar of property value, representing $30 for a $300,000 property. [168] Demonstrating further commitment to the cause, voters passed two constitutional amendments in 1996, one creating an Everglades Trust Fund to manage those monies[169] and another requiring polluters to pay for their impacts to the Everglades.[170]

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eventually, a member of the Democratic Party); Glenna Milberg, *Florida Sees 20-Year Drought of Democratic Governors*, LOCAL10 (Aug.14, 2018), https://www.local10.com/news/elections/florida-sees-20-year-drought-of-democratic-governors (describing Florida's history of governors).

164. *See generally* United States v. S. Fla. Water Mgmt. Dist., 847 F. Supp. 1567 (S.D. Fla. 1992) (reporting federal government and local water district reach compromise putting procedures in place to preserve and restore national parks).

165. FLA. STAT. § 373.4592(2)(g) (2019); BURNS & MCDONNELL, EVERGLADES PROTECTION PROJECT ES-1 (1994) (describing conceptual plan for stormwater treatment areas).

166. *See* FLA. STAT. § 373.45931 (2019).

167. FLA. STAT. § 373.4592(6)(c)(1) (2019).

168. *Id.* § 373.4592(4)(a).

169. *See* FLA. CONST. art. X, § 17 (establishing the Everglades Trust Fund to be administered by the South Florida Water Management District or its successor agency, consistent with statutory law).

170. *See id.* at art. II, §7(b) ("Those in the Everglades Agricultural Area who cause water pollution within the Everglades Protection Area or the Everglades Agricultural Area shall be primarily responsible for paying the costs of the abatement of that pollution.") (passing first as "Amendment 5" on a 1996 ballot initiative by citizens, followed by an advisory opinion issued by the Florida Supreme Court to the Governor holding "Amendment 5 is not self-executing and cannot be implemented without the aid of legislative enactment because it fails to lay down a sufficient rule for accomplishing its purpose. . . . Amendment 5 raises a number of questions such as what constitutes "water pollution"; how will one be adjudged a polluter; how will the cost of pollution abatement be assessed; and by whom might such a claim be asserted." Advisory Opinion to the Governor, 706 So. 2d 278, 281 (Fla. 1997)).

During Governor Bush's administration, funding for the SFWMD significantly increased. Governor Bush proudly announced his plans to accelerate Everglades restoration through his Acceler8 initiative.[171] The agency began using bond mechanisms, including Certificates of Participation worth $546 million used to finance its Comprehensive Everglades Restoration Plan projects, including reservoirs, stormwater treatment areas, and pump stations.[172]

During the Crist Administration, a nationwide decline in the real estate market in 2007 caused a downturn in tax revenues.[173] Since *ad valorem* property tax revenues partly funded the SFWMD, the loss of home values reduced the budgeted revenues. Nevertheless, the Crist Administration continued to use the SFWMD to pursue projects, including an attempt to acquire 180,000 acres of lands from the U.S. Sugar Corporation.[174] Expanding and refinancing the Bush Administration's bond finance mechanisms, the plan would have cost in excess of $2 billion.[175] The ultimate agreement, however, was far smaller. The SFWMD closed on a "River of Grass" deal in October 2010 to acquire nearly 26,800 acres, at an investment of $194.5 million.[176] The agreement also included options to purchase another 153,000 acres should economic conditions allow in the future.[177]

The SFWMD never recovered from the real estate crash. In 2010 and 2011, at the end of the Crist Administration, *ad valorem* tax revenue averaged $425 million per year.[178] Rebounding and rising property values could have generated more revenue if tax rates had not changed. Instead, in the years thereafter, the Scott Administration reduced property tax rates for the period

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171. Dexter Filkins, *Swamped: Jeb Bush's Fight Over the Everglades*, NEW YORKER (Jan. 4, 2016), https://www.newyorker.com/magazine/2016/01/04/swamped-the-political-scene-dexter-filkins.

172. *See* JOHN W. WILLIAMS ET AL., OFFICE INSPECTOR GEN., AUDIT OF THE USES OF SERIES 2006 CERTIFICATES OF PARTICIPATION PROCEEDS 1–2, 4 (2008) (explaining use of funds for construction projects to benefit the Everglades); *see also infra* Section V, C (discussing the Comprehensive Everglades Restoration Plan).

173. *See* S. FLA. WATER MGMT. DIST., *supra* note 144, at II-19 (including a chart showing the real estate market decline based upon the Federal Housing Finance Agency's House Price Index).

174. Jim Loney, *Florida Approves $1.34 Billion U.S. Sugar Deal*, REUTERS (Dec. 16, 2008), https://www.reuters.com/article/us-florida-sugar-everglades/florida-approves-1-34-billion-u-s-sugar-deal-idUSTRE4BF7NS20081217.

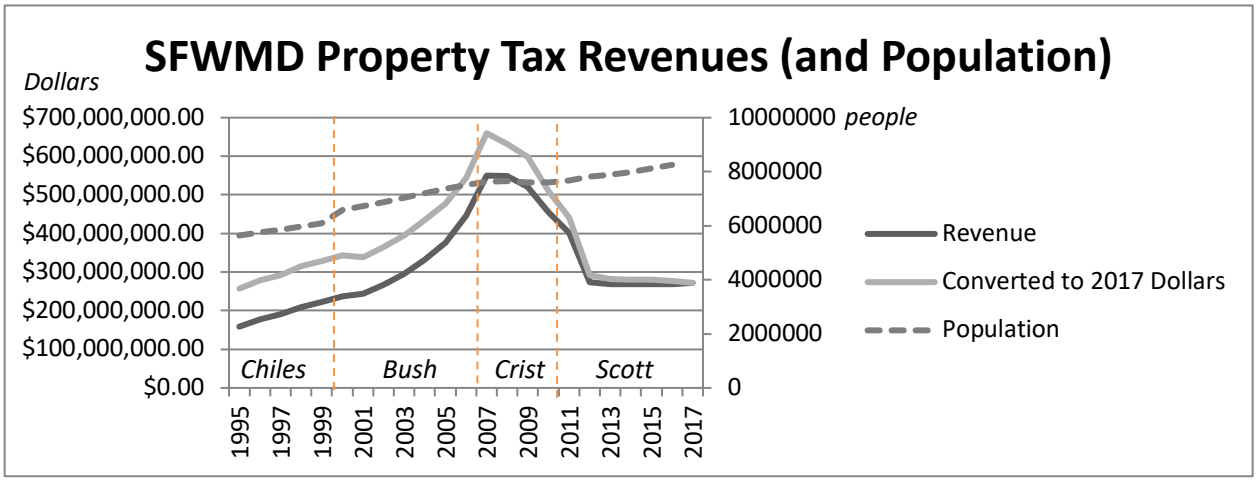
175. *See* S. FLA. WATER MGMT. DIST., REVIVING THE RIVER OF GRASS: ABOUT CERTIFICATES OF PARTICIPATE AND BOND VALIDATION (July 2009) ("[T]he District's Governing Board established a water resource financing program and approved up to $2.2 billion in certificates."); CHARLES V. STERN ET AL., CONG. RESEARCH SERV., R41383, EVERGLADES RESTORATION AND THE RIVER OF GRASS LAND ACQUISITION 1–2 (2010) (explaining the chronology and associated costs of the SFWMD plan).

176. S. FLA. WATER MGMT. DIST., 2011 SOUTH FLORIDA ENVIRONMENTAL REPORT 23 (2011).

177. Press Release, Kayla Bergeron, S. Fla. Water Mgmt. Dist., SFWMD Board Approves Affordable Plan for *River of Grass* Acquisition (Aug. 12, 2010).

178. S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-8.

from 2012 to 2017 and revenues held flat.[179] During this period, *ad valorem* revenues averaged just $270 million per year.[180] That level of tax income resembles that of 2002, when the 16-county district had 1.38 million fewer residents.[181] Adjusted for inflation, recent *ad valorem* revenues resemble those of 1996, when the district had 2.5 million fewer residents and far less responsibility.[182]



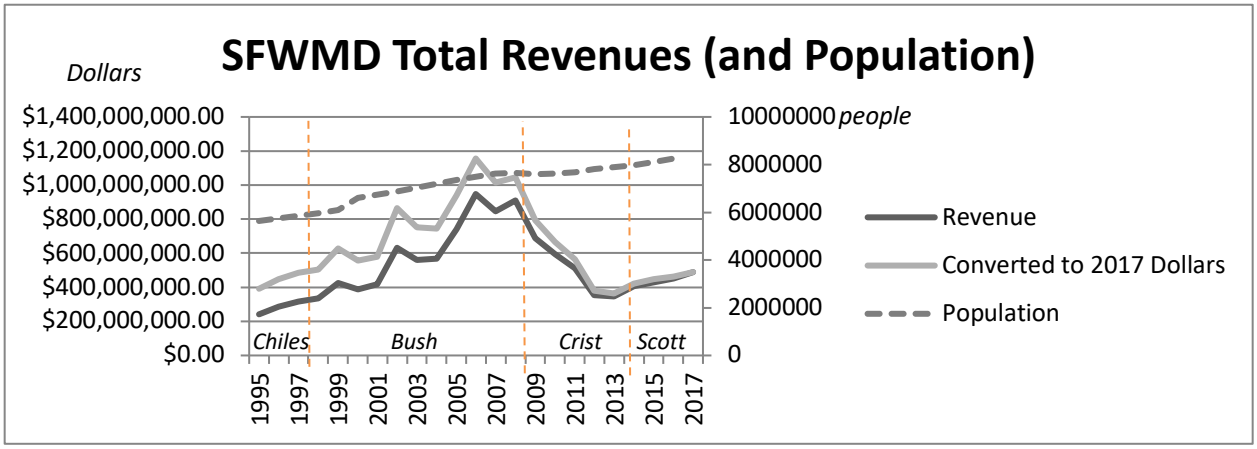
179. S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT III-29 (2012); S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT III-31 (2013); S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT III-31 (2014); S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT III-32 (2015); S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT III-34 (2016); S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at III-34.

180. S. FLA. WATER MGMT. DIST. (2012), *supra* note 179, at III-29; S. FLA. WATER MGMT. DIST. (2013), *supra* note 179, at III-31; S. FLA. WATER MGMT. DIST. (2014), *supra* note 179, at III-31; S. FLA. WATER MGMT. DIST. (2015), *supra* note 179, at III-32; S. FLA. WATER MGMT. DIST. (2016), *supra* note 179, at III-34; S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at III-34.

181. S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-6.

182. *Consumer Price Index Inflation Calculator*, BUREAU OF LABOR STATISTICS, https://data.bls.gov/cgi-bin/cpicalc.pl (last visited Sept. 12, 2019) (using January 2017 dollars).

The Scott Administration did not exercise the land acquisition option purchased by the Crist Administration, avoiding significant expenditures.[183] Although the Florida Legislature supplemented *ad valorem* taxes with additional funds, the modest uptick in total agency revenues after 2013 still leaves the water managers with funding akin to 1998, using inflation adjusted dollars.[184]



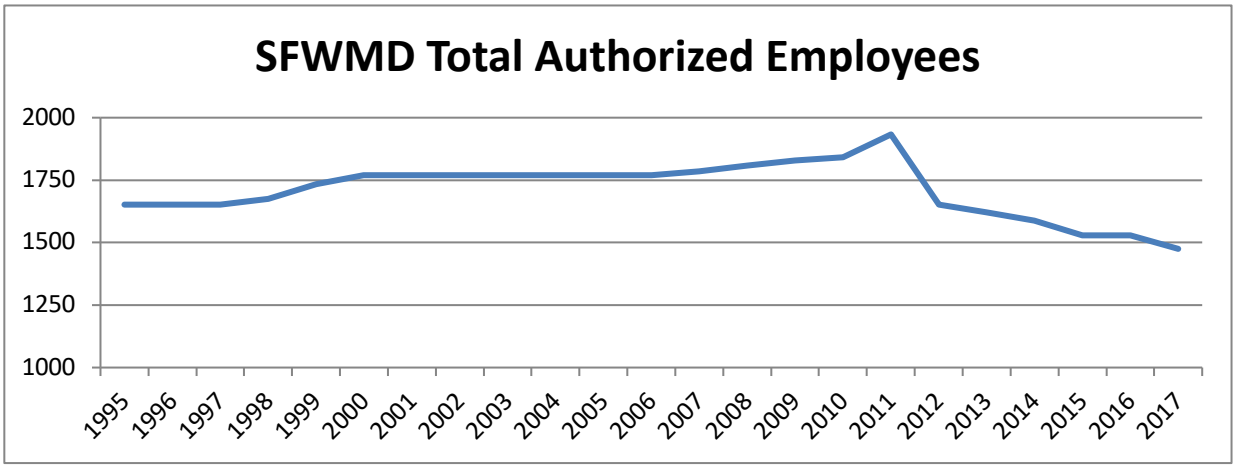
B. Fewer Personnel (and Increased Workload)

The SFWMD's budget decisions affected staffing at the agency. Data regarding the total number of authorized positions provides an important insight. The SFWMD's personnel positions gradually increased from 1,651 in 1995 to 1,771 in 2000, remained constant until 2006, climbed again to a peak of 1,933 in 2011, and fell to 1,475 in 2017.[185] Thus, total staffing at the agency is 10 percent lower than the levels held in 1995, and 24 percent lower than the 2011 peak.

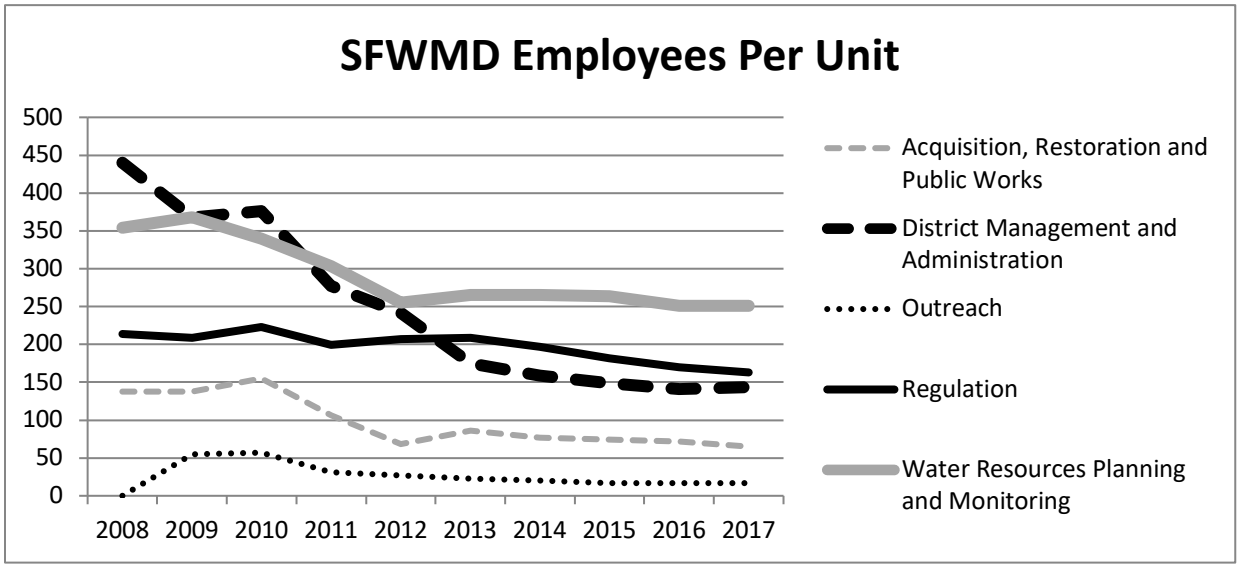
183. Amy Green, *South Florida Water Management District Terminates Sugar Land Purchase Option*, WGCU (Dec. 17, 2018), http://news.wgcu.org/post/south-florida-water-management-district-terminates-sugar-land-purchase-option.

184. S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT IV-2 (2004).

185. S. FLA. WATER MGMT. DIST. (2004), *supra* note 184, at IV-14; S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT VI-23 (2008); S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at VI-23.



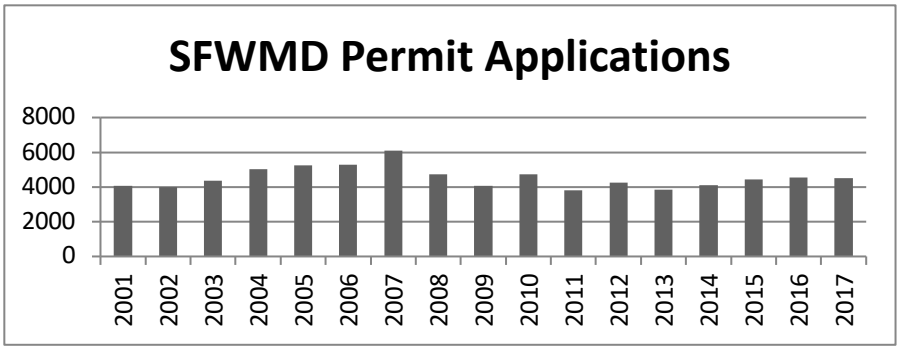
Data is available for individual units within the SFWMD for the period from 2008 to present due to an internal reorganization and restructuring of personnel in 2008. Operations and maintenance personnel increased 10 percent (from 650 in 2008 to 719 in 2017), but the number of personnel in every other unit trended downward from 2011 to 2017.[186] These trends reduced the agency's capacity to perform its statutory functions.



186. S. FLA. WATER MGMT. DIST. (2008), *supra* note 185, at VI-25; S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at VI-25.

1. Reduced Regulatory Scrutiny

Budget and staffing changes meaningfully affected the agency's implementation of its regulatory authority. For example, the SFWMD Regulation Division works on permits related to ground waters, wells, surface waters, and springs.[187] It tracks the numbers of permits issued and the enforcement actions taken. Of course, the total number of permits reviewed will vary annually due to economic and other factors. Still, total permit applications range in the thousands per year.[188]



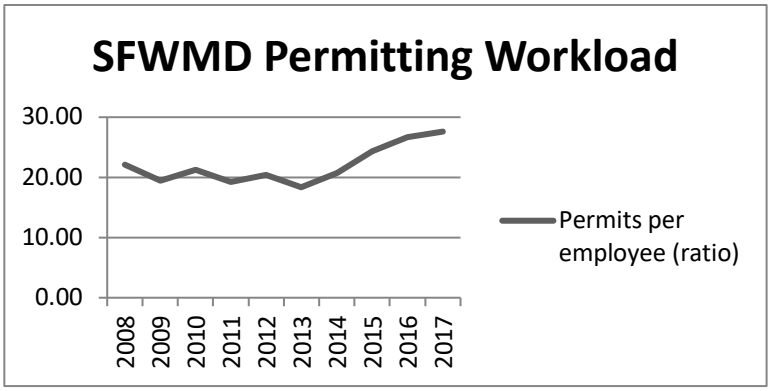
Staff reductions mean fewer people review each permit. For example, as part of the permitting process, staff must read and understand an application. They must compare the project to the statutory and regulatory criteria and may request additional information about the proposed project.[189] The application may require special permit conditions. Permit review can be a time-consuming task. A comparison of the total number of permits issued with the number of the permit reviewing staff suggests that individual workload is on the rise, which may mean less regulatory scrutiny.[190]

187. *See, e.g.*, FLA. STAT. §§ 373.203–373.250 (2019) (using water consumptively); *see also* FLA. STAT. §§ 373.302–373.342 (regulating wells); FLA. STAT. §§ 373.403–373.468 (2019) (managing and storing surface waters); FLA. STAT. §§373.801–373.813 (2019) (Florida Springs and Aquifer Protection Act).

188. *See, e.g.,* S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-26.

189. *See* FLA. ADMIN. CODE ANN. r. 40E-1.603(1) (2014) ("(a) Within 30 days of receipt of an application or notice of intent, the District shall review the application to determine whether all information needed to evaluate the application has been submitted. The District shall notify the applicant of the date on which the application is declared complete. (b) If the District determines that the application is incomplete, the District shall request the information needed to complete the application within 30 days of its receipt. The applicant shall have 90 days from receipt of a timely request for additional information to submit that information to the District."); FLA. STAT. § 373.223(1) (2019) (outlining permit conditions, including governing board water reservation regulation); *see also* FLA. STAT. § 373.229(1) (2019) (requiring permit application to supply "other information" as the governing board may deem necessary).

190. S. FLA. WATER MGMT. DIST., *supra* note 144, VI-25, VI-26.

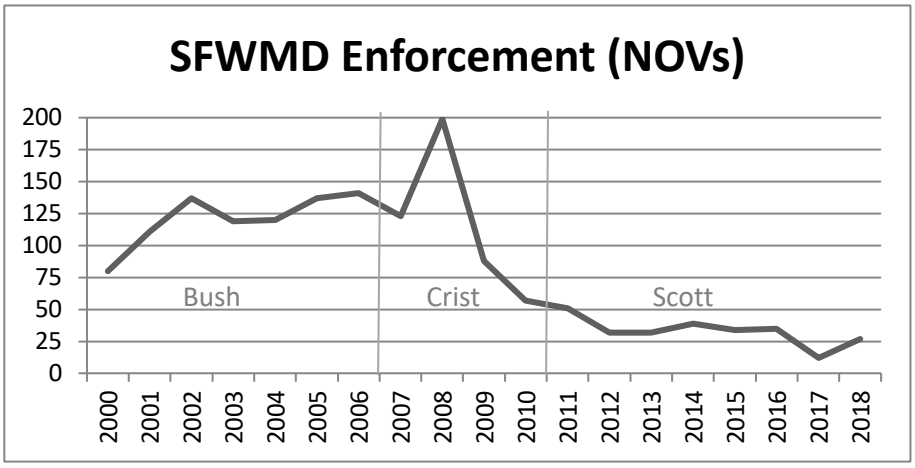


2. Less Enforcement

The permitting process does not end when a permit is issued. A permitting scheme must be enforced to be effective. Some people might act without obtaining required permits. Projects must be constructed, operated, and maintained pursuant to the permit conditions. SFWMD staff ensures that permittees comply with their duties.[191] If staff uncover violations of permit laws or conditions, then the enforcement process begins with a Notice of Violation (NOV).[192] While NOVs are not the only way enforcement activity is tracked, they are insightful because they represent an early stage of the process when a person or organization is first notified of a potential problem.

191. FLA. ADMIN. CODE ANN. r 40E-1.702(5) (2016) ("The District shall ensure that violators do not gain an economic advantage over competitors by circumventing District permitting requirements. Enforcement action shall be designed to remove any economic advantage resulting from the failure to comply with District permits and rules."); *Consumptive Water Use Permits*, S. FLA. WATER MGMT. DIST., https://www.sfwmd.gov/doing-business-with-us/permits/water-use-permits (last visited Sept. 25, 2019).

192. FLA. ADMIN. CODE ANN. r 40E-1.721(5) (1995), ("Upon receipt of a field inspection or investigation report and upon a finding of probable cause, District staff are authorized to issue a Notice of Violation providing instructions for compliance with Chapter 373, F.S., and all applicable District rules.").



This data came from the SFWMD's enforcement-tracking spreadsheet and includes the annual sum of all NOVs of any kind: environmental resource permits that regulate water quality, consumptive use permits that regulate water supplies, wetland impacts, or other.[193] Enforcement activity abruptly fell in the Crist and Scott Administrations.

C. Spending the Savings Account

In recent years, the SFWMD has embraced a strategy of "spending down" reserve funds. In other words, the agency intentionally spends previously saved money as a way to reduce taxes while still paying for project expenditures, as it explained in its financial documents:

> The District has reduced taxes and directed its fiscal resources towards its core mission of flood control, water supply, water quality and natural systems. The District has established a five-year spend-down plan to dedicate accumulated reserves and cash balances toward further improvements in water storage and water quality in the northern and southern Everglades, Lake Okeechobee and the St. Lucie and Caloosahatchee watersheds, while ensuring sufficient reserves remain available to address hurricane or unanticipated flood control infrastructure emergencies.[194]

193. S. FLA. WATER MGMT. DIST., *supra* note 161.
194. S. FLA. WATER MGMT. DIST., *supra* note 144, at I-6.

This was an intentional policy decision. Florida law authorizes the SFWMD to maintain reserves as part of its budget process, stating that the SFWMD "must set forth the proposed expenditures of the district, to which may be added an amount to be held as reserve."[195] The Governing Board decides how much money to have left at the end of the year but finding detailed information about how the reserves are implemented is difficult.[196] A search of the agency website for the term "spend down" of reserves yields no result. In fact, the basic terminology used to describe reserve funds underwent a substantial change in 2011,[197] as follows:

CHANGE IN "GENERAL FUND" TERMINOLOGY	
Categories prior to 2011	Categories after 2011
Reserved	Nonspendable
Unreserved	Restricted
	Committed
	Assigned
	Unassigned

CHANGE IN "OTHER GOVERNMENTAL FUND" TERMINOLOGY	
Categories prior to 2011	Categories after 2011
Reserved	Nonspendable
Unreserved, reported in:	Restricted
Special Revenue Funds	Committed
Capital Project Funds	Assigned
Permanent Fund	Unassigned

Changing terminology inhibits a full understanding of how reserve funds are used, but the Comprehensive Annual Financial Reports (CAFR) reveal some details. Balances held in reserves declined, as did revenues.[198] The "unreserved" and "unassigned" general fund balances are of particular note,

195. FLA. STAT. § 373.536(5)(e) (2019).

196. *See* Miller, *supra* note 9 (quoting Board member Jim Moran "When I first came on the board we had $400 to $500 million in what I call unrestricted reserves, but we've spent that down for restoration projects and other projects to what is now below $60 million and we are still only collecting the same amount we were eight to nine years ago.").

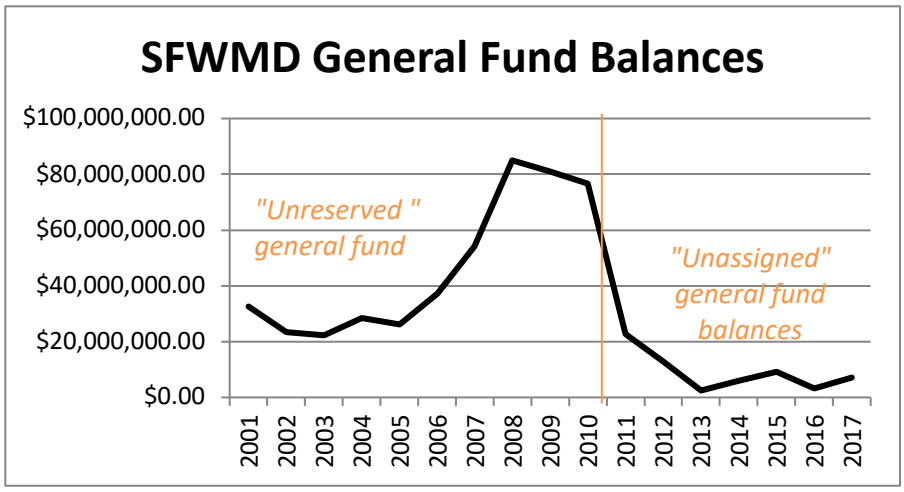
197. *Compare* S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at III-18 to III-23 (governmental and general funds) *with* S. FLA. WATER MGMT. DIST., COMPREHENSIVE ANNUAL FINANCIAL REPORT III-24 (general fund), III-3 (governmental fund) (2010).

198 S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-5.

because they measure the extra funds available to spend on the unexpected, as the SFWMD explained in the 2010 CAFR:

> The focus of the District's governmental funds is to provide information on near-term inflows, outflows, and balances of spendable resources. Such information is useful in assessing the District's financing requirements. In particular, unreserved fund balance may serve as a useful measure of a government's net resources available for spending at the end of the fiscal year.[199]

In 2017, the SFWMD used nearly identical language to explain the term "unassigned fund balance."[200] A chart showing the "unreserved fund balance" (the term used before 2011 term) and "unassigned fund balance" (the term used in 2011 and thereafter) reveals how the agency fundamentally modified its finances.[201]



During the period from 2012 to 2017, an agency with total revenues averaging $412 million was left with an average year-end balance of just $5.6 million.[202] According to the SFWMD's own financial disclosures to the Legislature, it was "ensuring sufficient reserves remain available to address

199 *Id.* at II-10.

200 *Id.* ("In particular, unassigned fund balance may serve as a useful measure of a government's net resources available for spending at the end of the fiscal year.").

201 *Id.* at VI-5.

202. *Id.* at VI-6.

hurricane or unanticipated flood control infrastructure emergencies."[203] The literature on financial management suggests otherwise, because an unrestricted reserve fund of three-to-six-months of expenses is common in non-profit management.[204] A similar window is expected for business planners, who are attentive to the availability of cash for lending.[205] The Government Finance Officers Association (GFOA), however, argues that Government agencies facing disaster risks need even more money in reserve:

> *Appropriate Level.* The adequacy of unrestricted fund balance in the general fund should take into account each government's own unique circumstances. For example, governments that may be vulnerable to natural disasters, more dependent on a volatile revenue source, or potentially subject to cuts in state aid and/or federal grants may need to maintain a higher level in the unrestricted fund balance. Articulating these risks in a fund balance policy makes it easier to explain to stakeholders the rationale for a seemingly higher than normal level of fund balance that protects taxpayers and employees from unexpected changes in financial condition. Nevertheless, GFOA recommends, at a minimum, that general-purpose governments, regardless of size, maintain unrestricted budgetary fund balance in their general fund of no less than two months of regular general fund operating revenues or regular general fund operating expenditures.[206]

An evaluation of the SFWMD's reserve funding reveals that its unassigned fund balances routinely fall far below the minimum GFOA recommendations. In other words, based on the unassigned general fund

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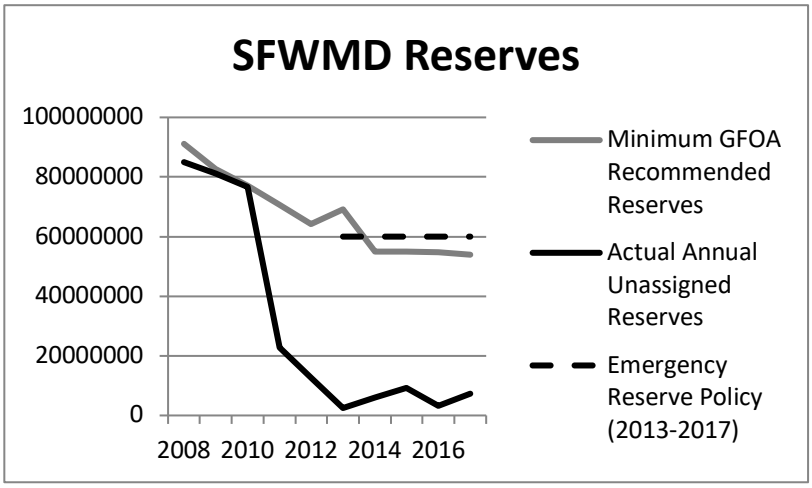
203. *Id.* at I-6.

204. NONPROFITS ASSISTANCE FUND, NONPROFIT OPERATING RESERVES AND POLICY EXAMPLES (2010), https://cgs.niu.edu/Growing-Communities/Toolbox/October/operating_reserves.pdf ("A commonly used reserve goal is three to six months' expenses. At the high end, reserves should not exceed the amount of two years' budget. At the low end, reserves should be enough to cover at least one full payroll including taxes."); *see* FISCAL MGMT. ASSOCS., DEVELOPING YOUR RESERVE FUND POLICY: A TEMPLATE AND GUIDE FOR NONPROFITS 6–7 (2018) (recommending nonprofits build a reserve fund for 3–6 months of operating expenses).

205. *See* Dave Ramsey, *Ask Dave*, https://www.daveramsey.com/askdave/small-business/6089 (last visited Sept. 25, 2019) (recommending a buiness's capital reserve emergency fund to have three to six month's worth of expenses). *But see* Hal Shelton, *How Much Cash Should a Small Business Keep in Reserve?*, SCORE.ORG (Oct. 2, 2018), https://www.score.org/blog/how-much-cash-should-small-business-keep-reserve (countering the traditional three to six month emergency fund recommendation with a more personalized estimate based on cash flow).

206. *Fund Balance Guidelines for the General Fund*, GOV'T FIN. OFFICERS ASS'N, https://www.gfoa.org/print/5024 (last visited Sept. 25, 2019).

balances, SFWMD does not maintain two-months of operating expenses.[207]



While the SFWMD's funding of the unassigned reserves appears low,[208] the district does have other categories of reserves that are "assigned," "committed," or "restricted" for specified purposes.[209] None of these line items in the SFWMD's CAFR explicitly reflect an emergency or hurricane reserve; nevertheless, the preliminary budget documents submitted to the Florida Legislature declare that the Governing Board currently has a policy of keeping approximately $60 million in reserves for hurricanes and emergency relief. [210] Assuming these funds exist through cash and investments,[211] then the SFWMD may be budgeting in a manner just slightly

207. S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-5.

208. *Id.*

209. S. FLA. WATER MGMT. DIST., *supra* note 144, at III-23 (explaining that restricted reserves can be spent only for specific purposes, such as those stipulated by creditors imposed by law; committed reserves can be used only for the specific purposes determined by a formal resolution of the District's Governing Board; assigned reserves represent amounts that are constrained by the District's intent to be used for specific purposes, but are neither restricted nor committed, and are made by the District's Executive Director or his or her designee).

210. *See* Letter from Ernie Marks, Exec. Dir., S. Fla. Water Mgmt. Dist., to Joe Negron, President of the Senate, State of Fla. & Richard Corcoran, Speaker of the House of Representatives, State of Fla. (Jan. 12, 2019) (preceding the S. FLA. WATER MGMT. DIST., FISCAL YEAR 2018–19 PRELIMINARY BUDGET SUBMISSION (2018)).

211. *See* S. FLA. WATER MGMT. DIST., *supra* note 144, at V-13 (showing available cash and investments as of September 30, 2017 as $61,343,995).

above GFOA's *minimum* recommendations.[212] Meeting the minimum level of reserve funding does not account for the world of billion-dollar risks, and will not be nearly enough.

D. Underfunding Infrastructure Maintenance

While questions exist as to the adequacy of the SFWMD's reserve fund budgeting, the reserves are not needed unless unexpected and unbudgeted expenses occur. But, according to the agency's own Inspector General, the budget for even routine maintenance of existing infrastructure is already inadequate.[213] South Florida must expect the unexpected.

In a 2018 audit of the SFWMD's operations and maintenance (O&M) of its capital assets, the Inspector General assessed the agency's process for inspection and replacement of structures.[214] The audit acknowledged that the agency is engaged in an exercise of triage, with funding below the levels needed:

> Our analysis of the O&M capital program priority project list and our review of the District's assessments of its water control structures, canals, and levees disclosed that increased funding should be considered for replacing / restoring / rehabilitating the District's water control structures, canals, and levees to ensure that integrity and reliability of south Florida's water management system. Specifically, the annual adopted budget for the O&M capital program, from Fiscal Year 2013 to Fiscal Year 2017, averaged about $53 million per year and is allocated to high risk projects. Our review of the O&M capital program priority project list disclosed that, at the current funding levels, no action has been taken on 117 of the 209 (56%) projects. Further, based on District assessments, about $88.5 million is needed annually needed to maintain, replace / refurbish the District's aging water control structures ($60 million), restore canals ($18.5 million), and rehabilitate levees ($10 million), which are considered high risk / high priority.[215]

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212. *Id.*; *see* Letter from Ernie Barnett, Interim Exec. Dir., S. Fla. Water Mgmt. Dist., to Rick Scott, Governor, State of Fla., at 33 (Aug. 1, 2014) (preceding the S. FLA. WATER MGMT. DIST., BUDGET SUBMISSION FY 2014 (2013)).

213. *See* TIMOTHY BEIRNES & JANKIE BHAGUDAS, OFFICE OF THE INSPECTOR GEN., S. FLA. WATER MGMT. DIST., AUDIT OF OPERATIONS AND MAINTENANCE CAPITAL PROGRAM 8 (Apr. 12, 2018).

214. *Id.* at 7.

215. *Id.* at 14.

In other words, the Inspector General concluded that the SFWMD's investment in its own flood-control mission fell short by $35.5 million annually. To its credit, the SFWMD has tried to minimize the risk by prioritizing the structure maintenance based on the levels of risk associated with them.[216] The risk may be underestimated because it does not fully account for the challenges of climate change and rising seas. As the Inspector General report notes, SFWMD staff evaluated canal conveyance between 2006 and 2008 and determined that a more careful evaluation of the system design was (and still is) needed[217] because drought and flooding will increase:

> The intensity of rainfall events is also changing. The District's data indicates that there has been an increase in heavy downpours in many parts of the region, while the percentage of the region experiencing moderate to severe drought increased over the past three decades. In the future, more frequent intense rainfall events are projected to occur, with longer dry periods in between. While periodic heavy downpours may increase overall precipitation totals, much of the water may be runoff that is eventually lost to tide.[218]

The increased storm intensity and the associated increase in use of drainage pumps may already be underway. According to the SFWMD data in the CAFR, volumes of water moved in 2016 and 2017 were very high, surpassing five million acre-feet of water annually.[219] Over time, as pumps and other systems work harder, age, and break down, maintenance needs will increase. While staffing of the O&M unit seems roughly on pace with the increase in water moved, whether O&M staffing is adequate in the first place, or able to deal with the changing climate or the next crisis, is yet to be learned.

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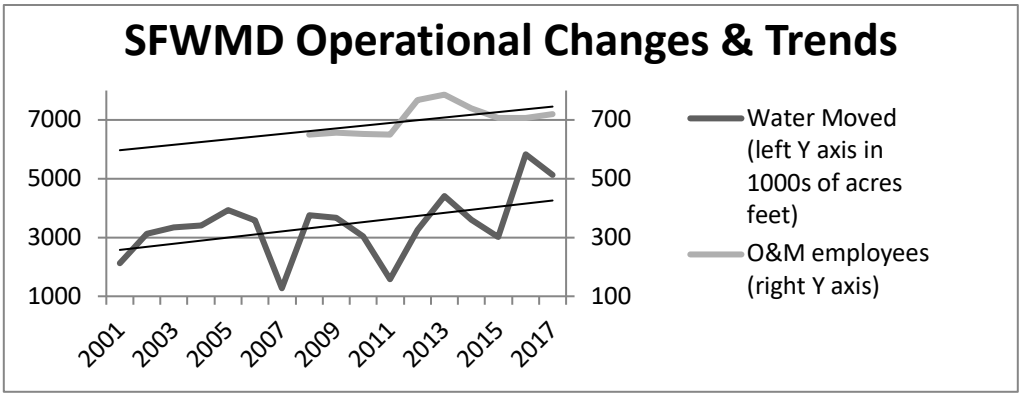
216. *Id.* at 8.

217. *Id.* at 36.

218. S. FLA. WATER MGMT. DIST., CLIMATE CHANGE & WATER MANAGEMENT IN SOUTH FLORIDA 15 (2009).

219 S. FLA. WATER MGMT. DIST., *supra* note 144, at VI-27; *see also* Mary Ellen Klas, *Sugar Growers to State: No Sale On Our Farmland South of Lake Okeechobee*, MIAMI HERALD (Feb. 6, 2017), https://www.miamiherald.com/news/local/environment/article131112014.html.



V. ENCOURAGING CHANGE: PROACTIVE POSSIBILITIES

By Florida statute, water management involves local decisions. While the governor and Department of Environmental Protection have a role, state law is clear. Local leaders—the Governing Board of each water management district—should exercise their authority to the greatest extent practicable:

> The Legislature recognizes that the water resource problems of the state vary from region to region, both in magnitude and complexity. It is therefore the intent of the Legislature to vest in the Department of Environmental Protection or its successor agency the power and responsibility to accomplish the conservation, protection, management, and control of the waters of the state and with sufficient flexibility and discretion to accomplish these ends through delegation of appropriate powers to the various water management districts. The department may exercise any power herein authorized to be exercised by a water management district; however, to the greatest extent practicable, such power should be delegated to the governing board of a water management district.[220]

220. FLA. STAT. § 373.016(5) (2019).

A. Recognize the Magnitude of the Mandates

In theory, SFWMD Governing Board members are sworn to faithfully execute Florida's water resources law.[221] Those laws are codified in Chapter 373, Florida Statutes, the printed form of which exceeds 170,000 words and 250 printed pages.[222] The law keeps growing. From 1997 to 2018, more than 7,350 legislative acts were codified in the Florida Statutes.[223] At least 17 enactments directly and substantially increased the SFWMD's responsibilities, in three categories:

(1) ***Oversight, reporting and planning.*** Some laws mandated annual reports and otherwise effected legislative scrutiny, budget and finance reporting, comprehensive planning, and permitting requirements for agency projects.

(2) ***Implementing regulatory programs.*** Other laws altered the requirements related to water supply and consumptive use permitting, conservation, reclaimed water, water quality credit trading, long term water quality compliance, and nonpoint source pollution.

(3) ***Public works project implementation.*** A few laws required construction and operation of new projects, especially regional water quality treatment and reservoir projects that benefit the Everglades, Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds.

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221. *See* FLA. STAT. § 373.079(1) (2019) (requiring oath of office for governing board members); FLA. STAT. § 373.083(2) (authorizing the governing board to enforce any provisions of Chapter 373 on water resources).

222. FLA. STAT. §§ 373.012–373.813 (2019).

223. *See generally,* FLA. DEPT. OF STATE, State Library and Archives of Florida (2019), http://llaws.flrules.org (allowing searches of all Laws of Florida from 1997 to 2018).

NOTEWORTHY LEGISLATION AFFECTING THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT SINCE 1997

Year	Subject	Category
1997	Joint Legislative Committee on Everglades Oversight created, with reporting requirements.[224]	1
1998	Consumptive use permitting criteria expanded, with exceptions, encouraging use of water from local sources.[225]	2
1999	Authorized implementation of Comprehensive Review Study of the Central and Southern Florida Project.[226]	3
2000	Lake Okeechobee Protection Program created with additional authority for the Kissimmee River Headwaters Revitalization Project; AND Everglades Restoration Investment Act created affecting funding mechanisms and requirements.[227]	1,3
2001	Comprehensive Everglades Restoration Plan Regulation Act, with permit procedures for Lake Okeechobee and Everglades projects.[228]	1
2003	Everglades Forever Act modified and additional requirements for long term plan compliance created.[229]	3
2005	Authorized each water management district to establish a small business program; AND required cooperative development of water supplies, including saltwater, groundwater, sources made available through the addition of new storage capacity, and reclaimed water.[230]	1
2006	Required submission of an annual strategic plan and a consolidated annual report.[231]	1
2007	Amended or created new project requirements for Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds.[232]	3
2008	Authorized water quality protection programs to include the trading of water quality credits.[233]	2

224. 1997 Fla. Laws 97-258.
225. 1998 Fla. Laws 98-88.
226. 1999 Fla. Laws 99-143.
227. 2000 Fla. Laws 2000-129; 2000 Fla. Laws 2000-130.
228. 2001 Fla. Laws 2001-172.
229. 2003 Fla. Laws 2003-12.
230. 2005 Fla. Laws 2005-215; 2005 Fla. Laws 2005-291.
231. 2005 Fla. Laws at 2005-36.
232. 2007 Fla. Laws 2007-253.
233. 2008 Fla. Laws 2008-189.

Year	Subject	Category
2009	Created new requirements related to water conservation, including irrigation and fertilizer use AND created the Central Florida Water Resource Development Initiative.[234]	1, 2
2012	Created new regulations for water supplies and reclaimed water AND encouraged public-private partnerships for water quality improvements but requiring study of baseline conditions.[235]	1, 2
2016	Omnibus Water Act: Florida Springs and Aquifer Protection Act, codifying the Central Florida Water Initiative, mandating BMPs, expanding conservation, reevaluating nonagricultural source rules.[236]	1, 2
2017	Required water storage reservoirs and other projects for regional watershed improvement.[237]	1, 3

Of course, all of these legislative requirements come with costs. Without personnel and funding, the effectiveness of these laws—no matter how well-intended—is limited.[238] The SFWMD budget today roughly mirrors that of

234. 2009 Fla. Laws 2009-199; 2009 Fla. Laws 2009-243.

235. 2012 Fla. Laws 2012-150; 2012 Fla. Laws 2012-187.

236. 2016 Fla. Laws 2016-1.

237. 2017 Fla. Laws 2017-10.

238. This table discussing the Laws of Florida is representative, but not all-inclusive. There were dozens or even hundreds of other laws, codified in the Florida Statutes, that further modified SFWD's responsibilities. For example, this list of relevant Acts from the Laws of Florida, as produced for this research project, does not include "glitch bills," nor other bills related to portions of the Florida Statutes other than Chapter 373. Laws altering the Administrative procedure requirements in Chapter 120 or laws altering water regulation in Chapter 403 could have direct effects on the agency and its decision-making process. Other bills affecting Chapter 373 in a less economically significant way that were not included in the table include: 2000 Fla. Laws 2000-319 (amending rulemaking authority of water management districts and authorizing water management district governing boards to delegate powers and duties pertaining to general permits to their executive directors); 2001 Fla. Laws 2001-193 (relating to the Lake Okeechobee Protection Program and sewer rates to cover wastewater residual treatment and disposal); 2001 Fla. Laws 2001-256 (relating to water resources and modifying agency authorities related to donations, leases, intellectual property, contracts, mineral interests, easements, and appraisals); 2003 Fla. Laws 2003-64 (relating to the inter-district transfer and use of water); 2003 Fla. Laws 2003-124 (relating to water use and impoundment construction permits and requiring that permits contain certain specified language); 2003 Fla. Laws 2003-265 (modifying various provisions of Chapters 373 and 403 related to state water policy); 2004 Fla. Laws 2004-53 (piloting a project to consolidate plans and reports); 2005 Fla. Laws 2005-29 (modifying requirements of Lake Okeechobee Protection Program); 2005 Fla. Laws 2005-121 (requiring water management districts with structures or facilities identified as critical infrastructure to conduct criminal history checks of certain persons); 2006 Fla. Laws 2006-13 (relating to the planned east coast buffer water resources management plan and mitigation fees under the Miami-Dade County Lake Belt Mitigation Plan); 2007 Fla. Laws 2007-191 (relating to surface water protection programs and the regulation of peat mines); 2008 Fla. Laws 2008-49 (relating to bonds for Everglades); 2009 Fla. Laws 2009-201 (relating to the limitation of liability of water management districts); 2011 Fla. Laws 2011-165 (creating agricultural-related exemptions to water management requirements); 2012 Fla. Laws 2012-107 (relating to the Miami-Dade County Lake Belt Mitigation Plan); 2013 Fla. Laws 2013-59 (revising long term planning requirements in the

1998.[239] Staffing is below 1995 levels.[240] In other words, as a practical matter, every law codified thereafter is simply an unfunded mandate.

B. Beware the Budget Constraints

Exemplifying the SFWMD's budgetary woes, property tax revenues were capped at $284,901,967 in 2011.[241] Therefore, the budget could not increase unless the Legislature said otherwise, and inflation functioned as a yearly pay cut for the SFWMD. Recognizing the economic challenge that such a law created, the Legislature later repealed the statutory budgetary limit.[242] Nevertheless, Florida law continues to contain a vigorous process for legislative oversight, requiring annual review of a preliminary budget and authorized millage rates for each water management district.[243] The SFWMD must explain why any increases in taxes might be required, especially any taxes resulting from new construction within the district.[244] In practice, this language suggests that only new construction can justify revenue increases.[245]

Yet absent money and people, even the most conscientious leaders cannot accomplish much. As mentioned earlier, the Everglades Forever Act of 1994 included dedicated sources of funding.[246] Staffing increased slightly in the years thereafter, but then precipitously declined.[247] Completing new projects, while continuing to maintain existing ones, requires more funding

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Everglades Forever Act); 2013 Fla. Laws 2013-146 (amending regulation of water quality credit trading); 2013 Fla. Laws 2013-176 (amending rules for environmental resource permitting); 2013 Fla. Laws 2013-229 (relating to water management districts and water supply agreements); 2015 Fla. Laws 2015-229 (relating to the implementation of the water and land conservation constitutional amendment); 2018 Fla. Laws 2018-155 (relating to water management district surplus lands).

239. S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at V-41; S. FLA. WATER MGMT. DIST. (2004), *supra* note 184, at IV-2.

240. *Id.*

241. *See* FLA. STAT. § 373.503(1) (2019). ("It is the finding of the Legislature that the general regulatory and administrative functions of the districts herein authorized are of general benefit to the people of the state and should fully or in part be financed by general appropriations. Further, it is the finding of the Legislature that water resources programs of particular benefit to limited segments of the population should be financed by those most directly benefited. To those ends, this chapter provides for the establishment of permit application fees and a method of ad valorem taxation to finance the activities of the district.").

242. 2012 Fla. Laws 2012-126.

243. *See* S. FLA. WATER MGMT. DIST., SFWMD FISCAL YEAR 2019-2020: JULY PROPOSED TENTATIVE BUDGET UPDATE & PROPOSED MILLAGE RATES 3 (2019) (following the statutory oversight mandated by FLA. STAT. § 373.535).

244. FLA. STAT. § 373.536 (2019).

245. *Id.*

246. FLA. STAT. § 373.4592(3)(a) (2019).

247. S. FLA. WATER MGMT. DIST. (2004), *supra* note 184, at IV-14; S. FLA. WATER MGMT. DIST. (2008), *supra* note 185, at VI-23; S. FLA. WATER MGMT. DIST. (2017), *supra* note 144, at VI-23.

and staff, not less. So, to withstand the inevitable legislative scrutiny of the agency budget, a careful and realistic accounting of the economic and staffing problems is sorely needed.

C. Continue the Conversation with the Corps

For decades, the State of Florida and the United States of America have engaged in an ongoing policy dialogue—sometimes necessitating litigation—about the management of the South Florida watershed. [248] In the 1990s, the SFWMD, the U.S. Army Corps of Engineers, and other state and federal partners and stakeholders engaged in a massive "Restudy" of the Central & South Florida Flood Control Project and its ecological effects upon the Everglades. [249] The Restudy ultimately led to the Comprehensive Everglades Restoration Plan (CERP); approved by Congress in the Water Resources Development Act of 2000.[250]

As part of this process, the state and federal governments completed a massive feasibility study and environmental impact statement known as the Yellow Book.[251] The CERP process embraced more than four-dozen projects to improve water quantity, water quality, and hydropatterns.[252] Admittedly, the federal government can be a frustrating partner. The SFWMD has been highly critical of the rate and amounts of federal funding for completing these projects.[253] Given the current state of affairs in South Florida, the risks ahead, and the enormous costs, a new conversation with the federal government

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248. U.S. ARMY CORPS OF ENG'RS, SOUTH FLORIDA ECOSYSTEM RESTORATION (SFER) OVERVIEW, (MAR. 2019) https://www.saj.usace.army.mil/About/Congressional-Fact-Sheets-2019/South-Florida-Ecosystem-Restoration-SFER-Overview-C-/ (noting that the Central and Southern Florida (C&SF) project was authorized under the Flood Control Acts of 1948, 1954, 1960, 1962, 1965, 1968, and the Water Resources Development Acts (WRDA) of 1986, 1988, 1990, 1992,1996, 1999, 2000, and 2007). Noted earlier, the federal government sued the state for allegedly violating water quality standards, and the parties entered into the Consent Decree that has long governed over the Everglades restoration. United States v. South Florida Water Management Dist., 847 F. Supp. 1567 (S.D. Fla. 1992).

249. GODFREY, *supra* note 75, at 201–212.

250. Water Resources Development Act, Pub. L. No. 106-541, § 601, 114 Stat. 2572, 2680–2693 (2000); Michael Voss, *The Central and Southern Florida Project Comprehensive Review Study: Restoring the Everglades*, 27 ECOLOGY L. Q. 751, 757 (2000).

251. DEP'T OF ARMY & U.S. ARMY CORPS OF ENG'RS, CENTRAL EVERGLADES PLANNING PROJECT: FINAL INTEGRATED PROJECT IMPLEMENTATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT § 1.1 (2014).

252. *See* U.S. ARMY CORPS OF ENG'RS, INTEGRATED DELIVERY SCHEDULE (IDS) SFER PROGRAM SNAPSHOT THROUGH 2030 (2018) (listing more than four-dozen projects).

253. *Federal Support Needed to Fully Implement CERP,* S. FLA. WATER MGMT. DIST., https://www.sfwmd.gov/our-work/cerp-project-planning/cerp-implementation (last visited Feb. 19, 2019); U.S. ARMY CORPS OF ENG'RS, *supra* note 252 (acknowledging Estimated Total Authorized Cost of $16,052,201,000, Estimated Federal Cost (USACE) $8,132,361,000, and Allocation through FY18 of $2,791,493,000).

should begin. The Corps and the SFWMD should reopen the Yellow Book to rediscover options and consider whether current plans should adapt to new information. The National Academy of Sciences reached a similar conclusion in 2016 when its careful assessment of progress in the Everglades declared – in bold-face font – that CERP has made little progress and was not in synch with existing science:

> **The CERP has made limited progress in articulating restoration objectives that are sufficiently quantitative to support effective planning, implementation, and assessment. An effort is now needed to develop quantitative restoration goals that capture new science and address potential conflicts in restoration.**[254]

Calling for a change in the status quo, the National Academy of Sciences also reminded everyone that CERP was intended to be an adaptive process with a five-year review that integrated new information:

> **A systemwide analysis of the potential future state of the Everglades ecosystem, with and without CERP and other restoration projects, should be conducted in conjunction with a CERP Update, which is long overdue.** The regular 5-year CERP updates called for in the Programmatic Regulations to evaluate the restoration plan considering new scientific, technical, and planning information have not been routinely conducted. A holistic, forward-looking analysis of the possible future state of the ecosystem is needed in the light of new knowledge gained over the past 16 years. This analysis should consider various scenarios for climate change and sea level rise, and explore the ecosystem implications of various options for future CERP implementation. By exploring alternative future scenarios, considering uncertainties in climate or funding to support implementation, decision makers and stakeholders will be better informed of the implications of near- and long-term decisions.[255]

The conversation between the SFWMD and the U.S. Army Corps of Engineers—along with other state, federal and non-governmental stakeholders—must resume. But, with current staffing and funding levels, the agency will hopelessly struggle to engage in any meaningful dialogue

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254 NAT'L ACADS. OF SCIS., ENG'G, & MED, PROGRESS TOWARD RESTORING THE EVERGLADES: THE SIXTH BIENNIAL REVIEW 200 (2016) (original emphasis).

255. *Id*. at 201 (original emphasis).

about new or revised projects.[256] In other words, CERP has become little more than just another unfunded mandate.

D. Leave Room for Leadership

For years, the public servants and employees at the SFWMD have labored to fulfill their duties. The many accountants, analysts, engineers, lawyers, scientists, and other professionals working for the agency make recommendations and manage dozens of projects, hundreds of laws, thousands of permits, billions of gallons, and countless environmental challenges as best they can. Ultimately, however, it is the Governing Board of the agency, the Florida Legislature, and the governor who must make the difficult decisions and rethink the agency's shrinking budget. As this article has noted, many governments are investing in water resources and infrastructure resilience. Unfortunately, most of those investments are involuntary, necessitated by disaster.

Proactive management is possible. There are countless recommendations that could be made based on the information above, and future scholarship will make additional recommendations. For now, the following four measures should be evaluated:

(1) Budgets should increase to levels capable of meeting statutory mandates, including adequate funds for infrastructure maintenance, repair and upgrading.

(2) Staffing levels should increase to ensure capacity to implement projects, operate and maintain infrastructure, and implement regulatory programs.

(3) Adequate reserve funds for emergency circumstances should be separately maintained with transparent budgeting and accounting.

(4) The SFWMD's Strategic Plan should carefully reconsider priorities, using a process to engage state and federal officials,

256. *See* GARTH REDFIELD ET AL., LAKE O ARCHIPELAGOS: A CONCEPTUAL PROPOSAL TO CREATE NATURAL SYSTEMS WITHIN LAKE OKEECHOBEE TO TREAT NUTRIENTS AND COMBAT HARMFUL ALGAL BLOOMS, TO BENEFIT NATURAL RESOURCES, AND TO ENHANCE HUMAN RECREATION, SUBMITTED IN RESPONSE TO DEP RFI POSTING NUMBER: 2020001 RE: METHODS TO PREVENT, COMBAT OR CLEAN UP HARMFUL ALGAL BLOOMS IN FLORIDA'S FRESHWATER BODIES AND ESTUARIES 4 (2019) (contributing a recent proposal sent to the Florida Department of Environmental Protection, by the author and colleagues, encouraging the use of natural systems to reduce nutrients and harmful algal blooms in Lake Okeechobee).

> local government leaders, and the stakeholder community, with special attention to the risks of emergencies, disaster, and the longer-term challenges of harmful algal blooms, and rising seas.

Fierce opponents of taxes, government regulation, and the water management districts may decry these recommendations and the associated expenses. They will have every opportunity to voice their views during the public budget process described elsewhere in this article. They will attend district budget hearings and oversight hearings before the Florida Legislature. Afterwards, the local governing board members and agency staff must explain and support their decisions.

The decision to increase the SFWMD budget, and to enhance its reserves, cannot and must not be lightly made. But, the very real risks of a water management disaster must not be blithely ignored. The crisis will come. The water managers should prepare for the inevitable.

VI. FACING THE FUTURE

All across the nation and the globe, people have suffered the consequences of water management mistakes. The deconstruction of the South Florida Water Management District foreshadows a similar disaster and more human misery. The rest of the nation should pay careful attention.

The worst case need not happen. The core statutory objectives of the Florida Water Resources Act of 1972 are to achieve beneficial use of water resources and to promote public health and safety.[257] The duty of the Florida Governor, the Florida Legislature, and the SFWMD's Governing Board is to make hard decisions to protect the public and its water resources.[258] The evidence above explains why Florida leaders should pursue an immediate effort to rebuild the agency.

In theory, the legal system can help avoid, mitigate and sometimes even solve problems. In practice, courageous leaders who understand the cruel, yet elementary logic of math must implement the laws. Water managers cannot keep doing more with less. New legal mandates in water management are mere statements of aspiration when agencies lack sufficient funds or personnel to implement them. At present, complying with the law by providing flood control, emergency preparedness, water supplies, adequate water quality, and water resource protection is impossible. Demanding improved results, without increased investment, is simply absurd.

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257. *See* FLA. STAT. § 373.439(1)(a) (2019) (authorizing remedial measures to protect life and property in the event of a stormwater management emergency).

258. FLA. STAT. §§ 373.016(3), 373.171, 373.439 (2019).

Of course, even with extraordinary talent and unlimited funds, implementing solutions to water-resource challenges take time. Litigation with third parties or regulation by and coordination with the federal government creates delays and complications.[259] Even if unanimous policy agreement could be achieved, with new treatment projects built, legacy pollution in the sediments may last for decades.[260] Still, flood control, water supplies, water quality, and the regional ecosystems need to be improved. Board Members and public servants at the SFWMD must engage in a dialogue with stakeholders, lawyers, judges, state legislators and federal regulators to obtain enough funding to benefit the people and meaningfully implement the law. Democracy is neither easy nor free.

Inaction is a choice by default. A relentless Mother Nature makes decisions of her own. Time decays the water infrastructure. Ecosystems decline. Pollution problems accumulate and compound. Accelerating evapotranspiration and harsher droughts threaten water supplies. Salt-water intrusion contaminates aquifers and magnifies the water supply risks. Rising seas reduce drainage capacity. Warming waters increase the intensity of hurricanes.

Insufficiently attuned to these risks, humans keep moving to South Florida, perhaps lured by lower taxes. But to the extent that the budget cuts at the SFWMD generated modest tax savings to property owners or any stimulus for the economy, the modest benefits came with incalculable costs. The SFWMD is akin to an emergency room engaged in high-stakes triage with too few doctors, insufficient resources, and more sick patients on their way. Underfunded and understaffed, the agency cannot perform miracles. It can barely send out a Notice of Violation.

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259. *See, e.g.*, Friends of the Everglades v. Envtl. Prot. Agency, 699 F.3d 1280, 1283 (11th Cir. 2012) (noting ongoing disagreements between the Friends of the Everglades and U.S. Environmental Protection Agency with SFWMD related to whether the District's structures required federal permits or regulation pursuant to the Clean Water Act); *see also* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1213 (11th Cir. 2009) (explaining that the appeal turns on whether the transfer of a pollutant from one navigable body of water to another is a "discharge of a pollutant" within the meaning of the Clean Water Act); Miccosukee Tribe of Indians of Fla. v. United States., No. 04-21448-CIV, 2011 WL 1624977, at *1 (S.D. Fla. Apr. 26, 2011); Keith W. Rizzardi, *Regulating Watershed Restoration: Why the Perfect Permit is the Enemy of the Good Project*, 27 NOVA L. REV. 51, 53 (2002) (discussing delays and complications).

260. Katrina Elsken, *Muck on Lake Bottom Complicates Phosphorus Loading Problem*, LAKE OKEECHOBEE NEWS (Jan. 7, 2018), https://lakeokeechobeenews.com/lake-okeechobee/muck-lake-bottom-complicates-phosphorus-loading-problem/; *see generally* UNIV. OF FLA., PHOSPHORUS RETENTION AND STORAGE BY WETLANDS IN THE OKEECHOBEE DRAINAGE BASIN (2012) (describing retention of phosphorus pollutants).

In 2019, Hurricane Dorian struck the Bahamas, directly to the east of the SFWMD headquarters.[261] It was the strongest Atlantic hurricane landfall on record.[262] The storm left behind rubble, missing persons, and death.[263] Although it turned north, missing the Florida shores, it scared the region.[264] Projections warned that more than 660,000 Florida homes were at risk of flooding due to rainfall, tides, and storm surges.[265] Public officials tried to reassure the public as they contemplated the failure of the Lake Okeechobee dike as a plausible scenario.[266] High-profile debates began over whether to drain waters in anticipation of future storms or to store them in anticipation of future droughts.[267] Two weeks later, the SFWMD Governing Board met. As if Hurricane Dorian had never happened, the agency decided not to increase its budget or its reserves.[268] Instead, it lowered the tax rates again.[269]

The catastrophic hurricane, the massive flood, and the unexpected critical infrastructure failure will happen. The harmful algal blooms will continue. The seas will rise. Inadequate water management systems will fail. Maybe, when disaster strikes South Florida, the charitable non-profits and federal government will offer adequate disaster response, relief, and recovery funding. Maybe not. In the years thereafter, as the region tries to rebuild, an angry public will search for accountability, and accuse their state and local

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261. Doyle Rice, *Dorian's Legacy: The Slowest, Strongest Hurricane to Ever Hit the Bahamas,* USA TODAY (Sept. 7, 2019), https://www.usatoday.com/story/news/nation/2019/09/06/hurricane-dorian-becomes-strongest-slowest-hurricane-hit-bahamas-record/2232225001/; Gary Detman & Sabrina Lolo, *Catastrophic Hurricane Dorian Pounds the Bahamas; Hurricane Warnings Issued in Florida* (Sept. 1, 2019), https://cbs12.com/news/local/hurricane-dorian (noting South Florida braced for possible hurricane force and tropical storm force winds).

262. Detman & Lolo, *supra* note 261.

263. Kirk Semple, *Corpses Strewn, People Missing a Week After Dorian Hit the Bahamas,* N.Y. TIMES (Sept. 8, 2019), https://www.nytimes.com/2019/09/08/world/americas/bahamas-dead-dorian.html.

264. Phil Helsel et al., *As Hurricane Dorian Begins Lashing Florida, Southeast Braces for Disaster*, NBC NEWS (Sept. 4, 2019) https://www.nbcnews.com/news/weather/hurricane-dorian-weakens-category-3-it-camps-out-over-devastated-n1049011.

265. Ed Leefeldt, *668,000 Florida Homes at Risk from Hurricane Dorian*, CBS NEWS (Aug. 30, 2019), https://www.cbsnews.com/news/668000-florida-homes-at-risk-from-hurricane-dorian/.

266. Christine Stapleton, *Storm Not Likely to Breach Lake O Dike, Corps Says*, THE PALM BEACH POST, Aug. 31, 2019, at A14; *Corps Prepares for Hurricane Dorian*, U.S. ARMY CORPS OF ENG'RS (Aug. 30, 2019), https://www.saj.usace.army.mil/Media/News-Releases/Article/1948974/corps-prepares-for-hurricane-dorian/.

267. Press Release, Brian Mast, Congress, Mast Urges Army Corps To Avoid Discharges After Hurricane Dorian (Sept. 5, 2019), https://mast.house.gov/2019/9/mast-urges-army-corps-to-avoid-discharges-after-hurricane-dorian.

268. Tyler Treadway, *South Florida Water Management District Board OKs $972.3M Budget, Rolled-back Tax Rate*, TREASURE COAST NEWSPAPERS (Sept. 12, 2019), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2019/09/12/sfwmd-board-oks-972-3-million-budget-rolled-back-tax-rate/2286780001/.

269. *Id.*

public officials and water managers of ethical breaches and dereliction of duty.[270] South Florida, and the nation, must brace for turbulent times.

270. *See generally* Keith W. Rizzardi, *Rising Seas, Receding Ethics? Why Real Estate Professionals Should Seek the Moral High Ground*, 6 WASH. & LEE J. ENERGY, CLIMATE & ENV'T. 402 (2015) (emphasizing duties of truthfulness, honesty and disclosure of material facts); Keith W. Rizzardi, *Sea Level Lies: The Duty to Confront the Deniers*, 44 STETSON L. REV. 75 (2014) (arguing when coastal real estate professionals and lawyers ignore the risks of rising seas, they contradict professional ethical duties, which extends to all other water management professionals.)