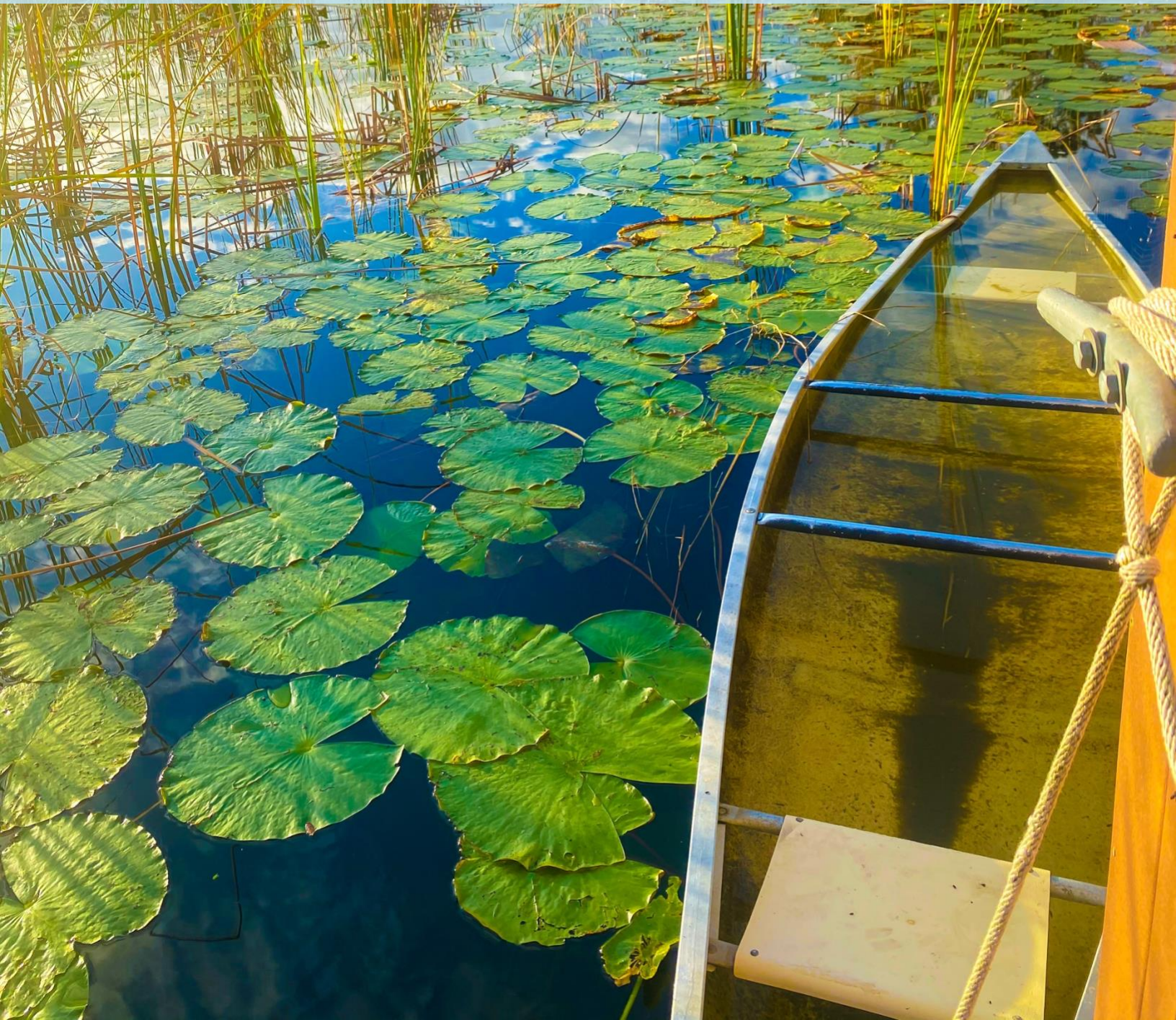




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MICRO-DEREGULATION: POLLUTING FLORIDA’S WATER, DROP BY DROP

*Keith W. Rizzardi*¹

Water pollution threatens public health, especially in Florida, where excess nutrients cause reoccurring algal blooms. The law itself has become the problem. Florida serves as a case study in micro-deregulation because its system of environmental regulation has been incrementally dismantled through a combination of legally mandated “drops.” Some deregulation occurred openly through exemptions, presumptions, preemptions, and deadline-driven procrastination. Other efforts are less transparent. Exercises of agency discretion, often based on vague standards, may be known to the government but hidden from public view. Furthermore, justice is willfully blind because the judiciary refuses to listen to citizen advocates, invoking doctrines of judicial restraint, standing, and fee-shifting to undermine access to courts in environmental affairs. Finally, some of the deregulatory efforts will never be truly understood due to the unknown impacts of appropriations and other structural deregulatory efforts. But as water quality continues to decline, Florida’s citizens endure the consequences of deregulation, one drop at a time.

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INTRODUCTION

Pollution has been memorably defined as “something in the wrong place, wrong time, and wrong quantity.”² Decades ago, Florida forged a reputation as a leader in water management and regulation, implementing an influential water code to protect Florida waters from pollution.³ Today, Florida serves as a case study in micro-deregulation because its historic system of environmental regulation has been incrementally dismantled.

In theory, Florida Statutes⁴ and the Clean Water Act (CWA) require water quality monitoring to find and control pollution.⁵ Permits and other rules may place restrictions on specific point sources,⁶ such as a discharge pipe from a sewage-treatment plant.⁷ Other forms of regulation, such as a

2. MARTIN W. HOLDGATE, *A PERSPECTIVE OF ENVIRONMENTAL POLLUTION* 18 (1st ed. 1979).

3. See Richard C. Ausness, *The Influence of the Model Water Code on Water Resources Management Policy in Florida*, 3 J. LAND USE & ENV’T L. 1, 18–20 (1987) (detailing Florida’s history with water pollution legislation and explaining how adopting the Model Water Code helped cement Florida as a prominent state for water pollution control); see also FRANK E. MALONEY ET AL., *A MODEL WATER CODE WITH COMMENTARY* v (1972) (explaining the Model Water Code and stating that Florida adopted the majority of the Model Code in 1972).

4. See FLA. STAT. §§ 373.012–373.813, 403 (2023) (containing statutes relevant to water resources). All subsequent citations to the Florida Statutes are to the most current version unless otherwise indicated.

5. See generally Clean Water Act, 33 U.S.C. §§ 1251–1387 (discussing water quality restoration).

6. Point sources, when covered by Clean Water Act permits, must have monitoring conditions to protect the downstream waters. *Id.* §§ 1342, 1318 (requiring monitoring for point sources to determine whether effluent limits are met when discharges are granted permits).

7. *Id.* § 1362(14) (“[P]oint source’ means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which

requirement for a farmer or construction worker to use best management practices for erosion control, address less discrete nonpoint sources created by rainfall runoff.⁸ Since those regulatory efforts are imperfect, large-scale public works projects can offer additional water quality improvement.⁹ Yet in practice, Florida law has undermined itself. The cumulative sum of small measures has become more impactful than individually significant laws and projects, and as a result, the whole water quality protection scheme endures systematic micro-deregulation.

Law is a core part of the grand social contract, where voters and public officials define society's rules and expectations.¹⁰ Florida water law now sets low expectations. While the state's general statutory scheme established lofty goals, and specific statutes might benefit individual watersheds, the whole system is riddled with self-destructive provisions that undermine the effective functioning of the legal or regulatory systems.¹¹ Known problems are openly accepted. Some problems are hidden from the public, while the government remains willfully blind to others. And in some instances, often due to the elimination of government agency funding, no one understands the problems at all. Expanding pollution and toxic algal blooms across the state reveal the consequences of this piecemeal deregulatory scheme.

Part I of the paper explores the idealistic design of the Florida water quality regulatory system. Part II reveals how the cumulative effects of small legal maneuvers have achieved deregulation, describing the nine deregulatory "drops" that diminish Florida's regulatory system. The Conclusion summarizes the author's views and provides recommendations.

I. BACKGROUND: FLORIDA'S REGULATION OF WATER QUALITY

Water is a defining and even existential issue in low-lying Florida, where the State Constitution demands protection of water resources.¹² Statutory

pollutants are or may be discharged. This term does not include agricultural discharges and return flows from irrigated agriculture."); *see also* Jeffrey G. Miller, *Plain Meaning, Precedent, and Metaphysics: Interpreting the "Point Source" Element of the Clean Water Act Offense*, 45 ENV'T L. REP. 11129, 11137 (2015) (explaining EPA's regulation of point source pollution).

8. *Controlling Nonpoint Source Pollution*, NAT'L OCEAN SERV., https://oceanservice.noaa.gov/education/tutorial_pollution/015controlling.html (last visited Apr. 3, 2024).

9. FLA. STAT. § 373.4592(4)(a).

10. *See generally* JEAN-JACQUES ROUSSEAU, *THE SOCIAL CONTRACT OR PRINCIPLES OF POLITICAL RIGHT* (G. D. H. Cole trans. 1762) (indicating law is an agreed upon tenant of the social contract).

11. *See infra* Part II (describing systemic failures).

12. FLA. CONST. art. II, § 7 (protection of natural resources); *id.* art. IV, § 9 (fish and wildlife conservation commission); *id.* art. VII, § 9(b) (taxation authority for water management districts); *id.* art. VII, §§ 11, 14 (bonds for pollution control and water resource development); *id.* art. X, § 11 (sovereign submerged lands held in public trust); *id.* art. X, § 16 (regulation of net fishing); *id.* art. X, § 17 (trust fund for the Everglades); *id.* art. X, § 28 (land acquisition trust fund for water resources protection).

provisions in Chapters 373 and 403, Florida Statutes, further describe a system of water governance and flood control.¹³ For example, Florida law gives the Florida Department of Environmental Protection (FDEP) the “power and the duty to control and prohibit pollution of air and water in accordance with the law and rules” of the state.¹⁴ To exercise that power, FDEP has authority to adopt rules,¹⁵ establish water quality standards,¹⁶ issue orders as necessary to control water pollution,¹⁷ and “[d]evelop a comprehensive program for the prevention, abatement, and control of the pollution of the waters of the state.”¹⁸ The Environmental Control chapter of the Florida Statutes¹⁹ includes the Water Resources Restoration and Preservation Act,²⁰ which assists in the restoration and preservation of bodies of water and a large-scale water quality monitoring program.²¹

While FDEP is the state’s lead water quality monitoring agency,²² it also supervises five important regional water management districts.²³ The water management district boundaries follow watershed boundaries.²⁴ These agencies, like FDEP, seek to manage, utilize, and conserve water resources to promote public health, safety, and welfare.²⁵ Pursuant to Chapter 373, these “water management districts are responsible for addressing issues such as water supply, flood protection, water quality, and protection of natural systems.”²⁶ Performing a critical role in the state’s water resource development,²⁷ the water management districts implement a comprehensive

13. FLA. STAT. § 373.016; *id.* § 403.011 (“This act shall be known and cited as the ‘Florida Air and Water Pollution Control Act.’”).

14. *Id.* § 403.061.

15. *Id.* § 403.061(7).

16. *Id.* § 403.061(11).

17. *Id.* § 403.061(8).

18. *Id.* § 403.061(10).

19. *See generally id.* § 403 (showing that the Environmental Control chapter contains various provisions devoted to water restoration in Florida).

20. *Id.* § 403.0615(1).

21. *Id.* § 403.0616; *id.* § 403.0625.

22. FLA. ADMIN. CODE ANN. r. 62-40.540 (“The Department is the state’s lead water quality monitoring agency and central repository for surface water and ground water information. The Department shall coordinate Department, District, state agency, and local government water quality monitoring activities to improve data and reduce costs.”).

23. FLA. STAT. § 373.026(7).

24. *Id.* § 373.016(4)(a).

25. *Id.* § 373.016(3).

26. Christina A. Klein et al., *Modernizing Water Law: The Example of Florida*, 61 FLA. L. REV. 403, 445 (2009).

27. FLA. STAT. § 373.019(24) (“‘Water resource development’ means the formulation and implementation of regional water resource management strategies, including the collection and evaluation of surface water and groundwater data; structural and nonstructural programs to protect and manage water resources; the development of regional water resource implementation programs; the construction, operation, and maintenance of major public works facilities to provide for flood control, surface and underground water storage, and groundwater recharge augmentation; and related technical assistance to local governments, government-owned and privately owned water utilities, and self-suppliers. . . .”).

environmental resource permit program for construction and operation of water structures, the regulation of wetland impacts, and the protection of Florida waters.²⁸ Some statutes include additional requirements for particular types of waters, such as estuaries,²⁹ ground waters,³⁰ wells,³¹ surface waters,³² and springs.³³

Overall, Florida's water laws, including the comprehensive Florida Water Resources Act of 1972,³⁴ now exceed 170,000 words and 250 printed pages.³⁵ In theory, the government ensures compliance by imposing civil penalties in the form of fines, jail, or both for violations.³⁶ Administrative enforcement can also be achieved by FDEP and the water management districts through court intervention.³⁷

Federal regulatory schemes pursuant to the CWA provide additional water resource protection.³⁸ In fact, Florida officials implement the federal programs because they have been delegated to the state through agreements with the Environmental Protection Agency (EPA). Industrial and sewage-treatment plant discharges are regulated through National Pollutant Discharge Elimination System (NPDES) permits.³⁹ Stormwater discharges are regulated, too.⁴⁰

Separately, Florida also received authority to implement the federal wetland regulatory program, thus satisfying the requirements of Section 404

28. FLA. ADMIN. CODE ANN. r. 62-330.010 (2020); FLA. STAT. § 373.4131.

29. *See, e.g.*, FLA. STAT. § 373.4592 (2018) (requiring special protection for the Everglades); *id.* § 373.4595.

30. *See id.* §§ 373.203–373.250 (permitting of consumptive uses of water).

31. *Id.* § 373.302.

32. *Id.* §§ 373.403–373.468.

33. *Id.* § 373.801.

34. *Id.* § 373.013.

35. *Id.* § 373.016; *see also* Keith W. Rizzardi, *Money, Mandates, and Water Management: Foreshadowing a Florida Disaster*, 21 VT. J. ENV'T L. 1, 44 (2019) (citing FLA. STAT. §§ 373.012–373.813).

36. *See generally* FLA. STAT. §§ 373.123–373.136 (showing the existing types of civil penalties for violations to Florida water laws).

37. *Id.* §§ 373.119, 403.121.

38. *See generally* Clean Water Act, 33 U.S.C. §§ 1251–1387 (providing an example of a federal regulatory framework that is designed to enforce water resource protection).

39. *Id.* §§ 1342(p)(3)(A), 1342(q)(1); *see also* *National Pollutant Discharge Elimination System Memorandum of Agreement Between the State of Florida and the United States Environmental Protection Agency Region 4*, EPA (Nov. 2007), <https://www.epa.gov/sites/default/files/2013-09/documents/fl-mo-npdes.pdf> (explaining the permitting program between Florida and EPA) (describing general provisions); *see also* *Domestic Wastewater Forms*, FLA. DEP'T OF ENV'T PROT. (Oct. 4, 2023), <https://floridadep.gov/water/domestic-wastewater/content/domestic-wastewater-forms> (listing domestic wastewater permits).

40. *See generally* *Stormwater Regulation*, FLA. DEP'T OF ENV'T PROT., <https://floridadep.gov/water/stormwater> (last visited Apr. 6, 2024) (discussing regulation of stormwater discharges through Municipal Separate Storm Sewer Systems (MS4s), construction activities and industrial activities).

of the CWA.⁴¹ However, that authority has been called into question. A challenge to the 404 program brought by the Center for Biological Diversity concluded that the delegated program and its approval by the U.S. Fish and Wildlife Service violated the Endangered Species Act.⁴² Separately but similarly, the Miccosukee Tribe of Indians challenged EPA's approval of the delegated program, arguing that it violated the CWA.⁴³ As this Article was being written, the litigation was put on hold for further review by the U.S. Department of Justice and Army Corps of Engineers, and no 404 permits were being issued by the State of Florida.⁴⁴

Water management in Florida, however, is about much more than just permitting programs. For more than a century, and with the frequent assistance of the U.S. Army Corps of Engineers, Florida has grappled with flood control.⁴⁵ Most notably, Florida built a system of canals across the state⁴⁶ and a massive dike around Lake Okeechobee.⁴⁷ To address the byproducts of these public works projects, and to supplement the regulatory schemes, Florida Statutes create requirements to plan, finance, construct, operate, and monitor a variety of public works projects.⁴⁸ While the Everglades Forever Act dedicated efforts to the protection of the Everglades,⁴⁹ other similar statutes tackled pollution problems related to Lake Apopka, the Kissimmee River, Lake Okeechobee, the St. Lucie River, the Caloosahatchee River, and Florida Bay.⁵⁰ With billions of dollars

41. 33 U.S.C. § 1344; EPA's Approval of Florida's Clean Water Act Section 404 Assumption Request, 85 Fed. Reg. 83553 (Dec. 22, 2020).

42. *Ctr. for Biological Diversity v. Regan*, No. 21-119, 2024 WL 655368, at *38 (D.D.C. Feb. 15, 2024).

43. *Miccosukee Tribe of Indians of Fla. v. U.S. EPA*, 2022 U.S. Dist. LEXIS 240541, at *1 (S.D. Fla. Oct. 14, 2022).

44. Jim Saunders, *Miccosukee Tribe Wetlands Permitting Case Put on Hold*, WGPU (Mar. 19, 2024), <https://news.wgu.org/section/environment/2024-03-19/miccosukee-tribe-wetlands-permitting-case-put-on-hold>.

45. See generally MATTHEW C. GODFREY & THEODORE CATTON, U.S. ARMY CORPS OF ENG'RS, RIVER OF INTERESTS: WATER MANAGEMENT IN SOUTH FLORIDA AND THE EVERGLADES, chs. 2-3 (2011).

46. See *Facility and Infrastructure Location Index Map*, S. FLA. WATER MGMT. DIST. (July 2016), https://www.sfwmd.gov/sites/default/files/documents/facility_map_overview.pdf (mapping out canals throughout the state of Florida); STEVEN J. MILLER ET AL., ST. JOHNS RIVER WATER MGMT. DIST., UPPER ST. JOHNS RIVER BASIN PROJECT INTERIM ENVIRONMENTAL WATER MANAGEMENT PLAN, iii (Apr. 2022), <https://static.sjrwmd.com/sjrwmd/technical-reports/technical-publications/SJ2022-01.pdf>; *Tampa Bypass Canal System*, SW. FLA. WATER MGMT. DIST., <https://www.sfwmd.state.fl.us/projects/tampa-bypass-canal-system> (last visited Apr. 6, 2024).

47. Alanna L. Lecher, *A Brief History of Lake Okeechobee: A Narrative of Conflict*, 1 J. FLA. STUDS. 1, 11 (2021), <https://www.journaloffloridastudies.org/files/vol0109/lecher-brief-history-lake-okeechobee.pdf>.

48. FLA. STAT. § 373.4595(1)(l).

49. *Id.* § 373.4592; *Central and Southern Florida Project Comprehensive Review Study: Final Integrated Feasibility Report and Programmatic Environmental Impact Statement*, U.S. ARMY CORPS OF ENG'RS JACKSONVILLE DIST. (Apr. 1999), <https://www.saj.usace.army.mil/Restudy/>.

50. See generally FLA. STAT. §§ 373.403-373.469 (showing state provisions designed to address pollution in other state water bodies).

invested, more than 100,000 acres of land acquisition and project construction, and thousands of miles of canals to monitor and manage, the state's investment is truly substantial.

Nevertheless, the consistent supervision and regulation of water quality standards in Florida relies on effective management and responsible stewardship by the state⁵¹—a point the U.S. Government Accountability Office has been explaining since the 1980s.⁵² And despite the collection of regulatory programs, expensive public works projects, and site-specific statutes, the truth is that Florida knows problems exist, yet its government increasingly chooses not to act. The high-profile public works projects offer great publicity, but micro-deregulation is the reality.

II. ANALYSIS: FLORIDA'S DEREGULATION OF WATER QUALITY

As American psychologists Joseph Luft and Harry Ingram explained, knowledge involves disclosure, understanding, feedback, and self-awareness.⁵³ Of course, management of natural resources and watersheds requires the careful use and application of knowledge. The logic of Luft and Ingram's famous diagram, known as the "Johari" Window (combining their first names),⁵⁴ readily applies to the regulation of water pollution, as depicted below. Some things are known to both the state government and its people and are openly addressed; these are the "known knowns." In an effective regulatory system, the known information is used. A distrustful public might worry that some things known to some state officials remain hidden from the community. But in an effective regulatory setting, the government simply uses the information behind the scenes. Other things are known by the citizens (and especially the scientific community) but not the state, leaving the state with a blind spot. In an effective regulatory system, the citizens have an opportunity to inform the state or even contest its decisions. As for the fourth quadrant and the concept of "unknown unknowns," neither the state

51. See Jason Totoiu & Jaclyn Lopez, *Holding States Accountable for Harmful Algal Blooms: Florida's Water Crisis in Focus*, 33 UNIV. FLA. J. L. & PUB. POL'Y 1, 14 (2022) (noting failures in water quality due to lack of effective management).

52. *Water Pollution: More EPA Action Needed to Improve the Quality of Heavily Polluted Waters*, GOV'T ACCOUNTABILITY OFF. (Jan. 13, 1989), <https://www.gao.gov/products/rced-89-38> (discussing Oregon implementation of TMDLs); *Clean Water Act: Changes Needed if Key EPA Program is to Help Fulfill the Nation's Water Quality Goals*, GOV'T ACCOUNTABILITY OFF. (Dec. 2014), <https://www.gao.gov/products/gao-14-80>.

53. JOSEPH LUFT, *THE JOHARI WINDOW: A GRAPHIC MODEL OF AWARENESS IN INTERPERSONAL RELATIONS* 34 (1982).

54. *Id.*; Dr. Parul Saxena, *Johari Window: An Effective Model for Improving Interpersonal Communication and Managerial Effectiveness*, 5 SIT J. MGMT. 134, 146 (Dec. 2015).

nor the citizens are fully aware of the problems. Ideally, in these circumstances, the government and people seek to know more.⁵⁵

The Johari Window was intended to provide a framework for developing greater self-awareness. Careful thought reveals that Florida law is no longer committed to the effective use of knowledge to solve water problems through regulation. While some of the trappings of regulation remain, Florida law simultaneously accepts and even demands non-use of the information, thereby embracing deregulation. The Johari Window, in other words, has a mirror image, which can help explain both the use of and the refusal to use information:

		THE JOHARI MIRROR: INFORMATION, REGULATION & DEREGULATION		
		<i>Known to the government</i>	<i>Unknown to the government</i>	
<i>Known to citizens</i>	(I) OPEN	<p><i>Effective regulation:</i> decision makers use known information</p> <p style="text-align: center;"><i>Deregulation inhibits information</i> using exemptions, presumptions, local preemption, & delayed deadlines.</p>	(II) BLIND	<p><i>Effective regulation:</i> citizens provide information for government use</p> <p style="text-align: center;"><i>Deregulation inhibits information</i> by obstructing citizen advocacy and preventing judicial review.</p>
	(III) HIDDEN	<p><i>Effective regulation:</i> decisionmakers use known information and inform the public</p> <p style="text-align: center;"><i>Deregulation inhibits information</i> by allowing non-transparent (ab)use of standardless discretion.</p>	(IV) UNKNOWN	<p><i>Effective regulation:</i> decision makers seek more information</p> <p style="text-align: center;"><i>Deregulation inhibits information</i> by reducing appropriations or allowing other systematic disruptions.</p>
<i>Unknown to citizens</i>				

55. However, regarding unknowns, Professor Luft separately emphasized that “eventually some of these things become known” and that “the value system of a group and its membership may be noted in the way unknowns in the life of the group are confronted.” LUFT, *supra* note 53, at 34–35.

Deregulation includes far more than just the traditional concept of repealing statutes or rules—which can be notoriously difficult to achieve.⁵⁶ Other forms of deregulation can include altering an existing regulation to reduce its impact.⁵⁷ Florida law embraces micro-deregulation one drop at a time. Through a series of lawful but seemingly small measures—characterized as “drops” throughout this article—the state statutes, rules, and legal doctrines inhibit the government’s use of information. Cumulatively, these small drops undermine the regulatory system and achieve deregulatory objectives instead.

Some deregulatory drops exist in the open, where the problems are well-known to everyone but the law allows for a combination of exemptions, presumptions, and preemptions. Other drops are somewhat hidden, dealing with problems known to the government but not well-known to the public, and are often achieved through agency discretion and procrastination. Should citizen advocates endeavor to confront the problem, deregulation is achieved through the judiciary, which drops responsibility and otherwise engages in obstruction through doctrines of judicial restraint, inhibition of citizen standing, and enforcement of fee-shifting statutes.

Finally, some of the deregulatory drops are unknown, especially because appropriations change budgets and reorganization undermines efforts to track changes over time. The citizens, who thought that the system was designed to protect their waters, instead endure the consequences of micro-deregulation.

A. Open Deregulation

Drop #1: Exemptions

Sometimes, an agency’s inaction on a water pollution problem is permitted by the legislature’s decision to create an exemption.⁵⁸ Exemptions, by definition, openly acknowledge the existence of a problem and then refuse to apply the law to that problem. Florida’s Legislature expressly authorized FDEP to create rules with exemptions from water quality permitting

56. See generally Cary Coglianese et al., *The Deregulation Deception*, UNIV. PA. CAREY L. SCH.: PENN CAREY LAW: LEGAL SCHOLARSHIP REPOSITORY 1–42 (2021), https://scholarship.law.upenn.edu/faculty_scholarship/2229; Jack Thorlin, *Deregulation Defanged: An Empirical Review of Federal Deregulatory Policy and its Legal Obstacles*, 34 BYU J. PUB. L. 333, 333 (2020), <https://digitalcommons.law.byu.edu/jpl/vol34/iss2/6>.

57. *Deregulation*, BRITANNICA, <https://www.britannica.com/topic/deregulation> (last visited May 10, 2024).

58. See, e.g., FLA. STAT. §120.542(1) (“Strict application of uniformly applicable rule requirements can lead to unreasonable, unfair, and unintended results in particular instances. The Legislature finds that it is appropriate in such cases to adopt a procedure for agencies to provide relief to persons subject to regulation.”); *id.* § 373.406.

requirements,⁵⁹ thereby allowing permittees to evade otherwise applicable water quality requirements.⁶⁰ For example, Florida Statutes create exemptions for aquaculture;⁶¹ batteries;⁶² dock, seawall, and floating platforms;⁶³ electrical power and transmission facilities;⁶⁴ gravity sewer systems;⁶⁵ infrastructure maintenance, such as repair or replacement related to bridges, roads, and stormwater projects;⁶⁶ mangrove trimming;⁶⁷ natural gas;⁶⁸ packaging;⁶⁹ public water systems;⁷⁰ and solid waste facilities.⁷¹

59. *Id.* § 403.087(1) (“A stationary installation that is reasonably expected to be a source of air or water pollution must not be operated, maintained, constructed, expanded, or modified without an appropriate and currently valid permit issued by the department, unless exempted by department rule.”)

60. *Id.* § 403.087(6) (allowing use of site-specific alternative criteria or exemptions from water quality criteria).

61. *Id.* § 403.0885(5) (“Certified aquaculture activities under s. 597.004 that have individual production units whose annual production and water discharge are less than the parameters established by the NPDES program are exempt from wastewater management regulations.”).

62. *Id.* § 403.7192(2)(d) (“The secretary of the department may exempt a specific type of battery from this subsection if there is not a battery that meets those requirements and that reasonably can be substituted for the battery for which the exemption is sought.”).

63. *Id.* § 403.813.

64. *Id.* §§ 403.501–403.5365.

65. *Id.* § 403.1815 (“Notwithstanding any other provision of this chapter to the contrary, the department may, upon request, allow any county or municipality to independently regulate the construction of water distribution mains of 12 inches or less, gravity sewage collection systems of 12 inches or less, and sewage force mains of 12 inches or less, and pump stations appurtenant to such force mains, provided the plant is owned by the county or municipality making the request for approval or, pursuant to interlocal agreement, plant capacity is provided from a plant owned by another county or municipality or by a regional water supply authority of which the county or municipality requesting approval is a member. . . . In the event the department allows any county or municipality to independently regulate the construction of such systems, these construction projects shall be exempt from department permit requirements.”).

66. *Id.* § 403.813.

67. *Id.* § 403.9326(1) (“The following activities are exempt from the permitting requirements of ss. 403.9321–403.9333 and any other provision of law if no herbicide or other chemical is used to remove mangrove foliage...”).

68. *See id.* §§ 403.9401–403.9425 (containing the Natural Gas Transmission Pipeline Siting Act).

69. *Id.* § 403.7191(4) (“EXEMPTIONS.—All packages and packaging components shall be subject to the provisions of this section except: . . . (b) Packages or packaging components to which lead, cadmium, mercury, or hexavalent chromium has been added in the manufacturing, forming, printing, or distribution process in order to comply with health or safety requirements of federal or state law or for which there is no feasible alternative. The manufacturer of a package or a packaging component must petition the department for any exemption from the provisions of this paragraph for a particular package or packaging component based upon either criterion.”).

70. *Id.* § 403.854(1) (“The department may authorize variances or exemptions from the regulations issued pursuant to s. 403.853 under conditions and in such manner as it deems necessary and desirable, provided that such variances or exemptions are authorized under such conditions and in such manner as are no less stringent than the conditions under which and the manner in which variances and exemptions may be granted under the federal act.”).

71. *Id.* § 403.707(1) (“A solid waste management facility may not be operated, maintained, constructed, expanded, modified, or closed without an appropriate and currently valid permit issued by the department. The department may by rule exempt specified types of facilities from the requirement for a permit under this part if it determines that construction or operation of the facility is not expected to create any significant threat to the environment or public health.”).

Exemptions can also be created implicitly. Thus, a vast range of construction activity and operational discharges escapes the scrutiny of regulators.

Similarly, FDEP and the state's five water management districts were authorized to add additional exemptions from water regulation.⁷² The agencies have general authority to adopt rules and create exemptions for activities determined to have only minimal or insignificant individual or cumulative adverse impacts on the water resources of the district.⁷³ Exercising that authority, the agencies implemented exemptions for various types of home construction,⁷⁴ mining activities,⁷⁵ road maintenance,⁷⁶ and water quality treatment systems.⁷⁷ And sometimes, the term "exemption" is replaced with a mirror-image concept of "threshold." As the agencies explain in the *Permitting Applicants Handbook*, a permit is needed only if the "thresholds" are met, meaning that projects below the thresholds are exempt.⁷⁸ These types of threshold exemptions include modifications of "existing" water management systems along roads, developments, and agricultural surface-water management systems.⁷⁹ For example, the St. Johns River Water Management District states that an agricultural drainage project pumping less than 10,000 gallons per minute or serving an area smaller than 40 acres may fall below the permitting threshold.⁸⁰

Exemptions protecting agricultural activities from regulatory scrutiny and the associated monitoring requirements are especially problematic given the vast evidence that agriculture contributes to point-source and nonpoint-source pollution.⁸¹ But for better or worse, this exemption is well-

72. *Id.* §§ 403.854, 403.707(2); *id.* § 373.069(1)(a)–(e).

73. *Id.* § 373.406(6). ("Any district or the department may exempt from regulation under this part those activities that the district or department determines will have only minimal or insignificant individual or cumulative adverse impacts on the water resources of the district."); *id.* §373.4131(1)(a)(4) (authorizing permit rules with "[e]xemptions and general permits that do not allow significant adverse impacts to occur individually or cumulatively.").

74. *Id.* § 373.4145(2)(c).

75. *Id.* § 373.414(6) (creating exemptions for some types of otherwise regulated mining activities).

76. *Id.* § 373.4145(2)(e) (creating an exemption for "repair, stabilization, or paving of county-maintained roads" constructed on or before January 2002).

77. *Id.* § 373.4142 (explaining water quality within stormwater treatment systems).

78. SW. FLA. WATER MGMT. DIST., 1 ENVIRONMENTAL RESOURCE PERMITTING APPLICANT'S HANDBOOK, at 3-5 (2020) https://www.sfwmd.gov/sites/default/files/documents/swerp_applicants_handbook_vol_i.pdf.

79. *Id.* § 3.1.4(c) ("As referenced in paragraph 62-330.020(2)(i), F.A.C., District-specific thresholds are in section 1.2 of each Volume II."); *see, e.g.*, ST. JOHNS RIVER WATER MGMT. DIST., 2 ENVIRONMENTAL RESOURCE PERMIT APPLICANT'S HANDBOOK, at 1-2 (2018), <https://www.sjrwmd.com/static/permitting/PIM-20180601.pdf>.

80. ST. JOHNS RIVER MGMT. DIST., *supra* note 79, at 1-3 to 1-4.

81. U.S. DEP'T OF AGRIC., AGRICULTURAL RESOURCES AND ENVIRONMENTAL INDICATORS (Daniel Hellerstein et al. eds, 2019), <https://www.ers.usda.gov/webdocs/publications/93026/eib-208.pdf> ("As of 2017, across the Nation, 55 percent of assessed rivers and streams; 71 percent of lakes; and 84 percent of bays and estuaries nationally have impaired water quality. Agriculture is the largest source of

established; in the CWA, agriculture is exempt from the requirements of the NPDES permitting program.⁸² Florida law, in fact, explicitly emphasizes the economic importance of the agricultural industry and the need to avoid “unnecessary expense.”⁸³ Agricultural and silvicultural byproduct materials are exempt from state hazardous waste regulation.⁸⁴ No permits are required to dispose of solid waste resulting from normal farming operations.⁸⁵ No permits are required for agricultural activities that alter the topography of any tract of land, even when they impede or divert the flow of surface waters or adversely impact wetlands.⁸⁶ No permits are required for the construction, operation, or maintenance of any agricultural closed system⁸⁷ or for environmental restoration or water quality improvement on agricultural lands.⁸⁸ Remarkably, even if the water management district disagrees about the applicability of an exemption, the Florida Department of Agriculture and Consumer Services has exclusive authority to make the determination about whether various exemptions apply.⁸⁹

The result of this system is that deliberately disregards known problems. Even if watershed monitoring finds pollution, and even when Florida officials discover an impaired watershed, the state officials cannot act. The exemptions, by preventing regulation, achieve deregulation. The state, by taking no action at all, permits the polluters to continue the status quo.

impairments in rivers and streams and the second-largest source in lakes and ponds.”); EPA, PROTECTING WATER QUALITY FROM AGRICULTURAL RUNOFF (2015), https://www.epa.gov/sites/production/files/2015-09/documents/ag_runoff_fact_sheet.pdf (“[A]gricultural nonpoint source (NPS) pollution is the leading source of water quality impacts on surveyed rivers and lakes, the second largest source of impairments to wetlands, and a major contributor to contamination of surveyed estuaries and ground water.”); *Agricultural Contaminants*, U.S. GEOLOGICAL SURV. (Mar. 1, 2019), https://www.usgs.gov/mission-areas/water-resources/science/agricultural-contaminants?qt-science_center_objects (“About 40 percent of the land in the United States is used for agriculture, and agriculture supplies a major part of our food, feed, and fiber needs. Agricultural chemicals move into and through every component of the hydrologic system, including air, soil, soil water, streams, wetlands, and groundwater.”).

82. 33 U.S.C. § 1342(l)(1) (“The Administrator shall not require a permit under this section for discharges composed entirely of return flows from irrigated agriculture, nor shall the Administrator directly or indirectly, require any State to require such a permit.”); *see generally* Jan G. Laitos & Heidi Ruckriegle, *The Clean Water Act and the Challenge of Agricultural Pollution*, 37 VT. L. REV. 1033, 1070 (2013) (discussing agricultural exemption from permitting).

83. FLA. STAT. § 403.927 (“The Legislature recognizes the great value of farming and forestry to this state and that continued agricultural activity is compatible with wetlands protection. In order to avoid unnecessary expense and delay from duplicative programs, it is the intent of the Legislature to provide for the construction and operation of agricultural water management systems under authority granted to water management districts and to control, by the department or by delegation of authority to water management districts, the ultimate discharge from agricultural water management systems.”).

84. *Id.* § 403.7045(2)(b).

85. *Id.* § 403.707(2)(e).

86. *Id.* § 373.406(2).

87. *Id.* § 373.406(3).

88. *Id.* § 373.406(9).

89. *Id.* § 373.407.

Drop #2: Presumptions

Even when activities are not completely exempt from regulation, various “presumptions” in Florida’s rules and statutes create another limitation on water quality investigation and understanding. Most notably, so long as upstream agricultural sites comply with required “best management practices” (BMPs)—defined as effective and practicable on-farm means to improve water quality in agricultural discharges⁹⁰—then the discharges are presumed to comply with water quality requirements.⁹¹

Although agricultural BMPs are a critical tool for improving water quality, the implementation of a BMP is not, by itself, a guarantee of water quality. For example, approved BMPs include the management of nutrient applications (including manure) to minimize impacts to water resources; irrigation management; and water resource protection using buffers, setbacks, and swales to reduce or prevent the transport of sediments and nutrients into waterbodies.⁹² Similar presumptions of water quality compliance exist for reclaimed water,⁹³ discharges of demineralization concentrate,⁹⁴ stormwater systems of up to 10 acres in size,⁹⁵ and water

90. *Id.* § 373.4292(2)(b) (“‘Best management practice’ means a practice or combination of practices determined by the district, in cooperation with the department, based on research, field-testing, and expert review, to be the most effective and practicable, including economic and technological considerations, on-farm means of improving water quality in agricultural discharges to a level that balances water quality improvements and agricultural productivity.”).

91. *Id.* § 403.067(7)(c)(3)(12)(b) (“The department shall use best professional judgment in making the initial verification that the best management practices are reasonably expected to be effective and, where applicable, must notify the appropriate water management district or the Department of Agriculture and Consumer Services of its initial verification before the adoption of a rule proposed pursuant to this paragraph. Implementation, in accordance with rules adopted under this paragraph, of practices that have been initially verified to be effective or verified to be effective by monitoring at representative sites, by the department . . . shall provide a presumption of compliance with state water quality standards. . . .”).

92. *What Are Agricultural Best Management Practices?*, FLA. DEP’T OF AGRIC. & CONSUMER SERV., <https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Best-Management-Practices>; see generally FLA. ADMIN. CODE § 5M, <https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5M-1> (discussing Best Management Practices for agricultural operations in the Northern Everglades as an example).

93. FLA. STAT. § 403.086(5)(a) (“Notwithstanding any other provisions of this chapter or chapter 373, when a reclaimed water product has been established to be in compliance with the standards set forth . . . that water shall be presumed to be allowable, and its discharge shall be permitted . . . at a reasonably accessible point where such discharge results in minimal negative impact.”).

94. *Id.* § 403.0882(6)(a) (“The discharge of demineralization concentrate from small water utility businesses is presumed to be allowable and permissible in all waters in the state. . . .”).

95. *Id.* § 403.814(12) (“A general permit is granted for the construction, alteration, and maintenance of a stormwater management system serving a total project area of up to 10 acres meeting the criteria of this subsection. Such stormwater management systems must be designed, operated, and maintained in accordance with applicable rules adopted pursuant to part IV of chapter 373. There is a rebuttable presumption that the discharge from such systems complies with state water quality standards.”).

management structures meeting pre-determined engineering requirements.⁹⁶ If a downstream Total Maximum Daily Load (TMDL) or Basin Management Action Plan (BMAP) is met, then upstream discharges are presumed to meet water quality standards.⁹⁷ These presumptions may all be law, but they are not necessarily reality. The pollution they permit, however, is all too real.

Drop #3: Preemption

Interconnected ecosystems and watersheds generally do not obey jurisdictional boundaries.⁹⁸ Water pollution is often regional in nature, coming from one place and flowing downstream to another, where it can cause distinctly localized effects.⁹⁹ As a result, even when state law includes exemptions or other limitations, local governments sometimes attempt to find their own solutions. But policy actions can generate policy reactions, and in Florida, when local governments attempt to get involved, the state legislature enacts new statutes to create barriers.¹⁰⁰

State lawmakers in Florida have increasingly used the doctrine of preemption to prevent local governments from adopting ordinances to protect the environment.¹⁰¹ Notably, when local governments attempted to regulate fertilizer use to prevent nutrient pollution of local watersheds, state

96. *Id.* § 373.4131(b)–(c). If a stormwater management system is designed in accordance with the stormwater treatment requirements and criteria adopted by the department or a water management district, or otherwise constructed, operated, and maintained for stormwater treatment in accordance with a valid permit or exemption under this part, then stormwater discharged from the system is presumed not to cause or contribute to violations of applicable state water quality standards. *Id.*

97. *Id.* § 403.061(44)(c) (2023) (“Compliance with an allocation calculated under s. 403.067(6) or, if applicable, the basin management action plan established under s. 403.067(7) for the downstream water shall constitute reasonable assurance that a discharge does not cause or contribute to the violation of the downstream nutrient water quality standards.”).

98. Josh Epperly et al., *Relationships Between Borders, Management Agencies, and the Likelihood of Watershed Impairment*, PLOS ONE, Sept. 2018, at 1, 3, <https://doi.org/10.1371/journal.pone.0204149>; Gerald J. Kauffman, *What if... the United States of America Were Based on Watersheds?*, 4 WATER POL'Y 57 (2002).

99. Tim Hyde, *Why Does Water Pollution Get Worse at Political Boundaries?*, AM. ECON. ASS'N (Dec. 14, 2015), <https://www.aeaweb.org/research/why-does-water-pollution-get-worse-boundaries>.

100. See, e.g., Solomon Gustavo, *Florida's Local Governments are Sick and Tired of State Lawmakers Pre-empting Home Rule, and They're Starting to Push Back*, ORLANDO WEEKLY (Feb. 5, 2020), <https://www.orlandoweekly.com/news/floridas-local-governments-are-sick-and-tired-of-state-lawmakers-pre-empting-home-rule-and-theyre-starting-to-push-back-26756020> (showing how the creation of new statutes can create barriers).

101. See generally Parker Watts, *Florida Preemption of Local Environmental Ordinances*, 74 FLA. L. REV. 483, 502 (2022). Local lawmakers in Texas have recently run into similar preemption issues. See *id.*; see also Paul S. Weiland, *Preemption of Local Efforts to Protect the Environment: Implications for Local Government Officials*, 18 VA. ENV'T L. J. 467, 503 (1999); Thomas Linzey, Esq. et al., *A Phoenix From the Ashes: Resurrecting A Constitutional Right of Local, Community Self-Government in the Name of Environmental Sustainability*, ARIZ. J. ENV'T L. & POL'Y 1, 4 (2014); Cf. *Preemption of County Authority in Florida*, FLA. ASS'N OF COUNTIES, <http://faca.fl-counties.com/sites/default/files/2021-09/Preemption.Whitepaper.61421%20FINAL.pdf> (last visited May 10, 2024) (listing dozens of subjects where preemption impacted local authority).

lawmakers expressly preempted the local law.¹⁰² Similarly, the Legislature banned local government efforts to regulate the “use or sale of polystyrene products.”¹⁰³ Local efforts to grant rights to nature have been stymied by legislation as well.¹⁰⁴

Additionally, the basic “home rule” powers of municipalities and counties to address local environmental problems can be quickly removed by the Legislature, either expressly or impliedly.¹⁰⁵ In 2023, one bill attempted to eliminate any meaningful local government role in land and water management by prohibiting counties and municipalities from adopting laws, regulations, rules, or policies relating to water quality; water quantity; pollution control; pollutant discharge prevention or removal; and wetlands.¹⁰⁶ These types of threats to local government home rules in Florida have become so frequent that the Florida Association of Counties has set up expert commissions to study the problem.¹⁰⁷ The mere threat of preemption also creates a chilling effect, dissuading local governments from engaging in innovative leadership at all.¹⁰⁸

Drop #4: Procrastination

Sometimes, even when the problem is known, the solutions are available, and the regulatory efforts are permissible, Florida law offers another obstacle: procrastination. Invoking financial concerns or other policy justifications, the government recognizes the problem and yet openly delays the implementation of the solution.

Consider sewage treatment, a long-known problem of environmental law and an important aspect of the Clean Water Act of 1972.¹⁰⁹ Yet in Florida,

102. See FLA. STAT. § 576.181 (empowering the Department of Agriculture with exclusive authority to adopt rules for fertilizers and expressly preempting such regulation of fertilizer to the state).

103. See, e.g., *id.* § 500.90 (2021) (showing the state’s desire to preempt the sale of these plastics); Fla. Retail Fed’n, Inc. v. City of Coral Gables, 282 So. 3d 889, 896 (Fla. Dist. Ct. App. 2019) (upholding the state’s preemption of single-use plastics ordinances by local governments).

104. FLA. STAT. § 403.412(9)(a) (2020) (preempting all local governments within Florida from granting rights to any waterways).

105. James R. Wolf & Sarah Harley Bolinder, *The Effectiveness of Home Rule: A Preemption and Conflict Analysis*, 83 FLA. BAR J. 92, 92 (2009).

106. See FLA. LEAGUE OF CITIES, LEGISLATIVE SESSION ’23 FINAL REPORT 34 (2023) <https://www.floridaleagueofcities.com/docs/default-source/advocacy/2023-legislative-final-report-6-30-23.pdf> (discussing HB 1197 and SB 1240).

107. *Presidential Select Committee on Preemption*, FLA. ASS’N OF COUNTIES 4, <https://www.fl-counties.com/wp-content/uploads/2023/05/LegislativeSession-Final-Report-2023-Final.pdf> (last visited May 10, 2024) (discussing HB 1197 and SB 1240).

108. Lydia Bean & Meresa Strano, *Punching Down How States are Suppressing Local Democracy*, NEW AM. (2019), <https://www.newamerica.org/political-reform/reports/punching-down/>; Don Hazen & Steven Rosenfeld, *The Other Right-Wing Tidal Wave Sweeping America: Federal and State Preemption of Local Progressive Laws*, SALON (2017), https://www.salon.com/2017/02/28/the-other-right-wing-tidal-wave-sweeping-america-federal-and-state-preemption-of-local-progressive-laws_partner/.

109. 33 U.S.C. § 1301.

even though there is a nutrient excess, and even though a BMAP requires public sewage-treatment systems to be implemented, the Legislature pushed the date by which entities must comply with the law to July 2025.¹¹⁰ Similarly, for many decades, septic systems have been known to be pervasive sources of nutrient pollution because Florida's ground water often connects with surface waters.¹¹¹ Human waste is unquestionably polluting Florida's springs,¹¹² waters,¹¹³ and estuaries.¹¹⁴ Yet Florida has been slow to create a comprehensive regulatory system to address this known problem, and while the administrative agencies (with their limited resources)¹¹⁵ may have authority to issue permits for commercial facilities¹¹⁶ and to handle enforcement for known problems,¹¹⁷ the cumulative problem of small residential systems remains. In fact, the inspection system for residential homes is optional,¹¹⁸ and even when problems are found, hardship variances are allowed¹¹⁹—as demonstrated by the monthly FDEP meetings issuing hardship variances for sewage-related pollution.¹²⁰

Admittedly, at times, delays are needed to allow time for project implementation and to encourage compliance.¹²¹ For example, as part of the implementation of a consent decree requiring actions to benefit the

110. FLA. STAT. § 403.067 (7)(a)(9)(a)(II) (“The wastewater treatment plan must be adopted as part of the basin management action plan no later than July 1, 2025. A local government that does not have a domestic wastewater treatment facility in its jurisdiction is not required to develop a wastewater treatment plan unless there is a demonstrated need to establish a domestic wastewater treatment facility within its jurisdiction to improve water quality necessary to achieve a total maximum daily load.”); *id.* § 403.067 (7)(a)(9)(b)(II) (“The department shall adopt the onsite sewage treatment and disposal system remediation plan as part of the basin management action plan no later than July 1, 2025[.]”); *id.* § 403.086 (1)(c)(1)(b) (delaying sewage treatment solutions for Indian River Lagoon until 2025).

111. THOMAS J. BICKI ET AL., UNIV. OF FLA., *IMPACT OF ON-SITE SEWAGE DISPOSAL SYSTEMS ON SURFACE AND GROUND WATER QUALITY: REPORT TO FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES UNDER CONTRACT NUMBER LC1702, 93–95* (1984).

112. Mary Lusk et al., *Septic Systems and Spring Water Quality: An Overview for Florida*, UNIV. OF FLA. (2020), <https://edis.ifas.ufl.edu/publication/SS693>.

113. Joey Pellegrino, *Septic Systems Contributing to Lee County's Water Quality Issues*, WINK NEWS, <https://winknews.com/2023/02/16/septic-systems-contributing-to-lee-countys-water-quality-issues/> (May 3, 2023).

114. *See, e.g.*, L.W. Herren et al., *Septic Systems Drive Nutrient Enrichment of Groundwaters and Eutrophication in the Urbanized Indian River Lagoon, Florida*, MARINE POLLUTION BULL., Nov. 2021, at 1, 10 (noting septic waste eventually contaminates and degrades water quality); Brian E. Lapointe et al., *Septic Systems Contribute to Nutrient Pollution and Harmful Algal Blooms in the St. Lucie Estuary, Southeast Florida, USA*, HARMFUL ALGAE, Dec. 2017, available at <https://pubmed.ncbi.nlm.nih.gov/29169565/>.

115. *See* FLA. STAT. § 381.0065(3)(c) (providing that the department must audit only 25% of the private inspections).

116. *Id.* § 381.0065(3)(m).

117. *Id.* § 381.0065(3)(h).

118. *Id.* § 381.0065(8).

119. *Id.* § 381.0065(4)(g)(2)(b).

120. *Variances*, FLA. DEP'T OF ENV'T PROT. (Feb. 27, 2024), <https://floridadep.gov/water/onsite-sewage/content/variances>.

121. Anne J. O'Connell & Jacob Gersen, *Deadlines in Administrative Law*, 156 UNIV. OF PA. L. REV. 923, 925 (2008).

Everglades, the state adopted a default water quality standard for phosphorus when it passed the Everglades Forever Act (EFA) in 1994.¹²² If the procedures were not completed in time, then the new standard automatically took effect.¹²³ The looming default standards helped to expedite the otherwise-slow scientific research process.¹²⁴ But in other instances, these “deadlines” and delays can be viewed as permission slips, allowing polluters who were insufficiently regulated for decades to do so yet again.

Furthermore, procrastination is not always so obviously presented as a delayed deadline. Sometimes, it is created by byzantine procedures and the time-consuming nature of agency rulemaking or litigation. Indeed, the “solutions” created in Florida law often take decades to evolve, shaped by years of arduous litigation.¹²⁵ The legal system, in other words, already includes abundant opportunity for delay and procrastination, allowing the pollution to continue unabated.¹²⁶ Future deadlines merely add to the delay.

B. Hidden Deregulation

Drop #5: Discretion

Florida’s statewide regulatory approach to water management and water quality is also supplemented by statutes that focus on specific projects or ecosystems, such as the EFA, which mandates the construction of specific projects and enhanced monitoring.¹²⁷ Nevertheless, Florida law delegates vast discretion to the agency decision-makers.

122. FLA. STAT. § 373.4592(4)(e)(2) (setting the allowable phosphorus criterion at 10 parts per billion in the Everglades Protection Area).

123. *Id.*

124. Keith Rizzardi et al., *Implementing Legally Mandated Science and Peer Review in Support of the Everglades Restoration Program*, SSRN 21, 27 (2011), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1925038.

125. *See, e.g.*, Consent Decree at 1–2, *Fla. Wildlife Fed’n, Inc. v. Browner* (N.D. Fla. 1999) (4: 98CV356-WS) (indicating EPA will set Total Maximum Daily Loads for waters under the CWA); THE FLA. SENATE, REVIEW OF PROGRESS IN IMPLEMENTING THE TOTAL MAXIMUM DAILY LOAD (WATER QUALITY IMPROVEMENT) PROGRAM BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION 1 (2003).

126. Letter from 23 State Senators to Joseph Biden, President of the United States (Jan. 30, 2023).

127. FLA. STAT. §§ 373.0363, 373.1502, 373.4134, 373.4135, 373.4137, 373.41492, 373.4592, 373.4595, 373.4599, 373.69. The 2019 Executive Order by Governor DeSantis encapsulates Florida’s approach to water quality: on the one hand, a meaningful collection of information and data by a Chief Science Officer is required, but on the other hand, a specific, ecosystem-by-ecosystem and project-oriented approach is emphasized, with references to the Everglades, Lake Okeechobee and the Caloosahatchee and St. Lucie Rivers, reservoir projects to be implemented with the U.S. Army Corps of Engineers, and septic conversion and remediation grant program with local governments. OFF. OF GOVERNOR, EXEC. ORD. NO. 19-12 (2019); *Executive Order: Less Than 48 Hours After Being Sworn into Office, Governor Ron DeSantis Issued an Executive Order Outlining His Bold Vision for Florida’s Environment*, PROTECTING FLA. TOGETHER (Jan. 10, 2019), <https://protectingfloridatogether.gov/about/executive-order>.

Sometimes, officials charged with authority refuse to even acknowledge the laws they administer.¹²⁸ The decision not to enforce the law can be a form of deregulation.¹²⁹ In some cases, such conduct might be a breach of duty or a violation of the public trust.¹³⁰ But in most cases, the law is far more nuanced—perhaps by design—and water law routinely gives broad discretion to public officials who can decide to do as much or as little as possible.

Consider the historic EFA, for example, in which Florida requires a peer-reviewed “Everglades research and monitoring program.”¹³¹ The statute includes instructions to “monitor all discharges” and to determine “compliance with state water quality standards” in the Everglades Protection Area, tributary waters, and nearby canals in the Everglades Agricultural Area.¹³² Research and monitoring must consider phosphorus,¹³³ assess the effectiveness of agricultural BMPs,¹³⁴ and “optimize the design and operation” of the regional wetland treatment systems known as Stormwater Treatment Areas (STAs).¹³⁵ For Lake Okeechobee¹³⁶ and its downstream tributaries,¹³⁷ a similar statutory scheme requires implementation of a research and monitoring program¹³⁸ and a BMAP. Although less specific

128. Adam Shinar, *Dissenting from Within: Why and How Public Officials Resist the Law*, 40 FLA. ST. UNIV. L. REV. 601 (2013).

129. Daniel T. Deacon, *Deregulation Through Nonenforcement*, 85 N.Y.U. L. REV. 795, 796 (2010).

130. Regina A. Kardash, “A Public Office is a Public Trust” *Examination of the Implementation of Constitutional Amendments Governing the Abuse of Public Office*, 51 STETSON L. REV. 447, 449–50 (2022).

131. FLA. STAT. § 373.4592(4)(d)(5).

132. *Id.* § 373.4592(4)(d)(1)–(2).

133. *Id.* § 373.4592(4)(d)(4).

134. *Id.* § 373.4592(4)(f), (2)(b). Recognizing the impact of agricultural runoff on the Everglades, the Everglades Forever Act also requires a monitoring program to evaluate agricultural best management practices, which are economically and technologically efficient and effective means of improving water quality in agricultural discharges, with specific instruction to consider phosphorus. *Id.*; but see also *infra* Part II(C) (highlighting how citizens are inhibited from helping solve state problems through legal and regulatory obstacles); see generally Keith W. Rizzardi, *Translating Science into Law: Phosphorous Standards in the Everglades*, 17 J. LAND USE & ENV'T L. 149, 150 (2001) (explaining how agricultural run-off is letting phosphorous into the Everglades); Mary Beth Erwin, *Agricultural Pollution and the Everglades: A Clean Water Act Solution*, 10 VA. ENV'T L. J. 165, 183 (1990).

135. FLA. STAT. § 373.4592(4)(d)(3).

136. *Id.* § 373.4595(3)(b).

137. *Id.* § 373.4595(4)(a)(2) (“Caloosahatchee River Watershed Research and Water Quality Monitoring Program.—The district, in cooperation with the other coordinating agencies and local governments, shall implement a Caloosahatchee River Watershed Research and Water Quality Monitoring Program that builds upon the district’s existing research program and that is sufficient to carry out, comply with, or assess the plans, programs, and other responsibilities created by this subsection.”). See also *id.* § 373.4595(4)(c)(2) (“St. Lucie River Watershed Research and Water Quality Monitoring Program.—The district, in cooperation with the other coordinating agencies and local governments, shall establish a St. Lucie River Watershed Research and Water Quality Monitoring Program that builds upon the district’s existing research program and that is sufficient to carry out, comply with, or assess the plans, programs, and other responsibilities created by this subsection.”).

138. *Id.* § 373.4595(3)(a)(2).

than the EFA, these programs also require procedures to measure and reduce phosphorus.¹³⁹

The ultimate objective of these laws, however, is uncertain, and success is open to debate. The programs must be “sufficient to evaluate whether reasonable progress in pollutant load reductions is being achieved over time,”¹⁴⁰ and the monitoring should occur at “representative sites to verify the effectiveness of agricultural nonpoint source [BMPs].”¹⁴¹

Presumably, when implementing these provisions, the agencies must assess water quality, from both point sources and nonpoint sources, in a manner that protects public health.¹⁴² But how much pollution risk is too much?¹⁴³ Without a specific standard, the law allows the agency experts to conclude that “reasonable progress” is being made—or that the BMPs are “effective”—without guidance as to what those terms truly mean.

Similarly, from a procedural perspective, questions remain over how to measure progress and effectiveness. Water quality samples must be taken, but there are no instructions as to when, where, or how. Samples could be taken hourly, daily, weekly, or monthly; though monthly testing is cheaper, it is also less informative. Technology offers help, such as autosamplers that periodically take measures, but the legislation does not require that agencies use particular methods.¹⁴⁴ In practice, water quality monitoring means whatever the agency says it means, and monitoring efforts remain highly discretionary even when the agency knows pollution exists.

Ultimately, EPA expects states to implement the CWA by adopting numeric water quality standards that allow for measurement and evaluation

139. *Id.* The Lake Okeechobee monitoring includes specific requirements to evaluate phosphorus in the Lake Okeechobee watershed, to develop a water quality baseline, and to measure compliance with water quality standards for phosphorus. It also requires the development of a water quality model that reasonably represents the phosphorus dynamics of the watershed, monitoring to determine contribution of phosphorus from identifiable and upstream sources, the development of recommendations related to water quality considerations, and an assessment of the water volumes and timing from the Lake Okeechobee watershed. *Id.*

140. *Id.* § 373.4595(3)(b).

141. *Id.* § 373.4595(3)(b)(9).

142. *See, e.g., id.* § 403.063(2) (monitoring of groundwater shall exist to determine the “degree of danger to the public health” and the “susceptibility of each site to contamination”); *id.* § 403.853; *id.* § 403.8532 (requiring monitoring related to drinking-water standards); *id.* § 403.086 (sewage disposal facilities); *id.* § 403.087; *id.* § 403.0855 (biosolids); *id.* § 403.121(3)(g) (enforcement and procedures for petroleum storage tanks); *id.* § 403.0882 (discharge of demineralization concentrate); *id.* § 403.707 (permits for solid waste management facilities); *id.* § 403.721 (standards governing generators and transporters of hazardous waste and owners and operators of hazardous waste facilities).

143. *See generally* Li Lin et al., *Effects of Water Pollution on Human Health and Disease Heterogeneity: A Review*, 10 FRONTIERS ENV'T SCI. 1, 2 (2022) (demonstrating the effects and risks associated with water pollution in the human system).

144. JOHN T. TURK & WATER DIPPER INC., FIELD GUIDE FOR SURFACE WATER SAMPLE AND DATA COLLECTION 15 (2001).

of whether a watershed complies with the specific unit of measurement.¹⁴⁵ But in reality, discretion is exercised by adopting narrative and non-numeric standards, which also have deregulatory consequences.¹⁴⁶ For many decades, Florida used a narrative standard for nutrients, providing that “[i]n no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.”¹⁴⁷ The vague standard, requiring case-by-case and site-by-site information, proved nearly impossible to enforce, in effect leaving the nutrient regulations meaningless.¹⁴⁸ Meanwhile, the Everglades and other watersheds continued to degrade due to nutrient pollution.

Change came through litigation. First, in the Everglades, a consent decree led to passage of the EFA, and the state conducted a research program to determine the point of imbalance and adopted new phosphorus standards.¹⁴⁹ Yet Florida refused to apply that knowledge elsewhere. It continued to accept the “known unknowns”: knowing that pollution was contributing to an excessive amount of nutrients but leaving the amount unknown and undefined. Eventually, exercising its authority under the CWA, EPA acknowledged the severity of Florida’s problems and directed the state to make changes.¹⁵⁰ More litigation followed, leading to another consent decree.¹⁵¹ Thereafter, EPA unilaterally set new standards for nutrients in Florida’s lakes and flowing waters,¹⁵² which eventually forced FDEP to implement new, more meaningful standards for nutrients.¹⁵³

145. Memorandum from Geoffrey Grubbs, Dir., Off. of Sci. & Tech., to the Water Directors, Region I-X (Nov. 14, 2001); *see generally* EPA, NATIONAL RECOMMENDED WATER QUALITY CRITERIA TABLES, <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-tables> (last visited Apr. 22, 2024) (offering recommended criteria for related to aquatic life, human health, nutrients, toxics and other categories).

146. Grubbs, *supra* note 145.

147. FLA. ADMIN. CODE. § 62-302.530(47)(b).

148. NAT. RES. COUNCIL, *Progress Toward Restoring the Everglades: Appendix E: Status of Numerical Nutrient Water Quality Criteria for the State of Florida*, THE FOURTH BIENNIAL REVIEW 1, 231 (2012); *see, e.g.,* *Cleaning up Fouled Florida Waters Can't Wait*, TAMPA BAY TIMES (Feb. 12, 2010) <https://www.tampabay.com/archive/2010/02/12/cleaning-up-fouled-florida-waters-can-t-wait/> (showing further support of the case-by-case nature and vagueness of the Florida standard).

149. Rizzardi, *supra* note 134, at 153; Rizzardi et al., *supra* note 124, at 27.

150. EPA, Letter from Benjamin Grumbles to Michael Sole (Jan. 14, 2009) (“Despite Florida’s widely recognized efforts, substantial water quality degradation from nutrient over-enrichment remains a significant challenge in the State and one that is likely to worsen with continued population growth and environmental and land-use changes. EPA has determined that numeric nutrient water quality criteria are necessary for the State of Florida to meet the CWA requirement to have criteria that protect applicable designated uses. Additionally, numeric nutrient criteria will create clear water quality goals and easily measurable quantitative baselines to support stronger collaboration and more effective partnerships with both point and nonpoint source dischargers of nutrient pollution.”).

151. Consent Decree, *Fla. Wildlife Fed’n, Inc. v. Jackson* (N.D. Fla. 2009) (No. 4:08-cv-00324-RH-WCS).

152. 40 C.F.R. § 131 (2010).

153. FLA. DEP’T OF ENV’T PROT., IMPLEMENTATION OF FLORIDA’S NUMERIC NUTRIENT STANDARDS 1–3 (2013).

Florida's experience with implementing environmental-restoration statutes demonstrates the significance of agency discretion. When implementing their water laws, states make choices. Sometimes they choose to do more than the federally required minimums.¹⁵⁴ Other times, even for known problems, they choose not to act. In theory, as water pollution problems mount, the CWA will eventually force states to respond, either by adopting TMDLs or BMAPs. But these actions, too, permit significant agency discretion, raising serious questions as to their effectiveness.

Consider the TMDL program. If a waterbody is deemed "impaired," the state must develop a TMDL.¹⁵⁵ This quantifiable, scientifically determined TMDL must reflect the maximum amount of a given pollutant that a surface water can absorb and still meet the water quality standards that protect human health and aquatic life.¹⁵⁶ TMDLs must then be incorporated into regulatory permits to ensure that discharges from point sources comply with and achieve water quality goals.¹⁵⁷ Setting that number, however, is once again an exercise of discretion, leaving vast room for officials to set insufficiently protective standards. Even when a number is set, the agency has discretion to issue variances or "moderating provisions," thereby using a less protective standard.¹⁵⁸

Similarly, for nonpoint sources, when a watershed is impaired, pollution control programs are required. In Florida, FDEP produces BMAPs, which require local and state commitments to reduce pollutant loading through current and future projects and strategies. Potentially useful pollution control measures may include additional permit limits on wastewater facilities, urban and agricultural BMPs, and conservation programs designed to achieve pollutant reductions.¹⁵⁹ The theory seems plausible, but in practice it might never become reality. Ominously, Florida law recognizes that FDEP's ability to monitor the watershed is "[s]ubject to appropriation."¹⁶⁰ Moreover,

154. John Dinan, *State Constitutional Amendment Processes and the Safeguards of American Federalism*, 115 PENN. ST. L. REV. 1007, 1009 (2011) ("State legislators also advance state interests by enacting state statutes in areas where the federal government has not yet acted or by enacted states policies that exceed federal requirements.").

155. 33 U.S.C. § 1313 (2023).

156. FLA. ADMIN. CODE § 62-302.200(39). The setting of a TMDL also helps monitoring efforts, because once a TMDL is calculated, it becomes easier for FDEP to determine whether excess nutrients exist, and thus helps to indicate whether a watershed is impaired. *Id.* § 63-303; FLA. STAT. § 403.067(2).

157. FLA. DEP'T OF ENV'T PROT., 2022 INTEGRATED WATER QUALITY ASSESSMENT FOR FLORIDA 66 (2022).

158. FLA. ADMIN. CODE § 62-302.200(42).

159. FLA. DEPT. OF ENV'T PROT., *Basin Management Plans (BMAPs)*, <https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps> (last visited Apr. 22, 2024).

160. FLA. STAT. § 403.0616(1) ("real-time water quality monitoring program").

FDEP's efforts merely need to be "sufficient" to evaluate "reasonable progress" and only "as appropriate."¹⁶¹

The success and impact of the TMDL and BMAP programs thus depend greatly upon the discretion exercised by public officials. Furthermore, even when numbers are established, Florida law openly allows for variances from its water quality criteria. After finding that strict application of rules "can lead to unreasonable, unfair, and unintended results in particular instances," the Florida Legislature authorized its agencies to grant variances and "provide relief to persons subject to regulation."¹⁶² Simply put, environmental protection in Florida depends significantly upon the political will of state agencies.

In sum, Florida's water laws often grant public officials wide discretion to act subject to limited public scrutiny—if any. Sometimes, interested citizens and concerned organizations can become aware of internal agency efforts, either through agency reports¹⁶³ or other legally required transparency measures allowing public citizens to ask for information.¹⁶⁴ But at best, these transparency measures reveal only information that a citizen requests or that the agency voluntarily provides. Unfortunately, that leaves the community with a blind spot. Unaware of what they do not know, citizens assume, perhaps mistakenly, that the government sufficiently protects their watersheds.

C. Deregulation Through Blindness

Perhaps worst of all, the law creates obstacles that prevent Floridians who know better from convincing their officials to solve state problems. Even when people know that a problem exists, and even when the public recognizes that its own government has failed or refused to fix or consider the problem, legal doctrines related to judicial restraint, litigant standing, and attorney's fees *inhibit* individuals who seek to force governmental action.

161. *Id.* § 403.067(7)(a)(6) ("The basin management action plan must include milestones for implementation and water quality improvement, and an associated water quality monitoring component sufficient to evaluate whether reasonable progress in pollutant load reductions is being achieved over time. An assessment of progress toward these milestones shall be conducted every 5 years, and revisions to the plan shall be made as appropriate.").

162. *Id.* § 120.542(1) ("These variances require the person subject to the rule to "demonstrates that the purpose of the underlying statute will be or has been achieved by other means" while simultaneously allowing the agency to consider whether the rules "create a substantial hardship or would violate principles of fairness.").

163. *See, e.g.*, Kimberly Richer, *Chapter 1: Introduction to the Overall Report and Volume I*, in 1 2023 SOUTH FLORIDA ENVIRONMENTAL REPORT (2024), at 1-1 to 1-2 (showing how agency reports can inform the public).

164. *See, e.g.*, FLA. STAT. § 119 (explaining the availability of public records).

Florida's political power belongs to the people,¹⁶⁵ who possess an explicit right to "instruct their representatives" and petition the government for grievances.¹⁶⁶ Similarly, Florida guarantees its citizens a right to witness open and noticed public meetings of state officials.¹⁶⁷ On rare occasions, agencies and decision-makers might even allow the public an opportunity to speak at a public hearing.¹⁶⁸ Yet in most instances, agencies can typically choose whether to hear from the public.¹⁶⁹ The average citizen has limited capacity to impact the Legislature, boards, public officials, or legal system through lobbying or political influence.¹⁷⁰

Instead, to meaningfully enforce the Florida Constitution and its protection of natural resources,¹⁷¹ citizens pursue litigation and seek access to the courts.¹⁷² Florida law allows citizens to bring suits against governments and administrative agencies to challenge decisions that violate environmental laws.¹⁷³ Courts and judges are then supposed to provide independent judicial review of the executive and legislative branches.¹⁷⁴ Even deregulation can be judicially reviewed.¹⁷⁵ Deregulation has been achieved in Florida by limiting the exercise of judicial power, making the government—and justice itself—willfully blind.

Drop #6: Judicial Restraint

Demonstrating a priority of the people, the Florida Constitution declares that "[i]t shall be the policy of the state to conserve and protect its natural

165. FLA. CONST. art. I, § 1.

166. *Id.* art. I, § 5.

167. *Id.* art. I, § 24.

168. *See, e.g.*, FLA. STAT. §§ 373.036, 373.139, 373.453 (requiring public hearings on water management, real property, and surface water management plans); *id.* § 373.0397 (public hearings on Biscayne Bay aquifers); *id.* §§ 403.532–403.537 (governing the siting of electrical transmission lines)

169. *See, e.g., id.* § 373.026 ("Adequate opportunity shall be afforded for participation at the conference by interested members of the general public."); *see, e.g., id.* § 373.0695(1) ("The various boards shall be responsible for discharging the following described functions in their respective basins: (a) the preparation of engineering plans for development of the water resources of the basin and the conduct of public hearings on such plans.").

170. *See generally* Maggie McKinley, *Lobbying and the Petition Clause*, 68 STAN. L. REV. 1131 (2016) (arguing that lobbying would be better characterized as a hidden form of deregulation, because it is known to the government officials, but not the people, and sometimes it is done in the open – perhaps even brazenly so. Either way, the results of the lobbying are eventually codified, and probably through one of the ten drops discussed in this article); *see, e.g.*, Susan Webb Yackee, *Invisible (and Visible) Lobbying: The Case of State Regulatory Policymaking*, 15 STATE POL. & POL'Y Q. 322 (2015).

171. FLA. CONST. art. II, § 7.

172. *Id.* art. I, § 21.

173. FLA. STAT. §§ 120, 403.412(a).

174. FLA. CONST., art. V, § 21 ("In interpreting a state statute or rule, a state court or an officer hearing an administrative action pursuant to general law may not defer to an administrative agency's interpretation of such statute or rule, and must instead interpret such statute or rule de novo.").

175. James T. O'Reilly, *Judicial Review of Agency Deregulation: Alternatives and Problems for the Courts*, 37 VANDERBILT L. REV. 509, 509 (1984).

resources and scenic beauty.”¹⁷⁶ Furthermore, the state Constitution also explicitly states that “[t]he courts *shall* be open to every person for redress of any injury, and justice *shall* be administered without sale, denial or delay.”¹⁷⁷ By emphatically codifying this right in their Constitution’s Declaration of Rights, Floridians arguably intended to make a powerful statement.¹⁷⁸ But in reality, the various statutes, rules, and judicial doctrines inhibit citizen access to the courts.

The Everglades provides an instructive example of the problem. After years of litigation over water quality in the Everglades, Florida adopted the EFA. This statute imposed a tax increase on citizens, coupled with an agricultural privilege tax, to pay for the construction of a massive system of wetlands known as STAs.¹⁷⁹ The taxes were controversial, however, and in 1996, the people of Florida amended the state Constitution to apply the “polluter pays” principle with respect to Everglades restoration: “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.”¹⁸⁰

Despite the constitutional amendment, the Florida Legislature declined to modify the EFA. Instead, faced with difficult implementation questions of who pays and how much, the Florida Governor turned to the Florida Supreme Court for an advisory opinion.¹⁸¹ The Court concluded that the language of the constitutional amendment was not self-executing “because it fails to lay down a sufficient rule for accomplishing its purpose” and further stated that “the voters expected the legislature to enact supplementary legislation to make it effective.”¹⁸² The Court and Governor thus evaded any need to further respond to the citizen initiative.

A few years later, a citizen opposed the EFA and its formula for allocating tax burdens, challenging the law as unconstitutional and contrary to the constitutional “polluter pays” principle. The citizen argued that he was paying the costs of abating agricultural pollution that should be borne by others in the Everglades Agricultural Area.¹⁸³ This time, the majority opinion upheld the EFA, deferring to the Legislature, and in a concurring opinion,

176. FLA. CONST. art. II, § 7(a).

177. *Id.* art I, § 21 (emphasis added).

178. Judith A. Bass, *Article I, Section 21: Access to Courts in Florida*, 5 FLA. ST. UNIV. L. REV. 871, 872 (1977).

179. FLA. STAT. § 373.4592.

180. FLA. CONST. art. II, § 7(b).

181. Advisory Opinion to the Governor – 1996 Amendment 5 (Everglades), 706 So.2d 278 (Fla. 1997).

182. *Id.* at 281, 282.

183. *Barley v. S. Fla. Water Mgmt. Dist.*, 823 So.2d 73, 74 (Fla. 2002).

one justice even suggested the Court lacked authority to compel the Legislature to act.¹⁸⁴

The two cases demonstrate the difficulty faced by citizens who pursue environmental change. A court may ignore even a constitutional clause under the guise of judicial restraint. By initially deferring to the Legislature so it could act and later deferring to the Legislature's inaction, the Court effectively nullified the ballot initiative.

Other constitutionally based lawsuits have encountered similar judicial reluctance. In a well-publicized case, a group of young activists sued the State of Florida for violating the natural-resources and public trust provisions of its own Constitution.¹⁸⁵ The detailed complaint plainly explained its ambitious efforts to confront climate change and demanded compliance with constitutional rights, invoking the history of the civil rights movement:

This case challenges Defendants' systemic, affirmative ongoing conduct, persisting over decades in creating, controlling, and perpetuating a Fossil Fuel Energy System despite long-standing knowledge of the resulting harm to these young Plaintiffs. Our Nation's most celebrated cases include decisions approving declaratory and broad-based injunctive relief to remedy systemic constitutional violations like those at issue here. *See, e.g., Brown v. Bd. of Educ.*, 349 U.S. 294 (1955) (systemic racial injustice in school systems); *Hills v. Gautreaux*, 425 U.S. 284 (1976) (systemically segregated public housing system created by state and federal agencies); *Brown v. Plata*, 563 U.S. 493 (systemically unconstitutional conditions across state prison system).¹⁸⁶

The complaint documented the massive harms climate change had caused the seven young plaintiffs, describing rising greenhouse gas emissions and their harmful consequences, such as elevated temperatures; declining physical and mental health; rising seas; intensifying storms; dying coral reefs; and other catastrophic and irreversible impacts.¹⁸⁷ Despite the many detailed factual assertions and the constitutional rights at stake, the Florida trial court dismissed the case as nonjusticiable:

184. *Id.* at 84 (Wells, C.J., concurring).

185. Chelsea Greenwood, *Florida Governor Rick Scott is Getting Sued by Teens for His Environmental Policies*, TEEN VOGUE (Apr. 18, 2018) <https://www.teenvogue.com/story/florida-governor-rick-scott-sued-by-teens-for-environmental-polices>; Zachary Sampson, *Florida Children's Climate Lawsuit Against State Leaders Set for Key Hearing Monday*, TAMPA BAY TIMES (May 28, 2020) <https://www.tampabay.com/news/environment/2020/05/28/florida-childrens-climate-lawsuit-against-state-leaders-set-for-key-hearing-monday/>.

186. Order Granting Motions to Dismiss with Prejudice at ¶ 3, *Reynolds v. Florida*, 316 So.3d 813 (Fla. Dist. Ct. App. 2021).

187. *Id.* at ¶¶ 54, 64, 69, 70, 84, 141.

The claims are inherently political questions that must be resolved by the political branches of government. Further, because this Court has found that the relief requested involves non-justiciable political questions and separation of powers, the Complaint's flaws cannot be corrected by amendment and therefore the amended complaint should be, and hereby is, DISMISSED WITH PREJUDICE.¹⁸⁸

On appellate review, the District Court of Appeal did not even bother writing an opinion. Instead, the *per curiam* order simply cited another case, with a parenthetical explanation rejecting the lawsuit for "raising nonjusticiable political questions."¹⁸⁹ Together, these cases should remind environmental lawyers of a hard truth once spoken by Justice Charles Evans Hughes: "We are under a Constitution, but the Constitution is what the judges say it is."¹⁹⁰

Drop #7: Standing Barriers

Even assuming that a judge is willing to engage in judicial review, it does not necessarily mean an individual may effectively bring a lawsuit. Courts have a long tradition of limiting judicial review based on doctrines of standing. The notion of constitutional standing, flowing from the U.S. Constitution's Case or Controversy Clause, suggests that a public interest advocate cannot bring a suit unless they can show an injury in fact, causation, and redressability.¹⁹¹ Florida courts also abide by a "special injury" rule, insisting that a private party suing to abate a public nuisance "must have suffered some special damage, differing not only in degree, but in kind, from the damages sustained by the community at large."¹⁹² These barriers to courtroom standing can be notoriously difficult for environmental litigants.¹⁹³ Additional doctrines of "prudential standing" suggest that the courts may delay review of a case based on other considerations, such as

188. Reynolds v. Florida, Case No. 2018-CA-819 at ¶ 3 (Fla. 2d Cir. Ct. 2021).

189. Reynolds v. State, 316 So.3d 813, 814 (Fla. Dist. Ct. App. 2021).

190. Charles Evans Hughes, COLUMBIA250, https://c250.columbia.edu/c250_celebrates/remarkable_columbians/charles_hughes.html (last visited Apr. 1, 2024).

191. Lujan v. Defenders of Wildlife, 504 U.S. 555, 560 (1992); see also Gene R. Nichol, Jr., *Justice Scalia, Standing, and Public Law Litigation*, 42 DUKE L. J. 1141, 1150 (1994) (describing Article III's case or controversy requirement).

192. Jacksonville, Tampa, and Key W. Ry. Co. v. Thompson, 16 So. 282, 283 (Fla. 1894).

193. Jan G. Laitos, *Standing and Environmental Harm: The Double Paradox*, 31 VA. ENV'T L. J. 55, 82 (2013).

whether the facts are developed enough to be sufficiently ripe for judicial review.¹⁹⁴

Florida's historic efforts to empower citizen advocacy have waned as well. When it was first established, the Florida Administrative Procedure Act (APA) was intended to allow citizens to obtain meaningful review of agency actions by appearing before an administrative law judge.¹⁹⁵ Since its enactment in 1974 in its "modern" form, there have been periodic adjustments to the Florida APA by the Florida courts and the Legislature aimed at limiting review.¹⁹⁶ Most notably, litigants must have "substantial interests" at stake and Florida citizenship or residency.¹⁹⁷ Economic injury is not enough to raise a claim because the injury alleged by the litigant must be of the type or nature that the proceeding is designed to protect.¹⁹⁸ Furthermore, even if a litigant does have substantial injuries at stake, the lawsuit must be filed within a certain timeline; in Florida, those timelines are shockingly short. Often, if an agency's action is not challenged within 21 days of the agency providing notice—which can be done by publication—an agency's proposed rule¹⁹⁹ or other form of preliminary decision²⁰⁰ becomes final. And perhaps most remarkably, some forms of relief, such as a petition for declaratory statement, are of limited availability, and by law, a third party cannot seek a declaratory statement that a permit or order issued by the agency violates the law.²⁰¹

Drop #8: Disincentivizing Citizen Suits

Even in the instances where the judiciary might allow a citizen suit to proceed in an effort to protect water resources, the Legislature is making that

194. Nora Coon, *Ripening Green Litigation: The Case for Deconstitutionalizing Ripeness in Environmental Law*, 45 ENV'T L. 811, 813; Micah J. Revell, *Prudential Standing, the Zone of Interests, and the New Jurisprudence of Jurisdiction*, 63 EMORY L. J. 221, 261 (2013).

195. See FLA. STAT. §§ 120.50–120.82 (outlining the process of citizen review under the Florida Administrative Procedures Act).

196. Robert C. Downie II, *Florida Administrative Procedures Act Remedies Survey*, FLA. BAR J., July/Aug. 2007, at 56, <https://www.floridabar.org/the-florida-bar-journal/florida-administrative-procedures-act-remedies-survey/>.

197. *Id.*

198. *Agrico Chem. Co. v. Dep't of Env't Regul.*, 406 So.2d 478, 481 (Fla. Dist. Ct. App. 1981); see also Richard M. Ellis, *Standing in Florida Administrative Proceedings*, FLA. BAR J. (Jan. 2001), <https://www.floridabar.org/the-florida-bar-journal/standing-in-florida-administrative-proceedings/> (describing the two-part test for substantial interest).

199. FLA. STAT. § 120.56(2)(b) ("A petition alleging the invalidity of a proposed rule shall be filed within 21 days after the date of publication of the notice required by s. 120.54(3)(a). . . .").

200. See FLA. ADMIN. CODE r. 28-106.111 (1997) ("Unless otherwise provided by law, persons seeking a hearing on an agency within 21 days of receipt of written notice of the decision.").

201. *Id.* r. 28-105.001 (2007) ("A declaratory statement is a means for resolving a controversy or answering questions or doubts concerning the applicability of statutory provisions, rules, or orders over which the agency has authority . . . [and] is not the appropriate means for determining the conduct of another person.").

possibility less likely through fee-shifting. Citizens who use the state APA to challenge governmental decisions but then lose may be held responsible for paying the government's attorney's fees.²⁰² Interestingly, if a citizen challenges a *local* government action adopting a land-use or environmental-protection law and prevails on the grounds that the local government action is preempted or otherwise arbitrary or unreasonable, the citizen may recover attorney's fees.²⁰³ In both scenarios, litigation intended to protect the environment is disincentivized.

In some instances, a role perhaps remains for local governments to protect the environment, especially when there is a uniquely local risk or concern.²⁰⁴ But for better or worse, environmental advocacy in Florida has become a high-risk and financially consequential endeavor, and the Florida Legislature's adoption of fee-shifting statutes dramatically alters litigation risks and incentives.²⁰⁵ For low-income and risk-averse individuals in Florida, the right to access the courts has effectively been denied.²⁰⁶ Perhaps in some cases these statutes will create incentives to benefit the environment, but the opposite conclusion seems more likely. Local governments will hesitate to take environmentally protective measures because of the threat of well-financed lawsuits by industrial actors.²⁰⁷ And less affluent individual citizens and non-profit groups will hesitate to challenge an environmentally harmful measure for fear of paying the government's attorney's fees.²⁰⁸ In

202. FLA. STAT. § 120.595 (allowing an award of reasonable costs and attorney's fees to the prevailing party if the administrative law judge determines the non-prevailing adverse party to have participated in the proceeding for an improper purpose).

203. See generally Chris Marr, *Also Bigger in Texas: The State's Preemption of Local Ordinances*, BLOOMBERG (May 30, 2023), <https://news.bloomberglaw.com/daily-labor-report/also-bigger-in-texas-the-states-preemption-of-local-ordinances> (explaining state-local preemption in Texas and Florida); FLA. STAT. § 57.112(2)–(3).

204. Shannon M. Roesler, *Federalism and Local Environmental Regulation*, 48 U.C. DAVIS L. REV. 1111, 1163 (2015); Robert H. Freilich & Neil M. Popowitz, *Oil and Gas Fracking: State and Federal Regulation Does Not Preempt Needed Local Government Regulation: Examining the Santa Fe County Oil and Gas Plan and Ordinance as a Model*, 44 URB. LAW. 533, 535 (2012).

205. See generally DEBORAH J. LAFETRA, FEE AWARDS TURNED UPSIDE DOWN: A THREAT TO PUBLIC-INTEREST LITIGATION (2019) (critiquing California's fee-shifting policy); see generally Michel Lee, *Attorneys' Fees in Environmental Citizen Suits and the Economically Benefited Plaintiff: When Are Attorneys' Fees and Costs Appropriate?*, 26 PACE ENV'T L. REV. 495 (2009) (providing an overview of federal fee-shifting policies).

206. FLA. CONST. art. I, § 21.

207. Jesse Scheckner, *Senate Passes Bill Enabling Businesses to Sue Local Governments, Halt 'Arbitrary or Unreasonable' Ordinances*, FLA. POL. (Mar. 8, 2023), <https://floridapolitics.com/archives/593973-senate-passes-bill-enabling-businesses-to-sue-local-governments-halt-arbitrary-or-unreasonable-ordinances/>; *Editorial: Legislature's Bill a Severe Blow to Home Rule in Palm Beach*, PALM BEACH DAILY NEWS (May 14, 2023), <https://www.palmbeachdailynews.com/story/opinion/editorials/2023/05/14/palm-beach-editorial-legislatures-sb-250-is-strike-across-bow-at-home-rule-in-florida/70211389007/>.

208. Kerry D. Florio, *Attorneys' Fees in Environmental Citizen Suits: Should Prevailing Defendants Recover?*, 27 B.C. ENV'T AFF. L. REV. 707, 732 (2000) (citing *Friends of the Earth v. Chevron Chem. Co.*, 885 F.Supp. 934, 939 (E.D. Tex. 1995)).

sum, even when Florida's environment is harmed, and even when environmental laws are violated, Florida law prevents solutions by suppressing the likelihood that anyone will be willing and wealthy enough to confront the problem.

D. Deregulation by Accepting Unknowns

Drop #9: Appropriations and Other Structural Disruptions

The last quadrant of the Johari Window accepts that there are many unknowns. Some things evade the awareness of both the government and the public. And in the struggle to regulate water pollution, Florida sometimes accepts these unknowns. Meanwhile, through the budgetary process, Florida's governors and legislators have insisted that water managers make do with fewer resources. A smaller budget has countless effects: a shrinking agency staff spreads its time more thinly, meaning that permits receive less scrutiny, enforcement efforts decline, and some laws are reduced to unfunded mandates.²⁰⁹

Similar forms of such "structural deregulation" might include occupying an agency with busywork or issuing official pronouncements designed to damage an agency's reputation.²¹⁰ And in so doing, Florida's legal system embraces this lack of information. Deregulatory goals are achieved by default, and the extent of the changes and the consequences are unknowable.

CONCLUSION: TOO MANY DROPS

Solutions to pollution are difficult, and the tragedy of Florida's declining environmental conditions may evade solutions.²¹¹ But the legal system need not make the problem worse. Periodically, EPA asks each state to engage in a long-term vision process and to establish new goals for CWA implementation and watershed management.²¹² Florida's ideal response to this EPA initiative would be to reconsider its entire legislative scheme. Self-destructive laws cannot solve the watershed pollution crisis, and at least four sweeping changes are needed:

209. Rizzardi, *supra* note 35, at 47.

210. Jody Freeman & Sharon Jacobs, *Structural Deregulation*, 135 HARV. L. REV. 585, 585 (2021); Lucia Geng, *Yes, Rick Scott Did Cut \$700 Million from Florida's Water Management Districts*, POLITIFACT (Aug. 14, 2018), <https://www.politifact.com/factchecks/2018/aug/14/florida-democratic-party/yes-rick-scott-did-cut-700-million-floridas-water-/>.

211. Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1245 (1968).

212. Memorandum from Acting Dir. Brian Frazer, Off. of Wetlands, Oceans, & Watersheds to Water Div. Dir. 1-10 (Mar. 29, 2023) (on file with the U.S. EPA); *The Vision for the Clean Water Act Section 303(d) Program*, EPA, <https://www.epa.gov/tmdl/Vision> (Jan. 3, 2024).

Eliminate the loopholes. The Legislature and agency officials must reconsider and repeal many of the statutory and regulatory exemptions that allow pollution to remain wholly unaddressed and further revisit, amend, or reverse the presumptions and procrastinating deadlines that illogically reduce concerns about pollution despite evidence to the contrary.

Embrace local solutions. Rather than preempting local government action on environmental issues, the Legislature should empower it—perhaps even offering matching funds as an incentive.

Set specific goals. Rather than giving agencies and public officials ill-defined discretion, legislators need to enact more precise laws, with clear priorities and science-based numeric directives.

Empower citizen suits. To honor the state Constitution, protect the environment, and respect the rights of the public, the Legislature should explicitly waive sovereign immunities to ensure that citizens retain meaningful rights to sue without facing burdensome standing doctrines and fee-shifting statutes. And instead of professing restraint, the judiciary should acknowledge the realities of environmental harms, both by awarding declaratory relief and by considering other meaningful remedies when litigants prove harm to natural resources.

Arguably, Florida's entire system of water law is an illogical mess.²¹³ At a macro level, an overarching framework of regulatory statutes and permitting schemes attempts to protect our waters, supplemented by an ad hoc cluster of state statutes that further declare charismatic places like the Everglades and Lake Okechobee to be state priorities. But the handful of publicly funded projects associated with these laws offer only partial solutions to massive state water quality problems. The pollution persists. Through a combination of openly codified exemptions, presumptions, preemptions, and procrastination, coupled with the hidden exercise of official discretion, the blindness of the judiciary towards the citizen advocate, and

213. Consider this example: it is a felony of the third degree to cause pollution that harms people, property, or wildlife. FLA. STAT. § 403.161(1), (3) (2020) ("It shall be a violation of this chapter, and it shall be prohibited for any person: (a) To cause pollution, except as otherwise provided in this chapter, so as to harm or injure human health or welfare, animal, plant, or aquatic life or property."); *see id.* § 859.01 (detailing that, under Florida law, willfully adding chemical compounds into any spring, well, or reservoir of water with intent to injury is a felony of the first degree). Yet counterintuitively, failing to look for pollution in the first place is inconsequential. Even if a person should "falsify, tamper with, or knowingly render inaccurate any monitoring device or method required to be maintained" pursuant to Florida law, it is merely a non-criminal infraction. *See id.* § 373.430 (2023) (describing prohibitions, violation, penalty, intent). The law is a nonsensical embrace of ignorance. It is criminal to pollute, yet intentionally preventing the discovery of pollution is not a crime.

the unknown effects of defunding and other systematic changes, Florida has deregulated its water resources. Thus, Florida law promises sweeping ecosystem restoration while simultaneously choosing to ignore the many water pollution problems causing ecosystem decline.

Admittedly, massive reforms seem unlikely. Any legal initiative seeking to pursue widespread reform of Florida water law would inevitably confront the well-organized opposition of Florida's powerful political forces—especially agriculture,²¹⁴ industry,²¹⁵ and land-use development.²¹⁶ But the pollution will surely continue until the law improves. If nothing more, then perhaps this Article can generate understanding of the use and misuse of information in regulation and deregulation.

214. Marcus Stern & Meryl Kornfield, *Polluted by Politics*, INVESTIGATIVE RSCH. WORKSHOP (June 5, 2020), <https://investigativereportingworkshop.org/investigation/polluted-by-politics/>; Kyle Rabin, *Nutrient Pollution from Industrial Farms Is a Major Factor in Florida's Toxic Algae Crisis*, FOODPRINT, <https://foodprint.org/blog/toxic-algae/> (Nov. 13, 2023); Maya Wei-Haas, *Red Tide Is Devastating Florida's Sea Life. Are Humans to Blame?*, NAT'L GEOGRAPHIC (Aug. 8, 2018), <https://www.nationalgeographic.com/environment/article/news-longest-red-tide-wildlife-deaths-marine-life-toxins>; Editorial Board, *Stop Letting Florida Agriculture Dictate Clean-Water Policy*, SUN-SENTINEL (Jan. 2, 2020), <https://www.tcpalm.com/story/opinion/editorials/2019/12/31/stop-letting-florida-agriculture-dictate-clean-water-policy-opinion/2783720001/>; Erwin, *supra* note 134, at 183.

215. *Polluters Dumping into Florida Waterways*, ENV'T FLA. (Mar. 29, 2018), <https://environmentamerica.org/florida/media-center/polluters-dumping-into-florida-waterways/>; Curt Anderson, *Pollution from Florida's Phosphate Mining Industry a Concern with Hurricane Ian*, FOX13 TAMPA BAY (Sept. 28, 2022), <https://www.fox13news.com/news/pollution-florida-phosphate-mining-industry-hurricane-ian>; Steve Patterson, *Pollution Persisted at St. Johns River Industrial Sites, Report Says*, FLA. TIMES UNION (Mar. 29, 2018), <https://www.jacksonville.com/story/news/2018/03/29/pollution-persisted-at-st-johns-river-industrial-sites-report-says/12878323007/>; Corey G. Johnson et al., *Poisoned*, TAMPA BAY TIMES (Dec. 2, 2021), <https://projects.tampabay.com/projects/2021/investigations/lead-factory/pollution-fallout/>.

216. *See generally Nonpoint Source Pollution Education*, FLA. DEP'T OF ENV'T PROT., <https://floridadep.gov/wra/319-tmdl-fund/content/nonpoint-source-pollution-education> (Jan. 25, 2024) (outlining some nonpoint pollution sources in Florida); *see generally* George Xian et al., *An Analysis of Urban Development and its Environmental Impact on the Tampa Bay Watershed*, 85 J. ENV'T MGMT. 965 (2007) (analyzing the environmental effect of urban population concentration in Tampa Bay); *see also* E.R. GERMAN, ANALYSIS OF NONPOINT-SOURCE GROUND-WATER CONTAMINATION IN RELATION TO LAND USE: ASSESSMENT OF NONPOINT-SOURCE CONTAMINATION IN CENTRAL FLORIDA (1996) (analyzing nonpoint source pollution in central Florida); *see also* Kevin DeGood, *A Call to Action on Combating Nonpoint Source and Stormwater Pollution*, CTR. FOR AM. PROGRESS (Oct. 27, 2020), <https://www.americanprogress.org/wp-content/uploads/sites/2/2020/10/WaterQuality-report.pdf> (detailing algal blooms in Florida and their relation to poor water quality standards); *see* Daniel R. Mandelker, *Controlling Nonpoint Source Water Pollution: Can It Be Done?*, 65 CHI.-KENT L. REV. 479, 482 (1989) (assessing the success and feasibility of controlling nonpoint sources).

**FROM DISCRETE TO SYSTEMATIC: MAINSTREAMING
NATURE-BASED SOLUTIONS TO DISASTERS INTO
ENVIRONMENTAL LAW IN CHINA**

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INTRODUCTION

Natural disasters are “unnatural.”² The risk of disasters is often a combination of social, economic, and environmental factors, such as land planning,³ poverty,⁴ and deteriorating ecosystems.⁵ At present, human activities could trigger or exacerbate the consequences of natural disasters on a global scale, putting the lives of millions of people at risk and undoing social and economic gains.⁶ In particular, as climate change evolves, the number of natural disasters associated with it has significantly increased. For example, the number of annual flood disasters worldwide rose from 1,389 to 3,254 between 2000 and 2019, accounting for 40% of the total number of

2. See Daniel A. Farber & Michael G. Faure, *Disaster Law*, 3 ELGAR RSCH. COLLECTIONS, at xiv (2010) (explaining that natural disasters are unnatural).

3. U.N. HUM. SETTLEMENTS PROGRAMME, LAND AND NATURAL DISASTERS: GUIDANCE FOR PRACTITIONERS 40 (2010), <https://unhabitat.org/land-and-natural-disasters-guidance-for-practitioners>.

4. Claude de Ville de Goyet & André Griekspoor, *Natural Disasters, the Best Friend of Poverty*, 14 GEO. J. ON POVERTY L. & POL’Y 61, 62 (2007) (discussing the strong positive relationship between natural disasters and poverty).

5. See ROBERT R.M. VERCHICK, FACING CATASTROPHE: ENVIRONMENTAL ACTION FOR A POST-KATRINA WORLD 1 (2010) (explaining that maintaining ecosystems is crucial for disaster mitigation).

6. U.N. OFF. FOR DISASTER RISK REDUCTION, GLOBAL ASSESSMENT REPORT ON DISASTER RISK REDUCTION: OUR WORLD AT RISK: TRANSFORMING GOVERNANCE FOR A RESILIENT FUTURE, at 2 (2022).

disasters and affecting 1.65 million people.⁷ The number of annual storm disasters rose from 1,457 to 2,034 in that time, accounting for 28% of the total number of disasters.⁸ In addition, the number of droughts, wildfires, extreme temperatures, and other natural disasters, such as earthquakes and tsunamis, have increased significantly.⁹

China experiences some of the most frequent and serious natural disasters in the world.¹⁰ These natural disasters are diverse, widespread, frequent, and damaging¹¹ and have hindered China's sustainable development and "ecological civilization" construction.¹² In some ecologically fragile and economically impoverished areas, a negative feedback cycle occurs in which economic and social considerations influence development.¹³ This in turn influences the level of ecological impact from frequent natural disasters.¹⁴ Furthermore, ecologically fragile, vegetated areas in ecological transition overlap with areas in the composite interlaced zones of agriculture, forestry, and animal husbandry, which suffer from ecological problems as a result of short-sighted management.¹⁵ According to the 2008 National Plan for the Protection of Ecologically Fragile Areas, economic losses in these areas due to various natural disasters, such as floods, sandstorms, mudslides, and landslides, cost about 200 billion yuan¹⁶ per year,

7. CTR. FOR RSCH. ON THE EPIDEMIOLOGY OF DISASTER & U.N. OFF. FOR DISASTER RISK REDUCTION, *HUMAN COST OF DISASTERS: AN OVERVIEW OF THE LAST 20 YEARS (2000-2019)*, at 7–16 (2021).

8. *Id.* at 7–10.

9. *Id.* at 7.

10. See *The 14th Five-Year Plan for the National Emergency Response System*, STATE COUNCIL PRC, https://www.gov.cn/zhengce/zhengceku/2022-02/14/content_5673424.htm (last visited Feb. 14, 2022) (explaining China's focus on creating a national disaster risk prevention plan).

11. GLOB. FACILITY FOR DISASTER REDUCTION & RECOVERY & WORLD BANK GRP., *LEARNING FROM EXPERIENCE: INSIGHTS FROM CHINA'S PROGRESS IN DISASTER RISK MANAGEMENT 10-13* (2020).

12. The modern concept of "ecological civilization" currently being discussed in a Chinese policy context is largely based on the October 2007 Report of the 17th National Congress of the Communist Party of China (CPC)—the first instance of the term appearing in policy documents. This marked a paradigm shift in the development of an ecological civilization. Currently, the semantics of the term "ecological civilization" in China can be understood as a new paradigm of governance and development based on a political perspective—with environmental management, ecological restoration, and green development as the primary principles—distinct from industrial and agriculturally oriented civilizations. The political reports of the 17th, 18th, 19th, and 20th CPC have focused on ecological civilization and have continued to raise its status as a guiding principle in social development strategies and governance. See Bing Xue et al., *Understanding Ecological Civilization in China: From Political Context to Science*, 52 *ECOLOGICAL CIVILIZATION* 1895 (2023), <https://doi.org/10.1007/s13280-023-01897-2> (discussing the ecological civilization concept in the policy context); Lu Jiang et al., *Implement the Idea of Ecological Civilization and Enhance the Ability to Resist Natural Disasters*, 10 *SOC. GOVERNANCE REV.* 35 (2021).

13. See Guomin Wang, *Research on the Problems of Agricultural Natural Disasters and Rural Poverty*, *ECONOMIST* (2005) (describing this negative feedback loop).

14. *Id.*

15. *Outline of the National Plan for the Protection of Ecologically Fragile Areas*, MINISTRY OF ENV'T PROT. (Sept. 7, 2008), https://www.gov.cn/gongbao/content/2009/content_1250928.htm.

16. The current exchange rate between the Chinese yuan (RMB) and the USD is 7.23:1, so RMB 200 billion equals about \$28 billion.

and the natural disaster loss rate increases by an average of 9% per year, which is higher than the average GDP growth rate of ecologically fragile areas.¹⁷ Additionally, between 1989 and 2019, the average annual disaster area of China's crops reached 40.2 million hectares, the average annual death toll was 870 (excluding 2008),¹⁸ and more than 80% of disaster-related casualties and economic losses occurred in rural areas.¹⁹ Extreme climate events frequently result in meteorological disasters because more than 70% of the 830 poverty-stricken counties in the country are in areas vulnerable to flooding and related disasters.²⁰

In recent decades, ecosystem degradation induced many of the mega-natural disasters²¹ that occurred in China.²² In addition to natural conditions, human actions that cause deterioration of the ecological environment are important factors in mega-natural disasters.²³ These actions include significant farmland reclamation around lakes, which greatly shrinks the area of lakes and wetlands, causes severe damage to forest cover within the

17. *Id.*

18. The Wenchuan earthquake happened in 2008, resulting in 69,227 deaths, 17,923 missing persons, 374,643 injured persons, and 19.9 million lost homes; 46.26 million people were affected in total.

19. Feng Kong, *China's Disaster Prevention and Mitigation System and Capacity Building in Rural Areas: Significance, Current Situation, Challenges and Countermeasures*, 21 *DISASTER REDUCTION CHINA* 10 (2020).

20. *Id.*

21. See Emergency Response Law of the People's Republic of China, art. 3 (dividing disasters and public health incidents into four levels of severity, the most severe being "mega-disasters"). According to such factors as the degree of social damage and extent of effects, natural disasters, accidental disasters, and public health incidents shall be divided into four levels: especially serious, serious, large, and ordinary, except as otherwise provided for by law. According to the Classification Criteria for Particularly Significant and Significant Public Emergencies (for Trial Implementation), the classification of mega-disasters will differ depending on the disaster. For example, "Mega-Water and Drought Disasters" include: (1) a mega-flood occurring in one basin or large floods occurring in several basins at the same time; (2) a levees breaking in an important section of the main channel of a major river or stream; (3) a dam holding a major reservoir collapsing; (4) flooding disrupting busy rail lines or interrupting the national highway network or major waterways for 48 hours; (5) an extremely large drought occurring in several provinces at once; and (6) extreme drought occurring in several large cities. Meanwhile, "Mega-Meteorological Disasters" include: (1) extremely heavy rain, heavy snow, tornadoes, dust storms, typhoons, and other extreme weather and climate events affecting important cities or areas of more than 50 square kilometers or resulting in more than 30 deaths or 50 million yuan of economic loss; (2) one or more provinces within the scope of the extreme weather and climate events or very strong catastrophic weather processes will occur, causing significant casualties and huge economic losses; and (3) extreme weather and climate events occurring in other countries or regions that may significantly impact China's economy or society.

22. For example, in 1998, Yangtze River suffered a basin-wide flood, which affected 30 provinces in the country; affected about 220 million people; caused more than 3,000 deaths; made 15 million people homeless; and resulted in direct economic losses of more than USD \$20 billion. See UN DISASTER ASSESSMENT & COORDINATION TEAM, FINAL REPORT ON 1998 FLOODS IN THE PEOPLE'S REPUBLIC OF CHINA (1998), <https://reliefweb.int/report/china/final-report-1998-floods-peoples-republic-china>. And in 2010, a devastating landslide occurred in Zhouqu County of the Gannan Tibetan Autonomous Prefecture within the Gansu Province, killing 1,557 people, leaving 208 missing, flooding two-thirds of Zhouqu County, and affecting 50,000 people. See L.Y. Jin et al., *The Characteristics and Forming Reasons of "8.8" Debris Flow at Luojiayu Gulley, Zhouqu*, 44 *NW. GEOLOGY* 10 (2011).

23. Hongbo Gu & Jian Gu, *On Characteristics, Distribution and Formation Mechanism of the Flood Disaster in China*, 11 *J. SHANXI AGRIC. UNIV. (SOC. SCI. ED.)* 1164 (2012).

watershed, and thereby contributes to increased soil erosion.²⁴ In 2010, for example, a devastating landslide occurred in Zhouqu County of the Gannan Tibetan Autonomous Prefecture within the Gansu Province, killing 1,557 people, leaving 208 missing, flooding two-thirds of Zhouqu County, and affecting 50,000 people in total.²⁵ Besides the natural causes of the disaster—geology, landscape, extreme rainstorms, and drought—human activities in Zhouqu, like poor urban planning, serious deforestation and land reclamation, and excessive development and construction of water conservancy resources, have aggravated disasters and their consequences.²⁶ Human action has also contributed to the frequent urban floods in recent years.²⁷ One of the leading causes is the rapid expansion of cities, which has diminished the ecological regulatory function of natural features, weakening urban stormwater management.²⁸

It is essential to strengthen the sustainable use of natural resources and integrated ecosystem management for disaster risk reduction. In response to this need, the ecosystem-based approach to disaster risk reduction (EbA-DRR) has emerged.²⁹ This approach is based on management principles, strategies, and tools that maximize the use of ecosystem services to reduce disaster risk and achieve sustainable and resilient development goals.³⁰ In 2008, the World Bank proposed the exploration of nature-based solutions (NbS) as a strategy for mitigating and adapting to climate change.³¹ Since then, the concept of NbS has become an umbrella for ecosystem-related approaches, which are defined as “actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges . . . effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits.”³²

24. *Id.*

25. See Jin et al., *supra* note 22.

26. Haiyan Fang et al., *Causes and Countermeasures of Giant Flash Flood and Debris Flow Disaster in Zhouqu County in Gansu Province on August 7, 2010*, 8 *SCI. SOIL & WATER CONSERVATION* 14 (2010).

27. See generally Ruijie Jiang et al., *Substantial Increase in Future Fluvial Flood Risk Projected in China's Major Urban Agglomerations*, 4 *COMMUN. EARTH & ENV'T* 389 (2023) (explaining how the urbanization of land contributes to urban flooding), <https://www.nature.com/articles/s43247-023-01049-0.pdf>.

28. *Id.* at 7.

29. G.A. Res. 69/283, Sendai Framework for Disaster Risk Reduction (2015-2030) (Mar. 18, 2015) [hereinafter Sendai Framework].

30. *Id.* at 13.

31. WORLD BANK, BIODIVERSITY, CLIMATE CHANGE, AND ADAPTATION: NATURE-BASED SOLUTIONS FROM THE WORLD BANK PORTFOLIO (2008), documents1.worldbank.org/curated/en/149141468320661795/pdf/467260WP0REPLA1sity1Sept020081final.pdf.

32. IUCN, NATURE-BASED SOLUTIONS TO ADDRESS GLOBAL SOCIETAL CHALLENGES, at xii (E. Cohen-Shacham et al. eds., 2016), <https://portals.iucn.org/library/sites/library/files/documents/2016-036.pdf>.

Environmental law can be a powerful tool to ensure the implementation of NbS strategies in the context of disasters by focusing on ecosystem protection.³³ Coincident with the drafting of an ecological code in China, this paper aims to seize this opportunity to transform the legal application of NbS to disasters from discrete to systematic. This Article is structured in four parts. Part I provides an overview of the global natural disaster landscape, with a specific focus on China, including notable incidents like the 1998 Yangtze River floods, the 2010 Gansu Zhouqu mudslide disaster, and the growing issue of urban flooding. This Part also examines the intricate interplay between ecosystems and natural disasters.

Part II contends that environmental law can be the vehicle for utilizing NbS to mitigate natural disasters. This Part redefines natural disasters, acknowledging them as products of social, economic, and ecological factors. Consequently, comprehensive disaster risk management assumes paramount importance. Within this framework, NbS emerges as a novel model for disaster risk reduction, offering cost-effective, multifunctional, resilient, and stakeholder-inclusive strategies.³⁴ By analyzing some of China's long-standing ecological engineering projects—the 1978 Three North Shelterbelt project,³⁵ the 1988 Coastal Shelterbelt Program,³⁶ the 1989 Shelterbelt Program for Upper and Middle Reaches of Yangtze River,³⁷ and the 1999 Grain for Green project³⁸—this Article underlines their notable achievements while also raising questions about their scientific and legal underpinnings.

Part III focuses on how the application of NbS to disasters is already part of Chinese environmental law. Through an examination of 42 pieces of environmental and related legislation, this Part presents an overview of the profiles and specific contexts of this function. Of these laws, 27 are dedicated in varying extents to disaster risk reduction, with ecological protection legislation being the most comprehensive. The analysis reveals that the

33. U.N. OFF. FOR DISASTER RISK REDUCTION, NATURE-BASED SOLUTIONS FOR DISASTER RISK REDUCTION: WORDS INTO ACTION (2021), <https://wedocs.unep.org/handle/20.500.11822/40490;jsessionid=04C0C4D1390F0C880F42B64D22CFAA6F>.

34. GLOB. FACILITY FOR DISASTER REDUCTION & RECOVERY ET AL., NATURE-BASED SOLUTIONS FOR DISASTER RISK MANAGEMENT (2018), <https://documents1.worldbank.org/curated/en/253401551126252092/pdf/Booklet.pdf>.

35. See, e.g., *China's Three-North Shelterbelt Forest Program Brings Forest Coverage to 13.57 Pct*, XINHUA (Nov. 30, 2018), http://www.xinhuanet.com/english/2018-11/30/c_137642405.htm (describing the 40-year progress of the initiative).

36. In 1988, the former State Planning Commission of PRC approved the “Overall Plan for the Construction of the National Coastal Shelterbelt System.”

37. Qingfeng Qin et al., *Review and Prospect of Protection Forest System Construction in the Yangtze River Basin in the Past 30 Years*, 16 SCI. SOIL & WATER CONSERVATION 145 (2018).

38. See, e.g., Suzanna Dayne, ‘Grain for Green’: How China Is Swapping Farmland for Forest, FORESTS NEWS (Nov. 28, 2017), <https://forestsnews.cifor.org/52964/grain-for-green-how-china-is-swapping-farmland-for-forest?fnl=en> (summarizing project progress since 1999).

existing disaster-risk-reduction function within environmental law encompasses both singular environmental measures and ecosystem approaches. The former primarily targets private entities, while the latter is chiefly steered by governmental entities without corresponding accountability requirements. Furthermore, the existing legal framework tends to prioritize isolated and discrete disaster risk prevention, sidelining the need for comprehensive and holistic risk management.

Part IV further elaborates on the characteristics of discrete nature-based solutions to disasters via the environmental legal system. This includes the scattered legislative model under the dominance of reductionism, the incomplete interaction between science and the legal system, and noticeable imbalances in rights, duties, and responsibilities. Lastly, this part also proposes how NbS should be systematically integrated into the draft of the Ecological Environment Code.

I. NATURE-BASED SOLUTIONS TO DISASTERS IN CHINA

A. Redefining Natural Disasters

The historical understanding of natural disasters has roughly gone through three stages: “Manifest Destiny,” “Scientific View,” and “Ecological View.”³⁹ Under the concept of Manifest Destiny, natural disasters are a supernatural and mysterious force.⁴⁰ Whether it was the “punishment of God” in European medieval culture⁴¹ or the theory of ancient manifest destiny,⁴² natural disasters were regarded as heaven’s punishment for human beings or as a warning to rulers.⁴³ Therefore, in the face of disaster, humanity’s response was mainly to reflect on its own actions and pray for forgiveness and solace.⁴⁴ With the spread of modern scientific ideas and the development of industrial technology, the world began to view nature as a passive machine with regular and predictable operation.⁴⁵ Consequently, natural disasters were seen as discrete, sudden events that deviated from normal regularity.⁴⁶ Later, under a more holistic approach, natural disasters

39. Mingfang Xia, *Big Data and Ecological History: The Compilation and Database Construction of Historical Sources of Chinese Disaster History in an Information Age*, QING HIST. J., May 2015, at 67.

40. *Id.*

41. Elaine Fulton, *Acts of God: The Confessionalization of Disaster in Reformation Europe*, in HISTORICAL DISASTERS IN CONTEXT: SCIENCE, RELIGION, AND POLITICS 54 (2012).

42. YUNTE DENG, THE HISTORY OF FAMINE RELIEF IN CHINA 146 (1998).

43. *Id.*

44. KRISTIAN CEDERVALL LAUTA, DISASTER LAW 16 (2015).

45. Xia, *supra* note 39, at 67.

46. *Id.*

began to be understood in the context of overall ecosystem changes.⁴⁷ Natural disasters are now considered the comprehensive product of natural and social factors, and there is consensus that social attributes transcend natural attributes.⁴⁸ In 2012, the Intergovernmental Panel on Climate Change defined disasters as “[s]evere alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.”⁴⁹ As a result, the Sendai Framework for Disaster Risk Reduction calls for a comprehensive understanding of disaster risk, including systemic risks across multiple dimensions of natural hazard characteristics, exposure, and vulnerability.⁵⁰

A comprehensive understanding of disaster risk requires the law to be adjusted in a timely manner. Focusing on the whole process of disaster prevention—including emergency response, rescue, and reconstruction—natural disaster law intersects with environmental law, insurance law, emergency response law, social assistance law, tort liability law, land planning law, urban and rural construction law, and other areas of law.⁵¹

B. Nature-Based Solutions to Disasters

Applying NbS to disasters is the main component of the intersection between natural disaster law and environmental law, the heart of which is an ecosystem-based approach to disaster risk reduction. EbA-DRR is based on a series of ecosystem-management principles, strategies, and tools to maximize the use of ecosystem services to reduce disaster risk and achieve sustainable and resilient development goals.⁵² Its core elements include: (a) recognizing ecosystem services;⁵³ (b) integrating sustainable livelihoods and development;⁵⁴ (c) integrating ecosystem investments;⁵⁵ (d) addressing and

47. Tong Xing & Zhang Haibo, *An Analytical Framework of Disaster Management in the Context of China*, 1 SOC. SCIS. CHINA 132 (2010).

48. *Id.*

49. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, MANAGING THE RISKS OF EXTREME EVENTS AND DISASTERS TO ADVANCE CLIMATE CHANGE ADAPTATION 558 (2012), <https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/>.

50. Sendai Framework, *supra* note 29, at 1.

51. See Farber & Faure, *supra* note 2.

52. U.N. UNIV., THE ROLE OF ECOSYSTEMS IN DISASTER RISK REDUCTION 30 (Fabrice G. Renaud et al. eds., 2013).

53. *Id.* at 31–36.

54. *Id.* at 36–37.

55. *Id.*

reducing climate-change risks;⁵⁶ (e) strengthening ecosystem-based disaster-risk management capacity through multisectoral and multidisciplinary platforms;⁵⁷ (f) involving local stakeholders;⁵⁸ and (g) using existing ecosystem-management tools.⁵⁹

In addition to EbA-DRR, ecosystem-based adaptation and disaster risk reduction through green infrastructure are also categorized as nature-based solutions to disasters.⁶⁰ Advocates of NbS for disaster risk reduction criticize traditional “gray engineering” because it tends to neglect the complexity and systematic nature of natural disasters.⁶¹ Gray infrastructures for disaster prevention and mitigation tend to mislead people into thinking that places protected by engineering measures are safe, resulting in a false sense of security.⁶² Additionally, such projects commonly cause serious damage to the environment.⁶³ The failure of such infrastructure aggravates the impact of disasters.⁶⁴ Moreover, NbS has the advantages of low cost, high efficiency, and wide application that make it more conducive to stakeholder participation.⁶⁵ NbS is one of the few ways exposed communities can reduce their exposure and vulnerability to all elements of disaster risk and thereby increase their resilience.⁶⁶ Ecosystems reduce exposure and mitigate the effects of disasters by providing natural protective barriers or buffer spaces.⁶⁷ Ecosystems also could reduce socioeconomic vulnerability by providing a subsistence environment and vital natural resources, such as water, food, medicine, and wood.⁶⁸ After a disaster, ecosystems and their resources are even more important to the affected areas, so they play an important role in the disaster resilience of the region.⁶⁹

At the level of scientific application, different ecosystems can prevent and control natural disasters.⁷⁰ For example, coastal ecosystems with

56. *Id.* at 37–38.

57. *Id.* at 41.

58. *Id.*

59. *Id.* at 39, 46.

60. Borja G. Reguero et al., *Nature-Based Solutions for Natural Hazards and Climate Change*, FRONTIERS ENV'T SCI., Dec. 2022, at 1; Press Release, U.N. Env't Programme, Green Infrastructure: Nature's Best Defence Against Disasters (May 19, 2019).

61. LIMIN ZHOU, A NEW THEORY OF WESTERN DISASTER SOCIOLOGY 172–75 (2015).

62. *Id.*

63. *Id.*

64. *Id.*

65. Karen Sudmeier-Rieux et al., *Scientific Evidence for Ecosystem-Based Disaster Risk Reduction*, 4 NATURE SUSTAINABILITY 803 (2021).

66. *Id.*

67. *Id.*

68. *Id.*

69. NAT'L INST. OF DISASTER MGMT., ECOSYSTEM APPROACH TO DISASTER RISK REDUCTION 9–13 (Anil K. Gupta & Sreeja S. Nair eds., 2012).

70. ADVANCES IN NAT. & TECH. HAZARDS RSCH., ECOSYSTEM-BASED DISASTER RISK REDUCTION AND ADAPTATION IN PRACTICE 1–20 (Fabrice G. Renaud et al. eds., 2016).

mangroves, swamps, wetlands, seagrasses, and sand dunes buffer against tropical tornadoes, storm surges, tsunamis, floods, coastal erosion, and other disasters.⁷¹ River ecosystems, such as wetlands, lakes, reservoirs, and floodplains, prevent and control floods and droughts.⁷² Forest ecosystems prevent and control disasters such as soil erosion, debris flows, landslides, and floods.⁷³ Once an ecosystem is damaged, its ability to mitigate and prevent disasters is weakened, which makes the ecosystem more vulnerable to future disasters.⁷⁴ Human activities play a decisive role in the positive feedback relationship between ecosystem degradation and natural disasters. Such activities include excessive reclamation, logging, mining, and various types of pollution discharge.⁷⁵ Consequently, whether the objective is improving ecosystem services or preventing ecosystem degradation, environmental law is one tool for adjusting humanity's interaction with the ecological environment, which plays a key role in disaster prevention and mitigation.⁷⁶

C. Top-Down Policies and Practices of Nature-Based Solutions to Disasters

China's EbA-DRR is mainly top-down, meaning that the central government devises a policy by which the government implements large-scale ecological engineering.⁷⁷ The relevant rules governing specific planning, budget investment, fund management, construction standards, and other rules are mostly normative documents.

At present, China has many large-scale forestry projects underway. In 1978, the State Council tasked the State Forestry Administration with the Construction of Large Shelter Forests in Key Areas of Aeolian Sand Hazards and Soil Erosion in the Three Norths, marking the official start of the Three North Shelter Forest System construction project.⁷⁸ The project includes 551 counties in 13 provinces in northern China, from Bin County in Heilongjiang Province in the east to the Uzbeli Pass in Xinjiang Uygur Autonomous

71. *Id.*

72. *Id.*

73. *Id.*

74. *Id.*

75. Yanjun Zhang et al., *Relationship Among Human Activities, Ecology-Environment and Natural Disasters*, 1 CHINA ENV'T MGMT. 30 (2003).

76. Daniel Farber, *Navigating the Intersection of Environmental Law and Disaster Law*, 6 BYU L. REV. 1783 (2011).

77. Ming Luo et al., *Development and Practices of Nature-Based Solutions in China*, 5 NATURE-BASED SOLS. 100109 (2024).

78. Li Shidong & Feng Deqian, *Three North Project: The World's Largest Afforestation Project*, CHINA.COM (June 28, 2021), http://grassland.china.com.cn/2021-06/28/content_41604437.html.

Region in the west.⁷⁹ The project stretches 4,480 kilometers (km) from east to west and 1,460 km from north to south, with a total area of 4.069 million square km (42.4% of the country's land area).⁸⁰ The project is planned to last from 1978 to 2050, is divided into three stages and eight phases, will afforest 35.083 million hectares, and will increase the forest coverage rate from 5.05% to 14.95%.⁸¹ Over the past 40 years, the Sanbei portion of the project has completed afforestation and preservation of 30.14 million hectares, and the forest coverage rate of the project area has increased from 5.05% to 13.57%.⁸² The annual value of forest ecosystem services reached 2.34 trillion yuan.⁸³ The total investment was 102.83 billion yuan, of which the central government invested 33.38 billion yuan.⁸⁴

In 1988, in order to prevent and control disasters such as typhoons, tsunamis, storm surges, and soil erosion, the State Planning Commission approved the compilation of the Overall Plan for the Construction of the National Coastal Protection Forest System by the Ministry of Forestry.⁸⁵ This marked the official initiation of China's Coastal Protection Forest System Construction Project (Coastal Forest Project).⁸⁶ The first phase of the project spanned 18,000 km from the Yalu River mouth in Liaoning Province in the north to the Beilun River mouth in Guangxi Province in the south.⁸⁷ It covered 195 counties across 11 coastal provinces and planned to afforest 2.491 million hectares.⁸⁸ In 2001, the second phase of the project was launched, and it was later revised and expanded to cover 261 counties in 11 coastal provinces.⁸⁹ In 2016, the third phase of the project was initiated, with its scope extending to 344 counties across the same 11 coastal provinces.⁹⁰ The total afforestation target for the third phase amounted to 8.0839 million hectares.⁹¹ By 2020, after more than 30 years of implementation, a total afforestation area of 8.3152 million hectares had been achieved, equating to a forest coverage rate of 36.9% and a tree coverage rate of 39%.⁹² The convergence of the core forest belts had been realized, forming a framework

79. *Id.*

80. *Id.*

81. *Id.*

82. *Id.*

83. *Id.*

84. *Id.*

85. *World-Famous Ecological Project - China's "Coastal Shelter Forest System Construction Project"*, ZHEJIANG FORESTRY BUREAU (Apr. 19, 2022), http://lyj.zj.gov.cn/art/2022/4/19/art_1277845_59029758.html.

86. *Id.*

87. *Id.*

88. *Id.*

89. *Id.*

90. *Id.*

91. *Id.*

92. *Id.*

for the Coastal Protection Forest System that combines “points” through village and town greening, “lines” through coastal core forest belt construction, and “areas” through afforestation of barren hills and wastelands and the establishment of a network of agricultural land forests.⁹³ According to estimates, the Coastal Protection Forest Project will provide nearly 1.26 trillion yuan in comprehensive annual benefits.⁹⁴ This includes 818.5 billion yuan in ecological benefits, 449.2 billion yuan in economic benefits, and 20 billion yuan in social benefits.⁹⁵

In 1989, China launched the first phase of the construction of a shelter forest system in the Yangtze River Basin, with a planned afforestation task of 6.484 million hectares.⁹⁶ The construction scope of the second phase of the project (2001–2010) was expanded to the Yangtze, Huaihe, and Qiantang River basins, involving 1,035 counties in 17 provinces, and planning 6.8772 million hectares of afforestation.⁹⁷ The afforestation goal for the third phase of the project (2011–2020) is 5.3021 million hectares.⁹⁸ Since the project’s implementation, 11.84 million hectares of afforestation have been completed.⁹⁹

In 2000, the project of returning farmland to forest and grassland was initiated by the Chinese government.¹⁰⁰ The purpose of the project is to restore cultivated land with serious soil erosion, salinization, desertification, or low and unstable grain yield by planting forests and grasslands and restoring vegetation according to local conditions.¹⁰¹ By 2020, the central government had invested a total of 535.3 billion yuan to return farmland to forest and grassland in 2,435 counties in 25 provinces (including 213 million mu of returned farmland to forest and grassland),¹⁰² directly benefiting 41 million rural households and 158 million farmers.¹⁰³ These projects are committed to preventing and mitigating land desertification, soil erosion, typhoons, tsunamis, storm surges, floods, droughts, and other geological

93. *Id.*

94. *Id.*

95. *Id.*

96. *World-Renowned Ecological Project – China’s “Coastal Shelterbelt System Construction Project”*, ZHEJIANG FORESTRY BUREAU (Apr. 19, 2022), http://lyj.zj.gov.cn/art/2022/4/19/art_1277845_59029758.html.

97. *Id.*

98. *Id.*

99. *Id.*

100. See generally Li Shidong & Liu Moucheng, *The Development Process, Current Situation and Prospects of the Conversion of Farmland to Forests and Grasses Project in China*, 13 J. RES. & ECOLOGY 120 (2022), <https://www.jorae.cn/CN/10.5814/j.issn.1674-764x.2022.01.014> (summarizing the project).

101. *Id.* at 120.

102. A mu is a Chinese unit of measurement equivalent to approximately one-fifteenth of a hectare. See http://www.onlineunitconversion.com/mu_to_hectare.html.

103. Shidong & Moucheng, *supra* note 100, at 120.

disasters.¹⁰⁴ According to the definition of “natural” in the International Union for the Conservation of Nature (IUCN) report on NbS,¹⁰⁵ these ecological projects work mainly by creating new ecosystems for disaster prevention and mitigation that are different from existing ones.

However, due to a long-term dependence on central policies without the benefit of a complete and effective legal system, these artificial ecological programs have also encountered many problems. The foremost problem is that the effectiveness of those programs has been questioned.¹⁰⁶ Due to the complexity of natural ecosystems,¹⁰⁷ the first doubt facing such large-scale ecological projects is whether they are scientifically sound.¹⁰⁸ The early stages of the projects’ implementation raised attention to their potentially harmful consequences. For example, the early afforestation method of the Three North project was mainly intended to create an artificial, unitary forest with a single species of tree—mainly poplars, which grow rapidly but have a lifespan of about 30 years—so there are many low-quality and degraded forests with many premature, aging, and dead trees.¹⁰⁹ Because of planners’ failure to fully consider the capacity of water resources, the high afforestation density, and a lack of necessary maintenance in the early stage, the final afforestation rate for the project was just 46.9%.¹¹⁰ The same situation also appears in other projects. For example, according to the evaluation results of the Coastal Shelterbelt Program, the stock of arboreal forest in the coastal shelterbelt accounts for only 55.3% of the national arboreal forest stock.¹¹¹ Following this program, the local forest ecosystem has weaker regulating

104. NAT’L DEV. & REFORM COMM’N, NATIONAL MASTER PLAN FOR MAJOR PROJECTS TO PROTECT AND RESTORE IMPORTANT ECOSYSTEMS (2021-2035) (2020), <https://www.ndrc.gov.cn/xxgk/zcfb/tz/202006/P020200611354032680531.pdf>.

105. The IUCN report classifies “nature” in nature-based solutions into three categories: all-natural ecosystems, protected or restored ecosystems, and reconstructed ecosystems. IUCN, *supra* note 32.

106. See, e.g., Kaiji Xu et al., *How Are Nature-Based Solutions Contributing to the Improvement of Ecosystem Quality in China: A Systematic Review*, 155 *ECOLOGICAL INDICATORS* 110985 (2023) (concluding that natural factors contribute more to such programs’ effectiveness than human intervention).

107. Pietro Landi et al., *Complexity and Stability of Ecological Networks: A Review of the Theory*, 60 *POPULATION ECOLOGY* 319 (2018).

108. Shixiong Cao et al., *Excessive Reliance on Afforestation in China’s Arid and Semi-Arid Regions: Lessons in Ecological Restoration*, 104 *EARTH-SCI. REVS.* 240 (2011); Yang Xiao et al., *Ecological Risks Arising from the Impact of Large-Scale Afforestation on the Regional Water Supply Balance in Southwest China*, *SCI. REPS.*, Mar. 2020, at 1, <https://www.nature.com/articles/s41598-020-61108-w>; C. Li et al., *Drivers and Impacts of Changes in China’s Drylands*, 2 *NAT. REVS. EARTH & ENV’T* 858 (2021).

109. *The Information Office Held a Press Conference on the “Comprehensive Evaluation Report on the Construction of the Three-North Protective Forest System for 40 Years”*, STATE COUNCIL (Dec. 24, 2018), https://www.gov.cn/xinwen/2018-12/24/content_5351500.htm.

110. Zhu Jiaojun & Zheng Xiao, *The Prospects of Development of the Three North Afforestation Program (TNAP): On the Basis of the Results of 40-Year Construction General Assessment of the TNAP*, 38 *CHINESE J. ECOLOGY* 1600 (2019).

111. NAT’L FORESTRY ADMIN., NATIONAL COASTAL SHELTER SYSTEM CONSTRUCTION PLAN (2016-2025), <https://www.gov.cn/xinwen/2017-05/16/5194348/files/8cfb540b5ff744518f1f05abdd201bdd.pdf>.

services because of the artificially low number of plant species. Since the project area spans five climatic zones, there are, in theory, numerous native tree species. Despite this, some areas of the coastal shelterbelt have poor geological conditions, singular species, and a simple structure.¹¹² These effects contribute to poor stability in the forest's ecosystem and congenital deficiencies in protective function.¹¹³

The next problem faced by these large-scale ecological engineering projects is the dilemma of legitimacy.¹¹⁴ The rights, obligations, and accountability frameworks of these projects are not explicit in the construction process due to the projects' top-down, policy-based approach. The construction process often contains non-transparent information and monitoring procedures.¹¹⁵ A project's construction may pose many scientifically questionable or unreasonable aspects. These aspects could affect the ecological, social, or economic efficiency of the process—or even cause devastating damage to the original ecosystem.¹¹⁶ However, neither the government planners nor the companies and individuals who implement the project are typically held accountable for the results of such an “act of God.”¹¹⁷ In 2023, Guoyou Sun's video “Kneeling for Water” highlighted these legal issues for public discussion.¹¹⁸ Civil society praised Guoyou as a hero for the prevention of desertification.¹¹⁹ After this incident, some ethically minded netizens questioned whether Guoyou Sun was a hero or a businessman with ulterior motives.¹²⁰ Certain ecologists and social

112. *Id.*

113. *Id.*

114. Jianfeng Jeffrey Qi & Peter Dauvergne, *China and the Global Politics of Nature-Based Solutions*, ENV'T SCI. & POL'Y, Nov. 2022, at 1.

115. Ruizi Yu & Quan Mu, *Implementation Progress of Nature-Based Solutions in China: A Global Comparative Review*, 4 NATURE-BASED SOL. 100075 (2023).

116. Julia Marinaccio, *Banning Logging, Conserving Legitimacy: Large-Scale Ecological Restoration Under Xi Jinping*, J. ENTWICKLUNGSPOLITIK, Mar. 2020, at 1, <https://www.researchgate.net/publication/337591162>.

117. Qun Du & Zhiyu Huang, *On the Tort Liability of the State for Inaction in the Management of Natural Disasters*, 15 J. CHINA UNIV. GEOSCI. (SOC. SCIS. EDITION) 37 (2015).

118. In March 2023, 64-year-old Guoyou Sun posted a video online in which he could be seen kneeling on the ground begging for water, sounding hoarse and appearing quite desperate. The video quickly made headlines in major media and attracted widespread attention. Prior to this, Sun Guoyou appeared as a hero in sand control, and his deeds of selling property into sand control were widely known. According to him, the reason for the video was that a coal mine in the sandy land destroyed the water source of the sandy forest, and although he won the case, the coal mine did not fulfill the water supply, resulting in the lack of water for what he called a “10,000 mu forest farm.” Later, the incident attracted the attention of local government departments and extensive discussion on the Internet. Some members of the media asked four questions about the incident: (1) Is there a forest farm of 10,000 acres? (2) Are the trees suitable for local cultivation? (3) Based on the water supply agreement, is the coal mine or forest farm in the wrong? (4) Is planting trees on a forest farm itself destroying the ecology? But so far, these inquiries have not received authoritative official answers. POLAR EYE NEWS (Apr. 2, 2023), <https://news.ifeng.com/c/8Of58xt62XB>.

119. *Id.*

120. *Id.*

organizations also believed that if 20-year-old, fast-growing poplars still needed watering, the solution was not to combat desertification but to instead install “pumps” in the desert.¹²¹ Legal scholars and lawyers had considered the water-supply dispute between Guoyou and Shuangma Coal Mine,¹²² but until now the relevant regulatory authorities’ information disclosure and review of the project has been inadequate. China is facing increasingly serious natural disasters and ecological degradation. These two issues interact with each other, increasing the demand for ecosystem regulation services alongside the upgraded model of disaster risk reduction.¹²³ On the other hand, there are scientific doubts and legitimacy dilemmas in the existing EbA-DRR framework.¹²⁴ Accordingly, addressing such issues should be a priority of environmental lawyers in the area of disaster risk reduction.¹²⁵

II. THE STATUS OF NATURE-BASED SOLUTIONS TO DISASTERS IN ENVIRONMENTAL LAW

A. *The Development of Chinese Environmental Legislation*

After the Chinese delegation participated in the Stockholm Conference in 1972, China began to attach more importance to environmental protection.¹²⁶ In 1973, the country promulgated its first policy document on environmental protection: *Several Provisions on the Protection and Improvement of the Environment (Trial Draft)*.¹²⁷

The 1978 Constitution declared that “the State protects the environment and natural resources and prevents and eliminates pollution and other hazards to the public.”¹²⁸ In 1979, the first Environmental Protection Law (For Trial

121. Sun Guoyou *Planted Trees to Destroy the Ecology: What He Planted Was a Desert Pump*, SOHU (Apr. 2, 2023), https://www.sohu.com/a/661893875_120514500.

122. *Environmental Resources Experts Analyze the Core Legal Issues of the “Ningxia Forest Farm Owner Seeking Water” Incident*, SINA (Mar. 30, 2023), <https://finance.sina.com.cn/jjxw/2023-03-30/doc-imynsptw4584793.shtml>.

123. Ning Zhao, *Promote Synergies Between Ecological Protection and Disaster Prevention and Mitigation*, CHINA NAT. RES. NEWS (Feb. 9, 2022).

124. Xin Mao, “*Ecological Restoration*” *Is a Good Lesson that Should Not Be Misread* (Aug. 30, 2023), http://www.banyuetan.org/jrt/detail/20230830/1000200033134991693210299533141545_1.html.

125. Zhiyu Huang, *The Failures and Countermeasures of the Legal System’s Implementation of Ecosystem-Based Disaster Management*, 32 ECOLOGICAL ECON. 214 (2016).

126. Zhou Shengxian, *The Development History and Effectiveness of Environmental Protection in My Country*, MINISTRY OF ENV’T PROT. (July 11, 2013), https://www.mee.gov.cn/gkml/sthjbgw/qt/201310/t20131009_261311.htm.

127. *Id.*

128. CONSTITUTION OF THE PEOPLE’S REPUBLIC OF CHINA (1978), art. 11, para. 3.

Implementation)¹²⁹ was enacted.¹³⁰ Since then, China has promulgated the Laws for the Prevention and Control of Water, Air, Solid Waste, Noise, Radioactive, and Soil Pollution.¹³¹ Additionally, the state promulgated the Law on Natural Resources, which governs Water, Land Management, Grassland, Forest, and Mineral Resources.¹³² These laws together constituted an environmental legal system.¹³³ With the promotion of the Preventive and Precautionary Principle,¹³⁴ the approach has gradually shifted to whole-process governance.¹³⁵

Consequently, statutes like the Circular Economy Promotion Law, Cleaner Production Promotion Law, and Environmental Protection Tax Law have been promulgated successively, which have amended the initial command-and-control measures for environmental protection by incorporating an administrative and marketing mechanism.¹³⁶ However, due to the long-term dominance of reductionist theory, China's environmental legislation predominantly focuses on the qualitative or quantitative environmental elements of natural resources without holistic, systematic thinking.¹³⁷ As a result, in the process of implementing the aforementioned laws, difficulties often arise in determining which of several potentially responsible government agencies should take the lead on a particular project.¹³⁸ For example, new legislation on ecosystem integrity has been introduced, including the Yangtze River Protection Law,¹³⁹ the Yellow River

129. The "For Trial Implementation" version of the law is intended to test the social effects of laws and regulations after they are enacted and is necessary to implement the enacted laws for a certain period of time, to determine problems with the laws, and to amend them before formal enactment.

130. Environmental Protection Law (for Trial Implementation) of the People's Republic of China (1979), <https://www.tandfonline.com/doi/abs/10.1080/00094609.2004.11036404>.

131. See discussion *infra* Section II(D).

132. *Id.*

133. Zhongmei Lu & Yiran Wu, *The 70 Years of Chinese Environmental Rule of Law: From the Past to the Future*, 5 CHINA L. REV. 102 (2019).

134. The preventive and precautionary principles are landmark principles of international environmental law. A distinction can be made between these two principles: prevention addresses tangible risks whilst precaution deals with scientific uncertainty. See Nicolas de Sadeleer, *The Principles of Prevention and Precaution in International Law: Two Heads of the Same Coin?*, in RESEARCH HANDBOOK ON INTERNATIONAL ENVIRONMENTAL LAW 152–88 (Malgosia Fitzmaurice et al. eds., 2010), <https://tradeenvironment.eu/wp-content/uploads/2021/10/Research-Handbook-of-IEL.pdf>.

135. *Id.*

136. *Id.*

137. Lu Zhang, *Chinese-Style Legal Synergy Concept that Promotes the Harmonious Coexistence Between Man and Nature*, 45 LEGAL RSCH. 19 (2023).

138. *Id.*

139. Zhongmei Lu, *Legal Thoughts on the Enactment of the Yangtze River Protection Law*, 2 ORIENTAL L. 79 (2020).

Protection Law,¹⁴⁰ and the Qinghai-Tibet Plateau Ecological Protection Law.¹⁴¹

B. Disputes over the Chinese Environmental Legal System

From the early controversy over whether environmental law was an independent branch of law,¹⁴² to the current dispute over the proper scope of the Ecological Code (Code),¹⁴³ China's environmental legal system has long been subject to a fundamental theoretical debate.

Professor Canfa Wang believes that the legal system for an ecological civilization construction should contain seven parts: (1) the Basic Law on Ecological Civilization Construction, (2) the Law on Pollution Prevention and Control, (3) the Law on Natural Resources Protection, (4) the Law on Ecological Protection, (5) the Energy Law, (6) the Law on Climate Change, and (7) the Law on Special Environmental Management Systems.¹⁴⁴

Professors Xisheng Huang and Yucheng Shi believe that the Chinese environmental legal system is based on the Environmental Protection Law and governs seven sub-legal areas: (1) the Environmental Pollution Prevention and Control Law, (2) the Natural Resources Protection Law, (3) the Ecological Protection Law, (4) the Resource Recycling Law, (5) the Energy Conservation and Emission Reduction Law, (6) the Disaster Prevention and Mitigation Law, and (7) the Environmental Damage Liability Law.¹⁴⁵

Professor Zhongmei Lu believes that the normative system of the Code includes pollution control, natural ecological protection, and green and low-carbon development legal norms. Additionally, Professor Zhongmei Lu believes that natural ecological protection includes legislation related to natural resources, regional, and watershed legislation.¹⁴⁶ Although scholars have different views, the various pollution prevention laws, the natural

140. Xueyong Hou, *A Survey of the Ecological Protection Mechanism of the Yellow River Basin from the Perspective of Coherence Theory – Take the Relevant Provisions of the Yellow River Protection Law as the Analysis Object*, 3 LEGAL F. 105 (2023).

141. Gu Gong, *Qinghai-Tibet Plateau Ecological Protection Law and New Development of Environmental Legislation Model*, 51 ENV'T PROT. 23 (2023).

142. Bopin Wen, *Environmental Protection Law Is an Independent Branch of Law*, 2 L. SCI. MAG. 29 (1980); but see Jiwen Chang, *Environmental Law Is a Field of Law but Not an Independent Branch of Law*, SCI. NET (Sept. 10, 2010), <https://news.sciencenet.cn/sbhtmlnews/2010/9/236588.html>.

143. Cao Wei, *Theoretical Reflection and Program Construction on "Moderate Codification" of Environmental Law*, 29 LAW & SOC. DEV. 113 (2023).

144. Canfa Wang, *On Establishment for Legal Guarantee System of Ecological Civilization Construction*, 3 CHINA L. SCI. 34 (2014).

145. Xisheng Huang and Yucheng Shi, *The Structure and Improvement of China's Environmental Legal System*, 28 CONTEMP. L. REV. 120 (2014).

146. Zhongmei Lu, *Construction of the Normative System of Environmental Code under Typological Thinking*, 44 MOD. L. SCI. 89 (2022).

resources law, the ecological protection law, and the green and low-carbon development law are widely recognized as components of the environmental legal system, so this Article will emphasize them.

This Article will analyze 42 pieces of Chinese environmental and natural disaster legislation, including 3 comprehensive pieces of legislation: the Environmental Protection Law, the Marine Environmental Protection Law, and the Environmental Impact Assessment Law.¹⁴⁷ It will also analyze 7 pieces of pollution-prevention-and-control legislation: the Laws on Prevention and Control of Water Pollution, Atmospheric Pollution, Solid Waste, Radioactive Pollution, Environmental Noise, Soil Pollution, and Environmental Protection Tax Law.¹⁴⁸ Further, it will examine 13 pieces of natural-resource legislation: fisheries, water, forests, grasslands, land, mineral resources, sea areas, islands, deep-seabed-area resources, wildlife, coal, biosecurity, and black-soil-protection laws.¹⁴⁹ Additionally, this Article will examine 7 examples of ecological protection legislation, which govern water and soil conservation, desertification prevention and control, the Yangtze River, wetlands, the Yellow River, the Qinghai-Tibet Plateau, and the decree on nature reserves.¹⁵⁰ The analysis will also include 4 green and low-carbon development laws: the Renewable Energy Promotion Law, Energy Conservation Law, Circular Economy Promotion Law, and Cleaner Production Promotion Law.¹⁵¹ Finally, the Article analyzes 8 natural disaster laws that contain cross-cutting environmental laws and regulations, which concern flood prevention, meteorological, protecting against and mitigating earthquake disasters, infectious disease prevention and decree of geological disaster prevention and control, drought resistance, forest fire prevention, grassland fire prevention.¹⁵²

147. *Review and Understanding of Ecological and Environmental Protection Legislation in the Past 40 Years of Reform and Opening Up*, NAT'L PEOPLE'S CONG. OF THE PRC, http://www.npc.gov.cn/npc/c12434/wgggkf40nlfcjgs/202108/t20210824_313202.html.

148. *Id.*

149. *Id.*

150. *There Are More Than 30 Laws on Ecological and Environmental Protection to Promote the Construction of a Beautiful China*, NAT'L PEOPLE'S CONG. OF THE PRC (Aug. 15, 2023), http://www.npc.gov.cn/npc/c2/kgfb/202308/t20230815_430991.html.

151. *Notice of the State Council on Issuing the Action Plan for Carbon Peaking Before 2030*, No. 23, STATE COUNCIL, P.R.C. (Oct. 26, 2021), https://www.gov.cn/zhengce/content/2021-10/26/content_5644984.htm?eqid=a4b97eeb0002d62b00000003645bab58.

152. *At Present, My Country Mainly Has 5 Laws and 9 Administrative Regulations in Terms of Disaster Prevention and Relief*, CENT. PEOPLE'S GOV'T OF THE PRC, https://www.gov.cn/zxft/ft129/content_1022484.htm.

C. Types of Natural Disasters and Disaster Risk Reduction

According to the national standards for the classification of natural disasters, there are five categories of natural disasters.¹⁵³ The first category includes meteorological and hydrological disasters, such as drought, flood, typhoon, heavy rain, strong wind, hail, lightning, low temperature and high temperature, ice and snow, sandstorms, and fog.¹⁵⁴ The second category is geological disasters, including earthquakes, volcanoes, collapses, landslides, debris flows, ground subsidence, and ground fissures.¹⁵⁵ The third category is marine hazards, which include storm surges, waves, sea ice, tsunamis, and red tides.¹⁵⁶ The fourth category is biological disasters, which include plant diseases and pests, epidemics, rodent pests, grass pests, and grassland fires.¹⁵⁷ The final category contains ecological and environmental disasters, including soil erosion, wind-eroded desertification, salinization, and rocky desertification.¹⁵⁸

Disaster risk reduction includes the processes of disaster prevention and early warning, emergency relief, and recovery and reconstruction.¹⁵⁹ The Article categorizes these methods as either “explicit” or “implicit.” The “explicit” category includes normative content that expressly relates to disaster risk management. “Implicit” norms, meanwhile, do not name disaster risk reduction expressly, but authoritative legislative interpretations and provisions have clarified their relevance to disaster risk management.¹⁶⁰ This Article will review in detail where and how the application of NbS to disasters is embodied in the legal system.

D. The Profile and Expressions of Nature-Based Solutions to Disasters

1. The Profile

As shown in Table 1, 27 of the 42 environmental laws are dedicated to disaster risk reduction. These include the Environmental Protection Law as

153. GEN. ADMIN. OF QUALITY SUPERVISION, INSPECTION & QUARANTINE, NATIONAL STANDARDS OF PRC: NATURAL DISASTER CLASSIFICATION AND CODING, GB/T 28921-2012 (2013).

154. *Id.*

155. *Id.*

156. *Id.*

157. *Id.*

158. *Id.*

159. ASIAN DISASTER REDUCTION CTR., TOTAL DISASTER RISK MANAGEMENT – GOOD PRACTICES 14 (2005).

160. The distinction between explicit and implicit functions draws on the theory of legal function. Explicit function refers to the fact that the objective consequences of the law conform to the original intention of the legislator or are intentionally arranged by the legislator. The implicit function refers to the fact that the impact of the law on society is unseen or unintended; that is, the consequence exceeds the legislature’s original intent. ZITANG FU, LEGAL FUNCTIONALISM 51 (1999).

the comprehensive “Basic Law”;¹⁶¹ 3 pollution-related laws governing soil pollution, water pollution, and solid waste; 11 pieces of natural resources legislation, governing issues arising with respect to land, mineral resources, water, fisheries, coal, forests, grassland, sea areas, islands, wildlife, and black soil; and 6 pieces of ecological protection legislation, including the Law on Water and Soil Conservation, the Law on Desertification Prevention and Control, the Law on the Protection of Wetland Areas, the Law on the Protection of the Yangtze River, the Law on the Protection of the Yellow River, and the Law on the Ecological Protection of the Qinghai-Tibet Plateau.¹⁶² In addition, 6 cross-cutting natural disaster laws regulate environmental social relations to achieve the goals of disaster risk reduction: the Flood Prevention Law, the Meteorological Law, the Law on Protecting Against and Mitigating Earthquakes, the Law on the Prevention and Control of Infectious Diseases, the Decree on the Prevention and Control of Geological Disasters, and the Decree on Drought Control.¹⁶³

According to Table 1, there are 163 environmental normative provisions at the specific regulatory level related to disaster risk reduction.¹⁶⁴ The ecological protection laws contain the greatest number of these normative provisions (96).¹⁶⁵ This is followed by natural resources (32), natural disasters (27), pollution prevention and control (7), and the comprehensive category (1).¹⁶⁶ Legislation related to green and low-carbon development does not contain any such normative provisions.¹⁶⁷ Among all normative provisions, 4 specific environmental statutes establish the purpose of disaster risk prevention and mitigation: the Water Law,¹⁶⁸ the Water and Soil

161. Interview with Bie Tao, Chief Legal Advisor and Director of the Department of Regulations and Standards of the Ministry of Ecology and Environment: “Use the Strictest System and Strictest Rule of Law to Protect the Ecological Environment.”, S. WEEKEND (Oct. 20, 2022), https://www.infzm.com/contents/236739?source=101&source_1=236736,20.

162. Hongzhen Xia, *China’s Ecological and Environmental Protection Legal System Has Been Basically Formed* (Oct. 25, 2022), www.npc.gov.cn/npc////c2/kgfb/202210/t20221025_319868.html.

163. Li Zhengwei, *Ministry of Emergency Management: We Are Accelerating the Legislative Process of the Natural Disaster Prevention and Control Law*, GUANGMING.COM (Nov. 14, 2023), https://politics.gmw.cn/2023-11/14/content_36965300.htm.

164. See Table 1, *supra* Section II(D).

165. Qun Du, *The Conceptual Composition of the Ecosystem-Based Disaster Mitigation Law: The Synergistic Jurisdiction of the Ecological Protection Law and the Natural Disaster Law*, 13 ENV’T RES. L. REV. 97 (2021).

166. See Table 1, *supra* Section II(D).

167. *Id.*

168. See *Zhonghua Renming Shuifa* (中华人民共和国水法) [Water Law of the People’s Republic of China] (promulgated by the Standing Comm. Nat’l People’s Cong., Jan. 21, 1988, rev’d July 2, 2016, effective July 2, 2016), art. 1, 2002, translated in 2016 P.R.C. LAWS (“This Law is formulated for the rational development, utilization, saving and protection of water resources, for the prevention and control of water disasters and for the realization of sustainable utilization of water resources in order to meet the needs in national economic and social development.”).

Conservation Law,¹⁶⁹ the Yellow River Protection Law,¹⁷⁰ and the Qinghai-Tibet Plateau Ecological Protection Law.¹⁷¹ The terms also contain a drought control decree that includes regulations intended to prevent and mitigate drought disasters and their losses, ensure domestic water usage, and coordinate production and ecological water usage.¹⁷² Additionally, 3 articles embody the principle of coordinated governance between ecosystem protection and disaster risk reduction: Article 4 of the Water Law,¹⁷³ Article 3 of the Law on Desertification Prevention and Control,¹⁷⁴ and Article 4 of the Flood Prevention Law.¹⁷⁵ Other than these overarching goals and basic principles, the other provisions assessed are all specific rules.

169. See *Zhonghua Renming Shuitubaochi Fa* (中华人民共和国水土保持法) [Water and Soil Conservation Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Dec. 25, 2010, effective Mar. 1, 2011), art. 1, 2011, *translated in* 2010 P.R.C. LAWS ("This Law is formulated to prevent and control water and soil loss, protect and reasonably utilize water and soil resources, reduce disasters of flood, drought and sandstorm, improve the ecological environment and guarantee sustainable economic and social development.").

170. See *Zhonghua Renming Huanghe Baohufa* (中华人民共和国黄河保护法) [Yellow River Protection Law of the People's Republic of China] (promulgated Oct. 30, 2022, effective Apr. 1, 2023), art. 1, 2023, *translated in* 2023 P.R.C. LAWS ("This Law is developed for the purposes of strengthening the protection of the ecology and environment of the Yellow River basin, guaranteeing the safety of the Yellow River, promoting the conservation and intensive utilization of water resources, driving high-quality development, protecting, inheriting, and promoting the Yellow River culture, and realizing the harmonious coexistence between man and nature and the sustainable development of the Chinese nation.").

171. See *Law of the People's Tibetan Plateau Ecological Protection*, art. 1, 2023 P.R.C. LAWS (China) (explaining that the law was "enacted for the purposes of strengthening the ecological protection of the Tibetan Plateau, preventing and controlling ecological risks, guaranteeing ecological security, building a hub of national ecological civilization, promoting sustainable economic and social development, and achieving the harmonious coexistence of man and nature").

172. See *Zhonghua Renmin Gongheguo Fang Han Tiaoli* (中华人民共和国防旱条例) [Drought Control Regulation of the People's Republic of China] (promulgated by the State Council, Feb. 26, 2009, effective Feb. 26, 2009), art. 1 (regarding China's law on preventing and relieving drought disasters and the losses caused by them).

173. See *Water Law of the People's Republic of China*, *supra* note 168 ("The development, utilization, preservation, and protection of water resources and the prevention and control of water disasters shall be carried out through comprehensive planning, with all factors taken into consideration. The planning shall seek both a temporary solution and a permanent cure, with emphasis on multipurpose use and achieving maximum benefits to take advantage of the multiple functions of water resources and harmonize water use in production and the environment.").

174. See *Zhonghua Renmin Gongheguo Fang Sha Zhi Sha Fa* (中华人民共和国防沙治沙法) [Law of the People's Republic of China on Desert Prevention and Transformation] (promulgated by the Standing Committee Nat'l People's Cong. on Aug. 31, 2001, effective Jan. 1, 2002), art. 3 ("Desert prevention and transformation shall follow the following principles: . . . (3) combining the protection and restoring of vegetation with the reasonable utilization of natural resources; (4) Following environmental rules and relying on technological advancement.").

175. See *Zhonghua Renmin Gongheguo Fanghong Fa* (中华人民共和国防洪法) [Flood Control Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 19, 1997, rev'd July 2, 2016, effective July 2, 2016), art. 4 ("Water resources shall be developed, utilized and protected in conformity with the overall arrangement for flood control and in adherence to the principle of deriving benefits being combined with eliminating damage.").

Table 1: An Overview of Disaster Prevention and Mitigation in Chinese Environmental Legislations¹⁷⁶

Categories of Legislation	Explicit Categories	No. of Terms	Type of Norm		
			Goal	Principle/ Philosophy	Specific Rule
Comprehensive (3)	1	1	0	0	1
Pollution Prevention & Control (7)	3	7	0	0	7
Natural Resources (13)	11	32	1	1	30
Ecological Protection (7)	6	96	3	1	92
Green & Low-Carbon (4)	0	0	0	0	0
Natural Disasters (8)	6	27	1	1	25
Total (38)	27	163	5	3	155

2. The Concrete Expressions

This Section will analyze the rules presented above in Table 1. Analyzing existing Chinese environmental legislation will demonstrate various patterns in the disaster risk reduction function in Chinese environmental law by identifying who is subject to them, what behaviors they regulate, which disaster types they address, their specific functions, and the nature of the norms they provide.¹⁷⁷

176. *See supra* Section II(D) (discussing methodology).

177. *See infra* Table 2.

Table 2: The Concrete Expressions of Disaster Risk Reduction in Chinese Environmental Legislation

Number of Rules/Types of Law		Compr. (1)	Poll. Ctrl. (7)	Natural Resource (30)	Ecol. Protection (92)	Natural Disaster (25)	Total (155)
Subjects Regulated ¹⁷⁸	Gov't ¹⁷⁹	1	4	20	65	19	112
	Enterprises & Business Unit	0	2	1	1	1	6
	Unspecified	0	2	9	23	8	41
	Other ¹⁸⁰	0	0	0	5	0	5
Behavior ¹⁸¹	Ecology & Env't Protection	1	2	6	59	12	80
	Env't Pollution Prevention/Ctrl.	0	4	0	2	3	9
	Sustainable Use of Resources	0	0	12	22	14	48
	Engineering, Sci., & Tech.	0	1	8	9	0	18
	Financial Incentives	0	0	4	0	0	4
Disaster ¹⁸²	Natural Disaster	0	2	4	14	0	21
	Meteorological & Hydrological Disasters	0	5	18	22	17	64

178. See Zhonghua Renmin Gongheguo Turang Wuran Fangzhi Fa (中华人民共和国土壤污染防治法) [Law of the People's Republic of China on Prevention and Control of Soil Contamination] (promulgated by the Standing Comm. Nat'l People's Cong. Aug. 31, 2018, effective Jan. 1, 2019), art. 44 (exemplifying how an Article can have different types of legal relationship subjects, e.g., by involving local people's governments and their departments, enterprises, public institutions, producers, and operators).

179. The government here includes the state, the State Council, the people's government and its responsible departments, and responsible authorities in the legislative provisions.

180. "Other" includes enterprises involving agriculture; forestry; animal husbandry; and fishery, planting, and breeding households.

181. See, e.g., Yellow River Protection Law, *supra* note 170, art. 44 (discussing both mine-pollution prevention and ecological restoration).

182. See, e.g., Zhonghua Renmin Gongheguo Huanjing Baohu Fa (中华人民共和国环境保护法) [Environmental Protection Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Dec. 26, 1989, rev'd April 24, 2014, effective April 24, 2014), art. 53, *translated in* 2014 P.R.C. Law 9 (exemplifying an article with many types of disasters, such as land desertification, rocky desertification, soil erosion, plant diseases and pests).

Number of Rules/Types of Law		Compr. (1)	Poll. Ctrl. (7)	Natural Resource (30)	Ecol. Protection (92)	Natural Disaster (25)	Total (155)
	Seismic/Geologic Hazards	0	0	1	5	9	15
	Marine Disasters	0	0	0	1	0	1
	Biological Disasters	1	0	3	3	1	8
	Ecological & Env't Disasters	1	0	7	63	0	72
Functions ¹⁸³	Synthesis	0	0	12	32	8	54
	Prevent/Warn	1	5	18	48	11	85
	Emergency/Rescue	0	2	3	3	7	15
	Recovery/Reconstruction	0	0	1	8	1	10
Nature of Norms ¹⁸⁴	Compound (Authority & Duty)	1	4	20	65	18	108
	Empowering	0	0	0	0	0	0
	Instructive	0	0	0	0	0	0
	Imperative	0	2	7	18	5	32
	Prohibitive	0	2	4	17	4	25
Method of Embodiment	Explicit	1	0	27	91	22	141
	Implicit	0	7	3	1	3	14

183. *See, e.g.*, Zhonghua Renmin Gongheguo Senlin Fa (中华人民共和国森林法) [Forest Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Sept. 20, 1984, rev'd Dec. 28, 2019, effective July 1, 2020), art. 34, 2020 P.R.C. LAWS 39 (exemplifying how one Article can have multiple functions, in this case both "delimiting forest fire prevention areas, stipulating fire prevention periods, and establishing monitoring and early warning systems and emergency response plans").

184. The complex norms of authority and responsibility are rules that stipulate the functions and powers of state organs. A norm of rights is a rule that stipulates the rights of a natural person, legal person, or other organization. Guiding norms are those under which the actor has discretion to act according to the behavior specified by the rules; thus, the rules are suggestive and non-binding. An imperative norm, on the other hand, sets out positive obligations, and prohibitive norms are rules that set out negative obligations.

Number of Rules/Types of Law		Compr. (1)	Poll. Ctrl. (7)	Natural Resource (30)	Ecol. Protection (92)	Natural Disaster (25)	Total (155)
Liability	Admin. Penalty, Coercion, Detention, etc.	0	4	4	13	3	24
	Administrative Sanctions	0	0	1	3	0	4
	No Liability	1	3	23	76	22	127

Table 2 indicates that environmental legislation presents different manifestations of disaster management. First, disaster risk reduction is generally approached through both the environmental-management and ecosystem-based approaches. The environmental-management approach is different from EbA.¹⁸⁵ EbA focuses on the overall ecosystem structure and functioning to maintain the health of ecosystem services, which is a priority.¹⁸⁶ In contrast, the environmental-management approach does not necessarily focus on whole ecosystems, but it may instead simply address issues around natural resource use in the context of disaster management.¹⁸⁷ There are two main groups of entities implementing the two different approaches. Private entities are mainly obligated to reduce disaster risk through environmental management; that is, they are prohibited or restricted from discharging specific pollutants or from utilizing natural resources in the name of disaster prevention and mitigation. For example, the Water Pollution Prevention and Control Law, the Solid Waste Pollution Prevention and Control Law, the Water Law, the Fishery Law, and the Mineral Resources Law all prohibit various private actions. These activities include discharging pollutants, dumping solid waste, planting trees in floodways, developing aquaculture on water beaches, and discarding mineral resources in a manner that causes flooding.¹⁸⁸

185. ECOSYSTEM APPROACH TO DISASTER RISK REDUCTION, *supra* note 69, at 29.

186. *Id.*

187. *Id.*

188. *See, e.g.*, Shui Wuran Fangzhi Fa (水污染防治法) [Water Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., May 11, 1984, rev'd June 27, 2017, effective Jan. 1, 2018), art. 38, 2018 P.R.C. LAWS 70 ("It is prohibited to stockpile or store solid wastes and other pollutants at bench land and bank slopes below the highest water level of rivers, lakes, canals, channels and reservoirs."); *see e.g.*, Gutu Feuwi Wuran Huanjing Fangzhi Fa (固体废物污染环境防治法) [Law on the Prevention and Control of Environment Pollution Caused by Solid Wastes] (promulgated by the Standing Comm. Nat'l People's Cong., Oct. 30, 1995, rev'd Apr. 29, 2020, effective Sept. 1, 2020),

On the other hand, the “Nation” or “Government” and its relevant agencies are the main entities implementing EbA-DRR and NbS measures. These entities implement disaster prevention and mitigation from the macro and abstract levels to ensure the success of ecological protection and restoration.¹⁸⁹ The Government has created initiatives to prevent and control natural disasters, such as the ecosystem-disaster, coordinated-monitoring, and early-warning mechanisms;¹⁹⁰ standard system;¹⁹¹ planning coordination;¹⁹² mega-ecological engineering construction;¹⁹³ comprehensive management;¹⁹⁴ and other measures or systems. All these measures are intended to support and protect ecosystem functions.

art. 38, 2020 P.R.C. LAW 43 (China) (“Any entity or individual shall be prohibited from dumping, stacking, or storing solid wastes in a river, lake, canal, channel, or reservoir, or its beach and sloping bank below the high-water mark, or any other place specified by any law or regulation.”); *see, e.g.*, Water Law of the People’s Republic of China, *supra* note 168, art. 37 (“It is prohibited to abandon or pile in any river, lake, reservoir, or canal objects that block the passage of floodwater. Planting trees or growing crops of a long-stalk variety that may block the passage of floodwater is also prohibited.”).

189. *National Disaster Reduction Commission’s Notice on Issuing the “14th Five-Year Plan” Notice of the National Comprehensive Disaster Prevention and Reduction Plan*, NAT’L DISASTER RISK REDUCTION COMM. (June 19, 2022), https://www.mem.gov.cn/gk/zfxxgkpt/fdzdgnr/202207/t20220721_418698.shtml.

190. *See, e.g.*, Changjiang Baohu Fa (长江保护法) [Yangtze River Protection Law] (promulgated by the Standing Comm. Nat’l People’s Cong., Dec. 26, 2020, effective Mar. 1, 2021), art. 7, 2021 P.R.C. LAWS 65 (China) (“The departments of ecology and environment, natural resources, water administration, agriculture and rural affairs, standardization, and other relevant departments of the State Council shall, in accordance with the division of responsibilities, establish and improve a standards system for the water environment quality and pollutant discharge, ecological and environmental restoration, conservation and intensive use of water resources, ecological flow, biodiversity protection, aquaculture, and disaster prevention and reduction, among others, in the Yangtze River Basin.”).

191. *See id.* art. 9 (“The National Yangtze River Basin Coordination Mechanism shall coordinate the improvement by the relevant departments of the State Council of the monitoring network system and monitoring information sharing mechanism for the ecology and environment, resources, hydrology, meteorology, shipping, and natural disasters, among others, in the Yangtze River Basin on the basis of established stations and monitoring projects.”).

192. *See, e.g.*, Yellow River Protection Law, *supra* note 170, art. 23 (“The department of water resources of the State Council shall, in conjunction with the relevant departments of the State Council and provincial people’s governments in the Yellow River basin, and under the principles of unified planning, management, and allocation, legally make comprehensive plans, water resource plans, and flood control plans, among others, for the Yellow River basin, and make arrangements on the conservation, protection, development, and utilization of water resources and the prevention and treatment of water disasters.”).

193. *See id.* art. 31 (“The local people’s governments at and above the county level in the Yellow River basin shall take measures such as building shelter forests, prohibiting grazing for restoration of grassland, fixing sand with engineering projects at the edge of sandy lands, closing off desertified land for protection, and rodent control to enhance the protection and restoration of natural forests, wetlands, and grasslands in the important ecologically functional areas of the Yellow River basin, carry out large-scale desertification prevention and control, scientifically control desertified land, and shall implement ecological restoration projects in key areas such as Hetao Plain Area, lake atrophy and degradation zones of the Inner Mongolia Plateau, desertified area of the Loess Plateau, and Fenwei Plain Area.”).

194. *See id.* art. 68 (“The state shall support the relevant local people’s governments in the Yellow River basin in planning as a whole the protection and restoration of river shorelines and the return of cultivated land to wetland, and constructing a green ecological corridor integrating the functions of flood control and ecological protection under the premise of stabilizing river regime, regulating flow paths, and ensuring flood passage capacity.”).

As for the types of natural disasters contemplated under the current legal framework, Table 2 demonstrates that current environmental law considers all kinds of natural disasters to some degree. The disasters that most frequently appear in the provisions examined are ecological environmental disasters (72), followed by meteorological and hydrological disasters (64)—particularly soil erosion, land desertification, flood, and drought.¹⁹⁵ These disasters occur more frequently because of their complex origins, relationship with the ecological environment, and close connection with human activities.¹⁹⁶ Therefore, these issues belong to the field of “synergistic resonance,” which lies somewhere between the fields of ecological protection and disaster risk reduction.¹⁹⁷ For example, a set of special legislation exists for marine protection, including the Marine Environmental Protection Law, the Island Protection Law, and the Marine Utilization and Management Law. Only Article 40 of the newly promulgated Wetland Conservation Law, however, provides for restoring mangrove wetland habitat to mitigate marine disaster risks.¹⁹⁸

Next, Table 2 outlines regulated entities’ legal relationships to these risk-reduction provisions by summarizing the rights, duties, and liabilities associated with each law. The government promulgates absolute legal statutes, which constitute a top-down, command-and-control management model.¹⁹⁹ Of the laws related to disaster risk reduction, there are 108 articles with norms of a compound nature. These 108 articles outline the powers and obligations of the government and its relevant departments in the context of disaster risk reduction, but only one article specifies that the head or executor of the administrative authority is subject to “administrative sanctions.”²⁰⁰ In addition, there are two prohibitive norms,²⁰¹ both of which permit local governments at or above the county level to reject projects. These projects include cultivating windbreak and sand-fixation forest networks, practicing forest harvesting, and reclaiming desert edge areas, woodlands, and

195. The data was compiled by the author after a review of the above-mentioned law.

196. Yi Wang et al., *Evolution Characteristics of Global Meteorological and Hydrological Disasters from 1990 to 2019*, 44 *TRANSACTIONS ATMOSPHERIC SCI.* 496 (2021).

197. Huang, *supra* note 125.

198. Shidi Baohu Fa (湿地保护法) [Wetlands Conservation Law] (promulgated by the Standing Comm. Nat’l People’s Cong., Dec. 24, 2021, effective June 1, 2022), art. 40, 2022 P.R.C. LAWS 102.

199. Chao Feng, *Analysis on the Changes of National Disaster Prevention and Mitigation Policies Since 1978 in China*, 37 *J. CATASTROPHOLOGY* 29 (2022).

200. Water Law of the People’s Republic of China, *supra* note 168, art. 64.

201. Law of the People’s Republic of China on Desert Prevention and Transformation, *supra* note 174, art. 20.

grasslands.²⁰² Both norms create liabilities, but only the head or executor of the administrative authority is subject to “administrative sanctions.”²⁰³

As for private entities, relevant legislation guarantees few rights or benefits. In the normative stage, agricultural facilities, fish hatcheries, and other industries that are sensitive to the ecosystem²⁰⁴ are often “absent.”²⁰⁵ However, these industries are covered by ecological protection legislation, all of which consist of imperative or prohibitive norms.²⁰⁶ Instructive and empowering norms that can mobilize the active and effective participation of private entities are seriously lacking.

Finally, the legal system includes procedural laws related to disaster-prevention management; emergency response and rescue; and recovery and reconstruction. With respect to existing environmental law norms, 54 pertain to comprehensive prevention and control, 85 relate to disaster prevention and early warning, 15 focus on disaster emergency relief, and 10 are dedicated to recovery and reconstruction.²⁰⁷ Although this shows that disaster prevention is emphasized by the current risk-reduction framework, to date, the law has focused on single hazards and has not meaningfully considered multi-hazard-related risk.²⁰⁸ Additionally, the “soft law” characteristics of these norms are apparent: only 24 provide a corresponding administrative punishment, just 4

202. See *id.* art. 16 (“Except the felling for fostering and renewing, *no felling of trees may be approved on the anti-wind and sand-fixation forest nets and forest zones*. Before felling trees in the anti-wind and sand-fixation forest nets and forest zones for fostering and renewing, succeeding forest nets and forest zones must be formed near them. *No felling shall be approved on the anti-wind and sand fixation forest nets and forest zones* at the places where it is difficult to renew forests.”) (emphasis added); *id.* art. 20 (“The people’s governments at the county level or above of the places where the desertified lands are located *may not approve the cultivation of the edging zones of deserts and the forests and grasslands*; if they have already cultivated the lands and harmful effects have been done to the environment, the cultivated lands shall be restored to forests and grasslands in a planned and organized way.”) (emphasis added).

203. See *id.* art. 43 (“Under any of the following circumstances, the directly responsible personnel in-charge and other directly responsible personnel shall be given administrative punishments by their units, oversight departments or the administrative departments in charge at the higher level according to law . . . (2) in violation of the provisions of the second, third paragraphs of Article 16 of this Law, approving the felling of trees in the anti-wind and sand-fixation forest nets and forest zones; (3) in violation of the second, third paragraphs of Article 20 of this Law, approving the cultivation of the edging areas of deserts and forests, grasslands.”).

204. Joshua E. Cinner et al., *Potential Impacts of Climate Change on Agriculture and Fisheries Production in 72 Tropical Coastal Communities*, NATURE COMMUN., July 2022, at 1, 2.

205. There are very few environmental legal provisions that focus on peasants, fishermen and pastoralists, so the term “absent” is used to describe the absence of rights towards them.

206. See, e.g., Water Law of the People’s Republic of China, *supra* note 168, art. 40, (“It shall be prohibited to reclaim parts of a lake for use as farmland. Those already reclaimed shall be restored to the lake according to the state-prescribed flood prevention standards.”).

207. See discussion *supra* Table 2 (demonstrating the environmental procedural laws in place that deal with natural disasters).

208. Stefan Hochrainer-Stigler et al., *Toward a Framework for Systemic Multi-Hazard and Multi-Risk Assessment and Management*, ISCIENCE, May 2023, at 1, 4, <https://www.sciencedirect.com/science/article/pii/S2589004223008131/pdf?md5=03397081db88290581db356e933d39bf&pid=1-s2.0-S2589004223008131-main.pdf>.

provide for administrative sanctions against the responsible government agents, and the remaining 127 paragraphs have no corresponding liability provisions.²⁰⁹

III. THE CHALLENGES OF NATURE-BASED SOLUTIONS TO DISASTERS IN ENVIRONMENTAL LAW

To give full play to the use of NbS for disaster prevention in Chinese environmental law, the top priority should be to respect, utilize, and protect ecosystem services to the greatest extent.²¹⁰ In particular, the country should focus on regulating the most neglected services.²¹¹ Then, because China is a civil law jurisdiction, a comprehensive legal system is needed to more effectively implement the currently disjointed framework of NbS for disaster risk reduction.²¹² Lastly, China needs reasonable incentive and enforcement mechanisms to ensure the sustainability and extensiveness of NbS for disaster risk reduction,²¹³ specifically to convince all entities to implement reflective governance that draws on past experience to improve future environmental decision-making.²¹⁴ Current environmental law, which faces challenges like scattered legislation, incomplete systems, and the imbalance of rights, duties, and responsibilities, may well not meet these requirements.

A. Scattered Environmental and Natural Disaster Legislation

For a long time, environmental law has been governed by a reductionist approach, which, by ignoring the complexity and dynamics of the overall socio-ecological system, loses the forest for the trees.²¹⁵ Such an approach is likely to lead to a misunderstanding of the operation and nature of the system.²¹⁶ This reductionist approach has profoundly influenced the theory and practice of environmental law in China.²¹⁷ As Chinese environmental

209. See discussion *supra* Table 2 (demonstrating the lack of accountability in the current legislation on disaster prevention).

210. Huang, *supra* note 125.

211. See VERCHICK, *supra* note 5, at 42 (explaining that neglecting ecosystems after a natural disaster can exacerbate subsequent environmental loss).

212. Yu & Mu, *supra* note 115, at 11.

213. Diana Dushkova & Dagmar Haase, *Not Simply Green: Nature-Based Solutions as a Concept and Practical Approach for Sustainability Studies and Planning Agendas in Cities*, LAND, Jan. 2020., at 1, 20.

214. Juliette G.C. Martin et al., *Catalyzing Innovation: Governance Enablers of Nature-Based Solutions*, SUSTAINABILITY, Feb. 2021, at 1, 2.

215. Klaus Bosselmann, *Losing the Forest for the Trees: Environmental Reductionism in the Law*, 2 SUSTAINABILITY 2424, 2431–33 (2010).

216. *Id.*

217. Lu Zhongmei, *Where Is the Road Back of Environmental Law? — Rethinking the Relationship Between Environmental Law and Traditional Sectoral Law*, 12 TSINGHUA UNIV. L.J. 6 (2018).

legal scholars have developed the theory of environmental law, the law has become aligned with the reductionism common to sectoral law; i.e., wherein “chickens and dogs hear each other, but cannot communicate with each other.”²¹⁸ This has resulted in the construction of a reductionist environmental legal system.²¹⁹

Whether it is a pollution control law or a natural resources law, the focus is on a specific individual pollutant or natural resource.²²⁰ If the legal system aims to advance the particular stability of just a single system, it risks harming all systems and contributing to the decline and collapse of both natural and human communities,²²¹ which naturally makes the laws structurally defective in the application of complex systems-based NbS. Per this reductionist view, environmental problems are rigidly categorized as either natural or human-caused,²²² and only the former are legally considered natural disasters. Additionally, the Law on Response to Emergencies, considered the “basic” Chinese emergency law, governs incidents involving public health, accident disasters, and social security risks.²²³ Human-caused environmental problems, meanwhile, are considered either environmental pollution or ecological damage.²²⁴ Based on this classification, the legal system seems clear and functional, but it meets challenges when asked to cope with systemic and complex natural disasters.

The characteristics of such fragmented legislation have led to various drawbacks in the context of environmental law for disaster risk reduction. First, such laws tend to lack comprehensive, integrated objective clauses or provisions laying out the law’s guiding principles. For example, as the “basic law,” the Environmental Protection Law only deals with disaster risk reduction regarding agricultural environmental protection.²²⁵ On the other hand, within the natural resources legal system, the Water Law requires the

218. *Id.*

219. *Id.*

220. Lu Zhongmei, *Thinking on the Research of Environmental Law in the New Era*, 4 J. CUPL 5 (2018).

221. Craig Anthony Arnold, *Environmental Law, Episode IV: A New Hope? Can Environmental Law Adapt for Resilient Communities and Ecosystems?*, 21 J. ENV’T & SUSTAINABILITY L. 1, 6 (2015).

222. This classification is widely used in Chinese environmental law textbooks. *See generally* JIN WANG, ENVIRONMENTAL LAW (Peking Univ. Press, 4th ed. 2018).

223. Yu An, *Implementation Issues of the Emergency Response Law*, 4 THEORETICAL HORIZON 44 (2009).

224. *See generally* WANG, *supra* note 222.

225. *See, e.g.*, Environmental Protection Law, *supra* note 182, art. 53 (“The people’s governments at all levels shall strengthen the protection of agricultural environment, promote the application of new technologies for protecting agricultural environment, strengthen the monitoring and early warning of agricultural pollution sources, and coordinate the relevant departments in adopting measures to prevent and control soil pollution, the desertification, alkalization, impoverishment and rocky desertification of land, land subsidence, vegetation deterioration, water loss and soil erosion, eutrophication of water bodies, exhaustion of water sources, extinction of species, and other ecological disturbances and promote the comprehensive prevention and control of plant diseases and insect pests.”).

“prevention and control” of water hazards and disasters in objective clauses.²²⁶ This has resulted in the sustainable governance of the water-based environment, the consideration of water resources and water disasters during project development, and the utilization of prohibitive measures.²²⁷ But as a rule, most natural resource legislation neglects to incorporate these objective or principle-based leading clauses.

Second, there exist serious legislative redundancies in reducing disaster risk. For instance, only the Law on the Prevention and Control of Environmental Pollution by Solid Waste and the Law on the Prevention and Control of Water Pollution prevent natural disasters, but all such laws aim to prohibit discharging, dumping, and accumulating pollutants.²²⁸ At the same time, the Water Law, Yellow River Protection Law, and Flood Control Law contain provisions prohibiting the placement of objects that obstruct flood discharge.²²⁹ Similarly, Fisheries Law, Land Management Law, and Mineral Resources Law also contain only one explicit regulation each, and these provisions all concern themselves with flood control.²³⁰ Finally, Chinese environmental law related to NbS for disaster risk reduction lacks sufficiently effective communication and coordination mechanisms. While the law nominally includes many evaluation and assessment mechanisms—like environmental impact assessments, flood impact assessment reports, atmospheric environmental impact assessments, seismic safety assessments, and geological disaster risk assessments—their procedures, scopes, and effectiveness are so varied that they do not allow entities to address risks comprehensively.²³¹

226. Water Law of the People’s Republic of China, *supra* note 168, arts. 1–2, 4, 10–11, 14.

227. Shen Baixin, *Chinese Sustainable Water Governance in the Perspective of Comparative Law*, 10 ENV’T & RES. L.R. 91 (2015).

228. Water Pollution Prevention and Control Law, *supra* note 188, art. 38; [Prevention and Control of Environment Pollution Law], art. 38, 2020 P.R.C. LAW 43.

229. Water Law of the People’s Republic of China, *supra* note 168, art. 37; Yellow River Protection Law of the People’s Republic of China, *supra* note 170, art. 67; Flood Control Law of the People’s Republic of China, *supra* note 175.

230. *See generally* Yuye Fa (渔业法) [Law on Fisheries] (promulgated by the Standing Comm. Sixth Nat’l People’s Cong., Jan. 20, 1986, rev’d Oct. 31, 2000, and Aug. 28, 2004), art. 40, 2004 P.R.C. LAWS; Tudi Guanli Fa (土地管理法) [Law on Land Administration] (promulgated by the Standing Comm. Sixth Nat’l People’s Cong., June 25, 1986, rev’d Aug. 28, 2004), art. 22, 23, 2004 P.R.C. LAWS; Kuangchan Ziyuan Fa (矿产资源法) [Law on Mineral Resources] (promulgated by the Standing Comm. Sixth Nat’l People’s Cong., Mar. 19, 1986, rev’d Aug. 29, 1996), art. 20, 1996 P.R.C. LAWS.

231. *See, e.g.*, Huanjing Yingxiang Pingjia Fa (环境影响评价法) [Environmental Impact Assessment Law] (promulgated by the Standing Comm. Ninth Nat’l People’s Cong., Oct. 22, 2002), arts. 24, 28, 2003 P.R.C. LAWS (stipulating that environmental impact assessment occur at planning and construction projects where environmental pollution and ecological damage can take place); *see e.g.*, Fanghong Fa (防洪法) [Flood Control Law] (promulgated by the Standing Comm. Eighth Nat’l People’s Cong., Aug. 19, 1997, rev’d Aug. 27, 2009, Apr. 24, 2015, and Jul. 2, 2016), art. 33, 2016 P.R.C. LAWS (stipulating that flood impact assessment reports be made for construction projects on flood plains and in flood storage

Recently, the country has indicated a willingness to discard the shackles of reductionism by formulating new types of legislation, such as the Yangtze River Protection Law, based on a holistic and systematic approach.²³² However, the prevailing environmental legal worldview remains a reductionist one, such that the ecosystem-based approach has not been fully reflected and implemented in Chinese environmental legislation.²³³ In sum, reductionist legislative thinking has rendered the country's environmental legal system fragmented and ineffective for disaster prevention and mitigation.

B. Incomplete Interaction Between Environmental Science and Legal System

The incomplete interaction between the ecosystem and legal system is reflected not only in the legislature's disregard for certain disaster risks but also in its insufficient discussion of certain forms of ecosystem services. In terms of the robustness of environmental legislation, although 27 pieces of legislation are devoted to different kinds of disaster prevention and mitigation,²³⁴ there are still many forms of natural disaster that urgently require more attention from environmental law. For example, because of the intensification of climate change and resulting sea level rise, marine disasters are becoming more frequent. Even so, the Marine Environmental Protection Law, Island Protection Law, and Marine Utilization and Management Law do not call for the restoration of mangroves, salt algae lands, coral reefs, or sand dunes for reducing hurricanes, storm surges, floods, and other marine disasters.²³⁵ Only Article 40 of the newly promulgated Wetland Conservation Law requires mangrove wetland restoration to prevent marine disaster risk.²³⁶

Simultaneously, the law's consideration of ecosystem function with respect to the pre-disaster, disaster, and post-disaster stages is insufficient. For example, the Forest Law mandates the prevention and control of soil erosion, fire, and biological disasters, but the two latter categories do not

areas); *see, e.g.*, Qixiang Fa (气象法)[Meteorological Law] (promulgated by the Standing Comm. Ninth Nat'l People's Cong., Oct. 31, 1999), art. 34, 2000 P.R.C. LAWS (stipulating that authorities at all levels shall organize atmospheric environmental impact assessments for urban planning, key national construction projects, and major regional economic development projects); *see, e.g.*, Dizhi Zaihai Fangzhi Tiaoli (地质灾害防治条例)[Regulations on Prevention and Control of Geological Disasters] (promulgated by the Standing Comm. Ninth Nat'l People's Cong., Nov. 19, 2003), art. 21, 2004 P.R.C. LAWS (stipulating that geologic-hazard risk assessments shall be conducted for planning and construction areas).

232. Lu, *supra* note 143, at 79.

233. Gong Gu, *Environmental Codification from the Perspective of the Ecosystem Approach: Direction and Ideas*, RULE L. RSCH., Issue No. 3, 2023, at 49.

234. *See* discussion *supra* Table 2 (summarizing Chinese law aimed at disaster prevention).

235. *Id.*

236. Wetlands Conservation Law, *supra* note 198, art. 40.

account for certain functions of forest ecosystems. These types of disasters can mitigate floods and droughts and reduce and prevent landslides, debris flows, avalanches, and other hydrological and geological disasters.²³⁷ In the context of disaster prevention and mitigation, planning solely for post-disaster recovery is never sufficient.

Provisions accounting for pre-disaster prevention are the most numerous, but they tend to be narrow, focusing on the prevention of existing, definite, and individual disasters.²³⁸ As a result, the role of environmental law in the emergency and recovery phases is perceived as short-term, largely ignoring the prospects for long-term recovery.²³⁹ Emergency relief and rehabilitation directly affect the adaptation and transformation capacity of disaster-stricken areas.²⁴⁰ As climate change intensifies, the likelihood of potential risks rapidly increases. Typically, the resilience indicators for disaster-affected areas include poverty reduction, sustainability, and multiple social and environmental stressors, which form a non-linear and complex relationship.²⁴¹ Therefore, transforming the socio-ecological system into an adaptive one requires environmental law to play a more substantial role in post-disaster emergency assistance and recovery.

C. Imbalance of Rights, Duties, and Responsibilities

The effectiveness of disaster risk reduction functions depends on the balance of clear rights, duties, and responsibilities.²⁴² In the process of bolstering NbS for disaster risk reduction, it is essential to involve various stakeholders.²⁴³ This requires incentivizing and safeguarding behaviors that actively promote EbA-DRR or improve environmental management. Alternatively, legislation could seek to punish or restrict actions that cause or exacerbate environmental disasters. However, China's current environmental regulations are deficient in both areas.

237. INTECHOPEN, PROTECTIVE FORESTS AS ECOSYSTEM-BASED SOLUTION FOR DISASTER RISK REDUCTION (ECO-DRR), at xiii–xiv (Michaela Teich et al. eds., 2022).

238. Wetlands Conservation Law, *supra* note 198, art. 40.

239. Melissa L. Finucane et al., *Short-Term Solutions to a Long-Term Challenge: Rethinking Disaster Recovery Planning to Reduce Vulnerabilities and Inequities*, 17 INT'L J. ENV'T RSCH. & PUB. HEALTH 482, 485 (2020).

240. *Id.*

241. See Nathan L. Engle et al., *Towards a Resilience Indicator Framework for Making Climate-Change Adaptation Decisions*, 19 MITIGATION & ADAPTATION STRATEGIES GLOB. CHANGE 1295 (2014) (explaining that non-linear and complex relationship focuses on interactions between social and ecological systems, including processes and feedbacks at various scales).

242. Xue-Song Liu, *A New Construction of Effective Disaster Prevention and Reduction From Disaster Community to Responsibility and Ethics Community*, 16 J. NAT. DISASTERS 148, 148 (2007).

243. Carl C. Anderson & Fabrice G. Renaud, *A Review of Public Acceptance of Nature-Based Solutions: The 'Why,' 'When,' and 'How' of Success for Disaster Risk Reduction Measures*, 50 AMBIO 1552, 1553 (2021).

In terms of incentive and safeguard mechanisms, there are no empowering norms actively encouraging private entities to engage in environmental and ecological disaster reduction. In addition, direct incentives related to financial, tax, or policy benefits are limited.²⁴⁴ The existing responsibility framework mainly targets administrative liabilities for enterprises, institutions, or individuals violating prohibitive norms.²⁴⁵ But numerous norms setting out both roles and responsibilities of the government and its administrative agencies lack corresponding legal consequences and accompanying accountability measures.²⁴⁶ Moreover, the traditional perception of natural disasters as *force majeure*²⁴⁷ and the historical exemption of state responsibility have led to an incongruity between the expansion of government disaster management powers and the simultaneous narrowing of accountability.²⁴⁸ This misalignment makes it difficult to comprehensively constrain situations in which the government is idle or acts improperly in the realms of ecological protection, restoration, and disaster prevention and mitigation.²⁴⁹

IV. MAINSTREAMING NATURE-BASED SOLUTIONS TO DISASTERS INTO THE ENVIRONMENTAL LEGAL CODE

Disaster risk reduction requires the collaborative governance of various legal sectors, including environmental, disaster, and social security law.²⁵⁰ China's environmental law is currently undergoing a paradigm transformation towards ecosystem-based governance.²⁵¹ Ensuring disaster regulation as one of the ecosystem services would be a natural progression. However, to address the fragmented and weak implementation of disaster prevention and mitigation norms within existing environmental law, a

244. For instance, only Article 25 of the Law on Desert Prevention and Transformation explicitly offers policy benefits to land users and leaseholders who took measures such as afforestation, reforestation, or land closure to combat desertification. See Law of the People's Republic of China on Desert Prevention and Transformation, *supra* note 174, art. 25.

245. See discussion *supra* Table 2 (highlighting 108 instances of compound norms involving authority and responsibilities).

246. See discussion *supra* Table 2 (demonstrating that only four of the 108 instances of compound norms contain administrative penalties).

247. *Force majeure* is a clause that is included in contracts to remove liability for unforeseeable and unavoidable catastrophes that interrupt the expected course of events and prevent participants from fulfilling obligations. These clauses generally cover natural disasters, such as hurricanes, tornadoes, and earthquakes, as well as human actions, such as armed conflict and man-made diseases.

248. Du Qun & Huang Zhiyu, *On the National Tort Liability for Inaction in Natural Disaster Management*, 15 J. CHINA UNIV. GEOSCIENCES (SOC. SCI. EDITION) 37 (2015).

249. *Id.*

250. See Farber & Faure, *supra* note 2, at xv (explaining that "the interdependencies between different forms of risk management" require collaboration between categories of risk management).

251. Gu Gong, *Legal Needs and Legal Expression of the Overall Management of Mountains, Rivers, Forests, Farmland, Lakes, Grass and Sand*, ORIENTAL L., 2022, Issue 1, at 108.

systematic update and improvement is necessary. The compilation of the Ecological Environment Code provides a significant opportunity.

A. The Draft Code Responses to Disaster Risk Reduction

1. General Plan

Since 2017, the Environmental and Resources Law Research Association of the China Law Society has compiled research for an Ecological Environment Code.²⁵² Nearly 200 scholars and practitioners have participated in the different forms of research.²⁵³ The project has completed three sub-projects: “Translation of Foreign Environmental Codes,” “Fundamental Theoretical Research on Environmental Code Compilation,” and “Research on Expert Proposed Draft of the Ecological and Environmental Code.”²⁵⁴ This effort has culminated in the translation and publication of environmental codes from nine countries, five monographs, and the “Expert Proposed Draft of the Ecological and Environmental Code.”²⁵⁵ Through a substantive and moderate approach that combines both “compilation” and “codification,” a comprehensive system of norms has been established. The norms consist of five sections—General Provisions, Pollution Control, Natural Ecological Conservation, Green and Low-Carbon Development, and Ecological and Environmental Responsibility²⁵⁶—spanning 36 chapters and encompassing more than 1,100 provisions.²⁵⁷

The realization of disaster prevention and mitigation functions in environmental law depends on two indispensable mechanisms: environmental management measures and the ecosystem-based approach.²⁵⁸ The extent to which an environmental code responds to disaster prevention and mitigation depends on two key facts: (1) the relationship between different environmental statutes and disaster risk reduction; and (2) whether pre-existing laws are repealed after codification.²⁵⁹ From the above analysis, it is evident that ecological protection statutes are the most closely related to

252. Lu Zhongmei, *Ten-Year Review of Environmental Rule of Law Construction and Prospects for Environmental Codification*, 36 J. BEIJING UNIV. (SOC. SCI. EDITION) 18 (2023).

253. *Id.*

254. *Id.*

255. *Id.*

256. Diao Fanchao, *Lu Zhongmei: The Motion to Initiate the Compilation of the Ecological and Environmental Code Has Been Fully Adopted*, PAPER: GREEN POL’Y OFF. (Mar. 6, 2024), https://www.thepaper.cn/newsDetail_forward_26572769.

257. *Id.*

258. ECOSYSTEM APPROACH TO DISASTER RISK REDUCTION, *supra* note 69, at 29.

259. The “moderate codification model” is a typology of existing environmental laws based on the value of sustainable development and the concept of ecological environment, then decide whether to include it in the Code. *See* Fanchao, *supra* note 256.

disaster risk reduction, and the relationship has been collaboratively governed at both the legislative and practical levels. However, the “ecological” provisions of the natural resources law will be repealed upon enactment of the Code.²⁶⁰ Therefore, the disaster prevention and mitigation provisions within the natural resources law should be thoroughly integrated and refined within the Code to comprehensively respond to disaster prevention and mitigation in the book of Natural Ecological Protection.²⁶¹ These pollution control statutes mainly focus on the exposure of pollutants in the face of disasters and the emergency treatment of resulting pollution. These statutes will also be abolished after the Code.²⁶² The disaster prevention and mitigation provisions therein should also be comprehensively integrated and addressed within the Code. The correlation between green and low-carbon development and disaster risk reduction is weaker, but it is important to analyze if and how these two aspects can be effectively aligned to enhance disaster resilience.²⁶³ Adding disaster risk reduction functions to the Ecological and Environmental Code depends upon harmonizing legal norms and integrating them into the Code’s comprehensive framework.

2. Specific Responses

Compared with existing norms, the Expert Proposed Draft of the Ecological and Environmental Code (Draft Code) demonstrates both progress and shortcomings in responding to disaster risk reduction functions. The areas of progress can be highlighted as follows. First, the Draft Code deserves praise for identifying common elements related to disaster risk reduction. For example, measures related to disaster emergency monitoring and contingency planning collected from laws such as the Water Pollution Prevention and Control Law, the Soil Pollution Prevention and Control Law, the Water Law, and the Forestry Law have been incorporated into the basic framework of the General Provisions under the Ecological and Environmental Emergency Management System (EEMS).²⁶⁴ This integration combines disaster emergency response with environmental emergency response, enabling an effective response to the environmental hazards of

260. *Id.*

261. Gu Gong, *Conception of the Nature and Ecological of the Environmental Code*, 40 *SCI. L.* 96, (2022).

262. Jin Wang, *The Construction and Innovation of the Framework of China’s Environmental Code-Lessons from the Framework of the Chinese Civil Code*, 35 *CONTEMPORARY L. REV.* 18 (2021).

263. See generally Frauke Urban et al., *Issues at the Interface of Disaster Risk Management and Low-Carbon Development*, 3 *CLIMATE & DEV.* 259, 270 (2011) (supporting the proposition that low-carbon technology development and disaster risk management is weak in the short-term but still a necessary consideration).

264. Xiaoran Zhou, *On the Establishment Principles for Basic Systems in General Provisions of Environmental Code*, 4 *J. SOOCHOW UNIV.* 42 (2021).

disasters and the disaster risks posed by environmental issues, thus improving the disaster response capacity of the socio-ecological system.²⁶⁵ Second, the Draft Code establishes the concept of “integrated ecosystem management” to coordinate and implement the approach from the book of *Natural Ecological Conservation*.²⁶⁶ This approach, which follows principles of systems thinking, adaptability, region-specific management, public participation, scientific decision-making, and dynamic adaptation, provides a solid foundation for ecosystem-based disaster risk reduction.²⁶⁷ Third, the Draft Code attempts to uniformly address the disparate sources of ecosystem degradation.²⁶⁸ The chapter on “Prevention and Control of Natural Ecosystem Degradation” systematically addresses ecological environmental disasters, such as soil erosion and land desertification. Existing laws boast similar chapters, including the Water Law, Forest Law, Grassland Law, Soil and Water Conservation Law, and Desertification Control Law.²⁶⁹ Finally, in the Green and Low-Carbon Development section, the Draft Code seeks to establish a monitoring, prediction, and early-warning mechanism for climate disasters.²⁷⁰ This inclusion integrates climate-change risk management into the disaster risk reduction framework, providing a critical response to the increasing frequency of climate-related disasters.²⁷¹

3. Potential Shortcomings

While there is progress in these areas, it is also important to acknowledge the potential shortcomings in the Draft Code and to continue refining it. By doing so, we can incorporate comprehensive and effective disaster prevention and mitigation measures into the final version of the Ecological Environment Code.

For example, the Draft Code not only fails to solve the existing inadequacies in the comprehensive regulatory framework of environmental laws for disaster risk reduction—including issues of imbalance to rights and responsibilities and the incompleteness of the legal system—but also fails to incorporate existing disaster-prevention and -mitigation norms. Furthermore, there has been insufficient discussion on post-codification disposal plans, which undoubtedly weakens the disaster-prevention and -mitigation

265. See generally Birutė Pitrenaitė-Žilėnienė et al., *Enhancing Resilience Against Disasters: Engaging the Public via Social Technologies*, 4 *SOCIALINĖS TECHNOLOGIJOS* 318, 318–32 (2014) (supporting integration of different legal propositions that enhance disaster response and resilience).

266. Gong, *supra* note 261.

267. *Id.*

268. *Id.*

269. *Id.*

270. Zhongmei Zhang, *The Contributions Made by the Green and Low-Carbon Development Chapter of the Environmental Code to Sustainable Development*, 40 *SCI. L.* 87 (2022).

271. *Id.*

functions of the Draft Code. For example, the Water Law—along with its legislative purposes, fundamental principles, planning guidelines, monitoring systems, regulations on water use, hydropower, river management, water-engineering facilities, and various prohibitive and restrictive measures to prevent and control hydrological disasters—has not been included.

Although the Code adopted limited and moderate “ecological” codification, those regulations should be modified rather than discarded.²⁷² These regulatory provisions on disaster risk reduction properly fall within the scope of the “ecological” aspect and should not be deleted. Even though the existing Draft Code establishes an ecosystem-based approach; dedicates specific chapters to develop disaster prevention and control systems; and provides additional conceptual, methodological, and institutional support for EbA-DRR, it ignores the specific mitigating functions of particular ecosystems.²⁷³ This omission may result in challenges to the effective implementation of the ecosystem approach or in the approach being implemented incompletely.

B. Systematic Approaches

1. Further Clarifying the Applicability of Nature-Based Solutions for Disasters

Although the Draft Code establishes the ecosystem approach,²⁷⁴ it does not explicitly define the proper scope of that approach. This scope should be clarified in the final Code. Relevant legal frameworks should be required to rationally utilize natural resources, implement environmental governance, and mitigate risks at an ecosystem level. This not only safeguards environmental and ecosystem health and helps reduce the occurrence of disasters and their impacts, but also improves societal and individual adaptability.²⁷⁵ Apart from helping distinguish environmental law from disaster law, focusing on short-term recovery helps shift the focus to long-term ecosystem resilience after natural disasters. Short-term solutions help socio-ecological systems that are vulnerable to disasters better cope with future disasters.²⁷⁶

272. Fanchao, *supra* note 256.

273. Gong, *supra* note 261.

274. Gong, *supra* note 233.

275. Colin G. Harrison & Peter R. Williams, *A Systems Approach to Natural Disaster Resilience*, 65 SIMULATION MODELLING PRACTICE & THEORY 11, 19 (2016).

276. Morgan Drake, *Federal Environmental Exemptions for Natural Disasters and the Case for Ecosystem Resilience*, 34 BYU J. PUB. L. 109, 110 (2019).

Though the ecosystem approach inherently provides regulating and buffering functions for humanity on a scientific level, its establishment in legal frameworks does not automatically confer disaster-prevention-and-mitigation capabilities to environmental law. This is partly because the ecosystem approach faces controversies, uncertainties, and complexities with respect to theoretical frameworks, methodologies, and practical applications.²⁷⁷ Additionally, these legal norms require clarity, without which the ecosystem approach may not as effectively guide government compliance. The necessity of reconciling conflicts of interest is also evident as different actors compete for ecosystem service functions, presenting intricate narratives of competition and interests,²⁷⁸ including competing ecological interests.²⁷⁹ Without explicit delineation of the scope, it is difficult to arrange specific systems for implementation, potentially neglecting disaster-regulating functions.²⁸⁰ Hence, although establishing the ecosystem approach serves as a foundation, clarifying its applicability in the field of disaster risk reduction serves two purposes.²⁸¹ On one hand, the ecosystem approach acts as a directive for specific environmental legal systems in managing disaster risks.²⁸² On the other, it acts as a “bridging clause” between environmental law and disaster law, providing a normative basis for their collaborative governance.²⁸³

2. Systemic Convergence of Integrated Risk Governance

Once the provisions pertaining to the ecosystem approach and its areas of application have been established in the Code, further steps are required to comprehensively rectify the existing inadequacies. First, the state must meticulously review and rectify the existing draft proposal from environmental law experts, incorporating any omitted disaster-risk-reduction norms into their respective chapters. Then, for the existing legislative gaps or incomplete regulations related to marine and biological disasters, the state

277. Vito De Lucia, *Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law*, 27 J. ENV'T L. 91, 93 (2015).

278. Lars Hein et al., *Spatial Scales, Stakeholders and the Valuation of Ecosystem Services*, 57 ECOLOGICAL ECON. 209, 224 (2006).

279. Volker Mauerhofer, *The Law, Ecosystem Services and Ecosystem Functions: An In-Depth Overview of Coverage and Interrelation*, 29 ECOSYSTEM SERVS. 190, 195 (2018).

280. VERCHICK, *supra* note 5, at 81.

281. Adam W. Whelchel et al., *Advancing Ecosystems and Disaster Risk Reduction in Policy, Planning, Implementation, and Management*, INT'L J. DISASTER RISK REDUCTION, Dec. 2018, at 1, 1.

282. Jacqueline Peel & David Fisher, *International Law at the Intersection of Environmental Protection and Disaster Risk Reduction*, in THE ROLE OF INTERNATIONAL ENVIRONMENTAL LAW IN DISASTER RISK REDUCTION 1, 9 (Jacqueline Peel & David Fisher eds., 2016).

283. See Farber, *supra* note 76, at 1786 (noting that appropriate legal guidance can ensure that disasters are anticipated and contained in a comprehensive and equitable manner). Farber does not directly discuss the ecosystem approach as a tool for integrating environmental law and disaster law.

should employ a process of consolidation to supplement and enhance these regulations. The state should then seamlessly integrate these provisions into various chapters of the Natural Ecosystem Conservation section,²⁸⁴ thus forming a comprehensive and scientifically sound regulatory framework. Next, it will be crucial to expand the scope of disaster risk management, thereby reinforcing the disaster-risk-prevention capabilities of environmental law.²⁸⁵ The ecosystem approach, which uses scientific, adaptive management to address the complexity and dynamism of ecosystems, requires a risk-preventive stance while respecting the limits of ecosystem functionality.²⁸⁶ Therefore, the state should expand the existing, reductionist role of mitigating singular disaster losses within environmental law by bolstering the law's preventive governance capacity to first identify potential disaster risks and then take proactive measures to prevent them. To achieve this, the existing environmental impact assessment (EIA) system should be expanded to encompass natural disaster risks.²⁸⁷ This could be achieved by broadening the scope of the requisite assessment to include natural disaster risks in coordination with existing regulations, such as EIAs, geological hazard assessments, and seismic safety evaluations. Finally, regulations or departmental rules pertaining to the planning and construction EIAs should be modified and enhanced.²⁸⁸

Identifying, assessing, and preventing disaster risks could be achieved through the following three key steps. First, planners should incorporate risk into development planning by conducting EIAs for development projects (such as dam construction and ecological restoration projects). This would reduce or prevent the construction of communities and infrastructure in vulnerable areas.²⁸⁹ For instance, such an assessment would need to consider how proposed deforestation activities could impact local landslide or flood risks. Second, integrating EIAs fully into post-disaster activities helps

284. Gu Gong recommends that the Natural Ecosystem Conservation section of the Code be structured into ten chapters: Chapter 1 General Provisions; Chapter 2 Nature Conservation Planning; Chapter 3 Nature Conservation Zoning; Chapter 4 Nature Conservation Information; Chapter 5 Control and Conservation of Ecological Elements Utilization; Chapter 6 Ecological Regional Conservation; Chapter 7 Nature Conservation Sites; Chapter 8 Species and Genetic Diversity Conservation; Chapter 9 Nature Ecological Degradation Prevention, Control and Improvement; and Chapter 10 Nature Ecological Conservation Funding and Benefits. Gong, *supra* note 261.

285. *Id.*

286. Elisa Morgera, *The Ecosystem Approach and the Precautionary Principle*, 3 ENCYCL. ENV'T L. 70, 74, 75 (2017).

287. See ECOSYSTEM APPROACH TO DISASTER RISK REDUCTION, *supra* note 69, at 163–84 (exploring EIAs as a policy-planning tool for natural disaster risk management).

288. See *id.* at 168 (illustrating the potential scope of EIAs in risk management).

289. See Yung-Jaan Lee, *Social Vulnerability Indicators as a Sustainable Planning Tool*, 44 ENV'T IMPACT ASSESSMENT REV. 31, 31 (2014) (“[A] focus on social vulnerability moves hazard research towards a more comprehensive and humanistic framework . . . as this framework considers the underlying but less visible factors that exacerbate the effects of . . . hazards.”).

prevent the recurrence of disasters and promotes sustainable development.²⁹⁰ Third, engaging with and soliciting input from the public, especially vulnerable communities, during the EIA process ensures that disaster-prevention-and-mitigation measures align with local ecological and developmental needs.²⁹¹ Especially as natural disasters become more frequent and severe due to climate change, expanding environmental law's capability to prevent and mitigate disaster requires entities to consider climate change's impact on such measures. Accordingly, measures must be taken to adapt to climate change and prevent future disaster risks.

3. Enhancing Incentives and Constraints for Equal Rights and Responsibilities

To actively reduce disaster risk by implementing actions that protect and restore ecosystems, the Code could integrate incentive mechanisms into various aspects of ecological environmental protection. These include economic, honor, and authorization incentives.²⁹² This integration ensures the sustainability and widespread adoption of such actions. Economic and honor incentives can be incorporated into the general provisions of the Guarantee and Guidance Mechanism section by “bringing together extracted and abstracted generalities.”²⁹³ Authorization incentives should be explicitly defined in the general provisions of the Ecological Environment Code to grant rights to enterprises, institutions, and the public for ecological protection and restoration.²⁹⁴

The maxim “one side suffering, all sides supporting” represents national cohesion, which forms the basis of a “disaster community.”²⁹⁵ However, as humanity's impact on the natural environment deepens, especially with respect to the intensifying effects of climate change, natural disasters can no longer be regarded solely as a *force majeure*.²⁹⁶ The disaster-prevention and

290. Thomas B. Fischer, *Disaster and Risk Management: The Role of Environmental Assessment*, J. ENV'T ASSESSMENT POL'Y & MGMT., Sept. 2014, at 1, 1.

291. See Kevin Alden, Note, *Extending NEPA to Address Disaster Mitigation*, 35 BYU J. PUB. L. 129, 132 (2020) (explaining how the U.S.'s National Environmental Policy Act requires public input at the environmental assessment stage).

292. See Annisa Triyanti & Eric Chu, *A Survey of Governance Approaches to Ecosystem-Based Disaster Risk Reduction: Current Gaps and Future Directions*, 32 INT'L J. DISASTER RISK REDUCTION 11 (2018) (explaining how incentives can be used for ecosystem conservation), https://pure-oai.bham.ac.uk/ws/files/45176689/IJDRR_Unedited_Proof.pdf.

293. The Code is based on the Pendleton system's legislative technique of “bringing together extracted and abstracted generalities.” Fanchao, *supra* note 256.

294. *Id.*

295. Liu, *supra* note 242.

296. See Kristian Cedervall Lauta, *New Fault Lines? On Responsibility and Disasters*, 5 EUR. J. RISK REGUL. 137, 137 (2014) (“[A]s disasters increasingly come to be understood through the affected society's vulnerabilities, what previously was considered horrible misfortunes become potential injustices instead—thereby resulting in an increased need for legal processes.”).

disaster-mitigation regulations in environmental law should gradually transition away from their “soft law” nature, challenging the prevailing trend of privatizing and internalizing responsibility and moving towards creating a “responsibility community” out of the disaster community.²⁹⁷ In the context of natural disasters, the government and its administrative bodies play a leading role in prevention, emergency response, and management.²⁹⁸ Consequently, these entities should enhance the review, constraint, and accountability of decisions regarding consideration of natural disaster risks.

Including so-called responsibility clauses would encourage various entities to reflect on past experiences and improve on future environmental decisions. Such clauses would help to address the issue of imbalanced rights and responsibilities. Additionally, incorporating causative-liability clauses into the code—when paired with legal liability systems for natural disaster prevention and control—could enhance the effectiveness of accountability mechanisms. Adopting these measures establishes a comprehensive legal framework that could not only incentivize ecological protection and disaster risk reduction but also enforce accountability for decision-making in the face of natural disasters.²⁹⁹

CONCLUSION

Constructing an ecological civilization in China requires innovation within the legal system and, consequently, the improvement of existing legal mechanisms and the creation of new ones. Compiling the Ecological Environment Code provides a favorable approach and is a valuable opportunity for achieving these goals.³⁰⁰ Synergizing the framework for nature-based solutions to disaster risk reduction is essential; although a loose framework governing risk reduction exists, it remains underdeveloped and deserves more thorough attention. This Article serves as an initial exploration of these ideas, inviting further discussion and insights from experts in the field.

297. Liu, *supra* note 242.

298. Zhiyu Huang, *The Study of Right-Based Approach to Disaster Prevention and Mitigation*, 2 LEGAL F. 125 (2018).

299. See Michael G. Faure, *In the Aftermath of the Disaster: Liability and Compensation Mechanisms as Tools to Reduce Disaster Risks*, 52 STAN. J. INT'L L. 95, 157 (2016) (explaining that liability regimes can create “better incentives for disaster risk mitigation by avoiding channeling legal liability”).

300. Fanchao, *supra* note 256.

**LEAD-FREE WITH EQUITY: AN ENVIRONMENTAL
JUSTICE-FOCUSED PROPOSAL TO ACHIEVE LEAD-FREE
D.C. BY 2030**

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INTRODUCTION

Intellectual disabilities, kidney disease, reproductive concerns, brain damage, cardiovascular disease—what do these have in common?² These seemingly unrelated health risks are all potential consequences of lead poisoning³—a very real risk for the 22 million people living in America who currently use lead service lines for drinking water.⁴ A service line is the pipe connecting the water main to the plumbing inside a home; pipes that contain lead are referred to as lead service lines (LSLs).⁵ The Safe Drinking Water Act requires the Environmental Protection Agency (EPA) to determine maximum contaminant level goals (MCLGs) for various contaminants in drinking water, beyond which no adverse health effects are likely to occur.⁶ For lead, EPA has set the maximum level at zero, based on its toxicity and ability to accumulate in the human body over time.⁷ “No safe blood level has been identified” because lead has no known biological use, can be harmful to human health even at extremely low exposure levels, and exposure is significantly more harmful to children and other vulnerable groups.⁸ Lead poisoning can lead to a variety of serious health effects, like seizures and even death.⁹

The widespread prevalence of lead service lines has impacted communities across the country. The District of Columbia (the “District”),

2. See *Lead Poisoning*, WORLD HEALTH ORG., <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health> (last visited Oct. 15, 2023) (discussing how lead can lead to various medical conditions).

3. Lead can be found in many places, including air, soil, water, and certain manufactured products. While lead-based paint poses the greatest risk based on its prevalence and difficulty to track, lead service lines can be replaced and significantly decrease the risk of lead-contaminated water. See *Learn about Lead*, EPA, <https://www.epa.gov/lead/learn-about-lead> (last visited Jan. 19, 2024) (discussing potential health risks from lead).

4. See Eric Olson & Alexandra Stubblefield, *Lead Pipes are Widespread and Used in Every State*, NAT. RES. DEF. COUNCIL (July 7, 2021), <https://www.nrde.org/resources/lead-pipes-are-widespread-and-used-every-state> (discussing danger of lead service pipes for drinking water).

5. *Getting Started with Lead Service Line Identification and Replacement*, EPA, <https://www.epa.gov/ground-water-and-drinking-water/getting-started-lead-service-line-identification-and-replacement> (last visited Jan. 19, 2024).

6. See *Basic Information about Lead in Drinking Water*, EPA, <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water> (last visited Oct. 15, 2023) (stating that The Safe Drinking Water Act requires the EPA to determine maximum contaminant level goals of various contaminants in drinking water, a point at which no adverse health effects are likely to occur).

7. See *id.* (stating that based on its toxicity and ability to accumulate in the human body over time, the EPA set the maximum level at zero for lead).

8. *Lead in Drinking Water*, CTR. FOR DISEASE CONTROL & PREVENTION, <https://www.cdc.gov/nceh/lead/prevention/sources/water.htm> (last visited Oct. 15, 2023).

9. See *Lead Poisoning*, *supra* note 2 (discussing how lead can lead to various medical conditions); see also *Lead Poisoning*, MAYO CLINIC, <https://www.mayoclinic.org/diseases-conditions/lead-poisoning/symptoms-causes/syc-20354717> (last visited Oct. 15, 2023) (discussing that lead poisoning can lead to a wide variety of health effects, as serious as seizures and death).

where thousands of lead service lines are still in use and continue to threaten the health and safety of all residents,¹⁰ can serve as a case study to remedy this nationwide issue. Given that lead service lines are the main source of lead contamination in drinking water, the District has prioritized lead pipe replacements for residents affected by the risks of lead poisoning.¹¹ Based on the Biden-Harris Justice Initiative, the Lead-Free by 2030 Initiative focuses on historically disadvantaged and vulnerable communities.¹² Closing the gap for people of color and low-income communities requires an environmental justice-focused prioritization of lead service line replacements within the most vulnerable areas in the District. Although individual action can lead to some benefits, a larger-scale initiative is needed to address the inequity issues that arise from most LSL replacement plans based on the high cost of replacements, disparate access to funding and grants, and high concentration of LSLs in historically underrepresented groups.¹³ In addition to direct health benefits for residents, a full LSL replacement will yield \$22,000 in societal benefits for reduced health impacts.¹⁴ A justice-focused program can help distribute funds to demographics that need it most to alleviate financial concerns surrounding LSL replacements, leading to an overall safer and healthier community.¹⁵

This paper will discuss the current lead service line-replacement programs in the District and propose a clear and centralized policy with an environmental justice lens to ensure equitable access to safe water across all

10. See Valeria Baron, *DC Water's Own Data Suggest Widespread Lead Contamination*, NAT. RES. DEF. COUNCIL (June 25, 2021), <https://www.nrdc.org/bio/valerie-baron/dc-waters-own-data-suggest-widespread-lead-contamination> (discussing how thousands of lead service lines are still in use in the District of Columbia).

11. See *Lead in Drinking Water*, *supra* note 8 (explaining that lead service lines are the main source of lead contamination in drinking water); see also *Lead Pipe Replacement Programs*, DC WATER, <https://www.dewater.com/replacelead> (last visited Jan. 20, 2024) (stating that D.C. has prioritized lead pipe replacement for residents).

12. See *Lead Free by 2030*, DC WATER, <https://www.dewater.com/lead> (last visited Jan. 22, 2024) (discussing the Lead Free by 2030 initiative in D.C.); see also *Justice40, A Whole-of-Government Initiative*, WHITEHOUSE.GOV, <https://www.whitehouse.gov/environmentaljustice/justice40/> (last visited Jan. 22, 2024) (explaining how the Biden-Harris Justice initiative, Lead-Free by 2030, focuses on historically disadvantaged and vulnerable communities).

13. See *Recognizing Efforts to Replace Lead Service Lines*, ENV'T DEF. FUND, <https://www.edf.org/health/recognizing-efforts-replace-lead-service-lines> (last visited Oct. 15, 2023) (explaining how a larger-scale initiative is needed to address the inequity issues that arise from most LSL replacement plans).

14. See Tom Neltner, *Eliminating Lead Service Lines Yields Huge Benefits for Reducing Premature Cardiovascular Deaths*, ENV'T DEF. FUND (Dec. 6, 2023), <https://blogs.edf.org/health/2023/12/06/eliminating-lsls-yields-huge-benefits-for-reducing-premature-cvd-deaths/> (stating that a full LSL replacement will yield \$22,000 in societal benefits for reduced health impacts).

15. See *Equity in Lead Service Line Replacement*, LSLR COLLABORATIVE, <https://www.lslr-collaborative.org/equity.html> (last visited Oct. 15, 2023) (explaining how a justice-focused program can help distribute funds to demographics that need it).

neighborhoods.¹⁶ While there are many federal initiatives and programs to remove LSLs nationwide,¹⁷ the scope of this paper is limited to opportunities within the District. This paper will evaluate the current initiatives to remove lead pipes in the District and propose that local programs focus on full LSL replacements across the District to further environmental justice and public-health goals. Though the District has prioritized LSL replacements and set aside funding for these programs,¹⁸ there are still gaps in the framework that prevent these replacement plans from being equitable, feasible, and accessible for all communities. Part I of this paper discusses the prevalence of LSLs in the District, particularly in vulnerable communities; consider the adverse effects of partial replacements; and provide examples of successful LSL replacement plans around the nation that have protected those most at risk. Part II examines replacement plans currently in place, including the Lead-Free by 2030 Initiative and its disproportionate impact on vulnerable communities. Part III provides suggestions to improve this initiative with revisions to the replacement plans and opportunities for funding to ensure vulnerable communities have access to clean water.

I. WHY IS THERE LEAD IN AMERICAN DRINKING WATER?

The presence of lead in drinking water is deeply rooted in American history. American colonies in the 1600s used lead pipes for the transportation of drinking water.¹⁹ Widespread installation and use of these pipes continued despite early identifications of health risks due to the durability, pliability, and relatively low corrosiveness of lead.²⁰ The powerful Lead Industries Association (LIA) accelerated the promotion and sale of lead pipes for

16. This paper uses the term “environmental justice” to describe the right to a safe, healthy, and sustainable environment for everyone, regardless of race, color, national origin, or income. Historically, communities of color face a disproportionate number of environmental harms. Environmental justice initiatives seek to remedy those gaps. *See generally* Renee Skelton & Vernice Miller, *The Environmental Justice Movement*, NAT. RES. DEF. COUNCIL (Aug. 22, 2023), <https://www.nrdc.org/stories/environmental-justice-movement> (defining environmental justice); *see also* *Environmental Justice*, S. ENV'T L. CTR., <https://www.southernenvironment.org/our-focus/environmental-justice/> (last visited Apr. 7, 2024) (defining environmental justice and explaining initiatives).

17. *See e.g.*, *Lead Service Line Replacement Accelerators*, EPA, <https://www.epa.gov/water-infrastructure/lead-service-line-replacement-accelerators> (last visited Nov. 30, 2023) (providing “targeted technical assistance” for various states through local education efforts and community outreach, guidance for Bipartisan Infrastructure Law funding, and support in developing LSL replacement plans).

18. Jessica Kronzer, *It's Time to Change Lead Pipes, EPA Says — How DC's Water Crisis Spurred this Move 20 Years Ago*, WTOP NEWS (Dec. 1, 2023), <https://wtop.com/dc/2023/12/its-time-to-change-lead-pipes-epa-says-how-dcs-water-crisis-spurred-this-move-20-years-ago/>.

19. *See* Jack Lewis, *Lead Poisoning: A Historical Perspective*, EPA (1985), <https://www.epa.gov/archive/epa/aboutepa/lead-poisoning-historical-perspective.html> (explaining the use of lead pipes dating back to the 1600s in the American colonies).

20. Richard Rabin, *The Lead Industry and Lead Water Pipes: “A Modest Campaign”*, 98 AM. J. PUB. HEALTH 1585, 1590 (2008).

decades as industry representatives worked closely with federal officials, plumbers' organizations, architects, and local water authorities to ensure the installation of lead pipes throughout the country.²¹ Over several decades, the LIA published a variety of materials discussing the benefits of lead pipes and provided guidance on how to install and repair the pipes.²² The marketing themes promoting lead included notions about the use of lead as “modern,” emphasis on its durability, and an endorsement of lead as the “responsible” and “sustainable” option.²³ This led homeowners to mistakenly believe their lead pipes were harmless and not take any action to prevent the installation of lead pipes under their property.²⁴

The LIA was further empowered due to the lack of federal regulation and public skepticism about the health risks of lead pipes.²⁵ As literature describing the risks associated with lead contamination developed and industrial workers began noticing adverse health effects, public concern about lead pipes emerged.²⁶ The 1974 Safe Drinking Water Act did not originally set standards limiting the concentration of lead in public water systems but was later amended to include the requirement of “lead-free” pipes after EPA conducted further research into the effects of lead poisoning.²⁷ Homeowners remained uninformed about the risks of lead and continued to rely on lead pipes for their water.²⁸ Though Congress banned the installation of lead water pipes in 1986 based on more concrete findings about their adverse health effects,²⁹ up to 10 million American households and around 400,000 schools currently have water connections through lead pipes and lead service lines.³⁰ The LIA's promotion of lead pipes, the lack of immediate action by lawmakers, and the unclear scientific determinations of the health risks associated with lead contamination placed the responsibility

21. Rabin, *supra* note 20, at 1586.

22. *Id.* at 1587–88.

23. Perry Gottesfeld, *Lead Industry Influence in the 21st Century: An Old Playbook for a “Modern Metal”*, 112 AM. J. PUB. HEALTH 723, 723–24 (2022).

24. *See id.* at 724 (describing the ways that the lead industry downplayed harms).

25. Rabin, *supra* note 20, at 1588–89.

26. *Id.* at 1584; *see* David C. Bellinger & Andrew M. Bellinger, *Childhood Lead Poisoning: The Torturous Path from Science to Policy*, 116 J. CLINICAL INVESTIGATION, 853, 855–56 (2006) (providing an example of the dangers of lead exposure in children and why the governmental response was limited).

27. Rabin, *supra* note 20, at 1590; *Use of Lead Free Pipes, Fittings, Fixtures, Solder, and Flux for Drinking Water*, EPA (Apr. 5, 2024), <https://www.epa.gov/SDWA/Use-Lead-Free-Pipes-Fittings-Fixtures-Solder-and-Flux-Drinking-Water>.

28. Gottesfeld, *supra* note 23, at 5724.

29. Lauren Rosenthal & Will Craft, *Buried Lead: How the EPA Has Left Americans Exposed to Lead in Drinking Water*, APM REPORTS (May 4, 2020), <https://www.apmreports.org/story/2020/05/04/epa-lead-pipes-drinking-water#>.

30. *Fact Sheet: The Biden-Harris Lead Pipe and Paint Action Plan*, WHITE HOUSE (Dec. 16, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/16/fact-sheet-the-biden-harris-lead-pipe-and-paint-action-plan/#>.

on homeowners to identify, remove, and replace lead pipes on their property without any clear direction.

A. Lead-Contaminated Water in the District of Columbia

In the District, LSLs were predominantly installed prior to the mid-1950s, but there are records of installations as late as 1977.³¹ The ongoing issue of lead-contaminated water was exacerbated in the early 2000s when the District received national attention for the high health risks of its drinking water.³² Some households had lead levels above 300 parts per billion (ppb), exceeding EPA's 15 ppb action level, and creating an increased risk of miscarriage and fetal death.³³ Between 2001 and 2004, there were 200 fetal deaths as a result of lead-contaminated water and 2,000 miscarriages due to lead poisoning in mothers.³⁴ At the time, it was considered the "nation's most severe lead water contamination crisis."³⁵ A few officials in the District were aware of the issues but took years to notify residents.³⁶ Six congressional investigations and a Center for Disease Control and Prevention (CDC) report emphatically stated that there was no issue with the drinking water in the District, putting residents at unknown levels of risk.³⁷ The lack of communication or clarity on the severity of the issue made it difficult for homeowners to act.³⁸

Like the more recent crisis in Flint, Michigan, the District's drinking-water crisis emerged during a change in water-supply management.³⁹ Between 2001 and 2004, the Washington Aqueduct, which supplies water for

31. *Do You Have Lead Pipes? Let Us Help You Find Out*, DC WATER, <https://www.dewater.com/resources/lead/do-you-have-lead-pipes/let-us-help-you-find-out#> (last visited Oct. 24, 2023).

32. Mary Tiemann, CONG. RSCH. SERV., *Lead in Drinking Water: Washington, DC, Issues and Broader Regulatory Implications* 1 (Oct. 7, 2004); Katherine Shaver & Dana Hedgpeth, *D.C.'s Decade-old Problem of Lead in Water Gets New Attention During Flint Crisis*, WASH. POST (Mar. 17, 2016) https://www.washingtonpost.com/local/dcs-decade-old-problem-of-lead-in-water-gets-new-attention-during-flint-crisis/2016/03/17/79f8d476-ec64-11e5-b0fd-073d5930a7b7_story.html.

33. Rebecca Renner, *Plumbing the Depths of D.C.'s Drinking Water Crisis*, AM. CHEMICAL SOC'Y (June 15, 2004); Michael Andrei, *Failure to Learn from D.C. Water Crisis Led to Flint, Edwards Tells UB Audience*, UBNOW (Oct. 20, 2016), <https://www.buffalo.edu/ubnow/stories/2016/10/edwards-renew-lecture.html#>.

34. Andrei, *supra* note 33.

35. Baron, *supra* note 10.

36. Andrei, *supra* note 33.

37. *Id.*

38. See David Nakamura, *Water in D.C. Exceeds EPA Lead Limit*, WASH. POST (Jan. 30, 2004, 7:00 PM), <https://www.washingtonpost.com/archive/politics/2004/01/31/water-in-dc-exceeds-epa-lead-limit/1e54ff9b-a393-4f0a-a2dd-7e8ceedd1e91/> (showing that homeowners were not properly notified about the lead contamination).

39. *Flint Water Crisis*, CTR. FOR DISEASE CONTROL & PREVENTION, https://www.cdc.gov/nceh/casper/pdf-html/flint_water_crisis_pdf.html#print (last visited Apr. 3, 2024).

the District, switched its treatment chemical from chlorine to chloramine⁴⁰ in accordance with an EPA rule to limit byproduct contamination.⁴¹ The chloramine, however, caused pipe corrosion and resulted in lead leaking into the water supply.⁴² Media attention and news stories first exposed the issue and the city received national attention for its “alarming” levels of lead.⁴³ It took three years for the Washington Aqueduct to act, and residents continued drinking lead-contaminated water until 2004, when the Aqueduct took steps to address the pipe corrosion, including adding orthophosphate to the water and replacing old pipes that may have been at higher risk of lead leakage.⁴⁴ Orthophosphate, a tasteless, odorless, food-grade additive, creates a protective coating inside pipes and is effective in reducing the levels of lead released in water.⁴⁵ Within a few months, the District saw lead levels drop below EPA’s standards, emphasizing how a relatively simple action made a significant change in the quality of life for residents in a short amount of time.⁴⁶ However, orthophosphate is not a suitable substitute for lead service line replacements; the protective layer can corrode over time or lose efficacy if disturbed during a partial LSL replacement.⁴⁷ More than 20 years after initial discovery of these lead pipes by government officials, many pipes await replacement.⁴⁸

B. Disproportionate Impact of Partial Replacements on Vulnerable Communities

Although everyone is equally vulnerable to lead poisoning, not everyone is equally at risk. In addition to the LIA’s influence, historical legislation incorporating discriminatory practices forced people of color to stay in older, undeveloped neighborhoods with high levels of lead contamination, creating

40. Nakamura, *supra* note 38.

41. Shaver & Hedgpeth, *supra* note 32; see EPA, EVALUATION OF WASHINGTON AQUEDUCT TREATMENT CHANGES 1 (2008) (describing the requirement to switch from chlorine to chloramine); see also EPA, ELEVATED LEAD IN D.C. DRINKING WATER: A STUDY OF POTENTIAL CAUSATIVE EVENTS 1 (2007) (describing why EPA found the switch necessary).

42. Nakamura, *supra* note 38.

43. See *id.* (providing an example of a Washington Post article with some residents’ responses, proving there was national media attention to the D.C. water crisis).

44. Shaver & Hedgpeth, *supra* note 32.

45. *Corrosion Control Treatment*, PROVIDENCE WATER, <https://www.provwater.com/water-quality/lead-center/corrosion-control-treatment#> (last visited Apr. 6, 2024).

46. Neal Augenstein, *Before Flint: D.C.’s Drinking Water Crisis Was Even Worse*, WTOP NEWS (Apr. 4, 2016), <https://wtop.com/dc/2016/04/flint-d-c-s-drinking-water-crisis-even-worse/>.

47. Analies Dyjak, *Orthophosphate and Lead Contamination in Drinking Water*, HYDROVIV (Oct. 1, 2018), <https://www.hydroviv.com/blogs/water-smarts/orthophosphate>.

48. See Baron, *supra* note 10 (explaining how although they were discovered 20 years prior, many of the pipes found to have lead contamination have yet to be replaced).

a disproportionate impact of lead exposure on people of color.⁴⁹ Federal policies, such as redlining,⁵⁰ led to state disinvestment in affected communities and residents had little access to private funding to invest in proper infrastructure. As a result, Black households are at a greater risk of lead exposure, and neighborhoods with higher percentages of residents below the poverty line have elevated blood-lead levels.⁵¹ Racial segregation has contributed to low-income communities and people of color experiencing extraordinarily high exposure to lead-contaminated water.⁵²

Like many environmental justice issues, lead-contaminated water predominantly affects people of color and low-income District residents.⁵³ With respect to general lead exposure, Black Americans have the highest mean blood-lead levels.⁵⁴ Low-income and minority populations disproportionately live in older housing units with LSLs installed before the congressional lead-pipe ban.⁵⁵ The highest blood-lead levels are predominantly in Black children, putting them at the highest risk level.⁵⁶ Despite the nation's progress in lowering overall child blood-lead levels, Black children still face the biggest risks of lead exposure and lead poisoning.⁵⁷ Poverty and education levels also contribute to the likelihood of exposure to lead-contaminated water.⁵⁸ “[T]he U.S. Government Accountability Office found higher concentrations of LSLs in neighborhoods with more markers of vulnerability,” including high poverty rates, high unemployment rates, larger minority populations, more single female-headed households, more residents who rent property rather than own, and lower educational attainment.⁵⁹

One of the most significant factors contributing to this disproportionate racialized impact is the consideration of whether to replace the entire service

49. Fadumo M. Abdi & Kristine Andrews, *Redlining Has Left Many Communities of Color Exposed to Lead*, CHILD TRENDS (Feb. 13, 2018), <https://www.childtrends.org/blog/redlining-left-many-communities-color-exposed-lead>.

50. See *Redlining*, LEGAL INFO. INST., <https://www.law.cornell.edu/wex/redlining> (Apr. 2022) (defining the practice).

51. Robert J. Sampson & Alix S. Winter, *The Racial Ecology of Lead Poisoning: Toxic Inequality in Chicago Neighborhoods*, 13 CAMBRIDGE UNIV. PRESS 261, 262, 266 (2016).

52. *Id.* at 266, 279.

53. See Karen J. Baehler et al., *Full Lead Service Line Replacement: A Case Study of Equity in Environmental Remediation*, 14 SUSTAINABILITY 352, 354 (2021) (describing the disproportionate impacts of lead-contaminated water on marginalized groups generally).

54. *Id.*

55. *Lead and Copper Rule Improvements*, EPA, <https://www.epa.gov/ground-water-and-drinking-water/lead-and-copper-rule-improvements> (last visited Apr. 6, 2024).

56. Deniz Yeter et al., *Disparity in Risk Factor Severity for Early Childhood Blood Lead Among Predominantly African American Black Children: The 1999 to 2010 U.S. NHANES*, 17 INT'L. J. ENV'T RES. & PUB. HEALTH 1552, 1552 (2020).

57. *Id.* at 1552-53.

58. *Id.* at 1552.

59. Baehler, *supra* note 53, at 354.

line or just the portion under public property. Currently, some lead-replacement initiatives, such as those in Virginia⁶⁰ and Maryland,⁶¹ offer the option to partially replace the water pipes, focusing only on the portion under public land and leaving the privately owned pipes alone. Replacing the privately owned pipes is the responsibility of the homeowner, creating unequal remedies for different neighborhoods. Additionally, partial replacements can actually increase the amount of lead that seeps into drinking water by dislodging the lead in the unreplaced pipes, increasing water contamination.⁶² Studies have shown that the process of partially replacing a lead service line, such as digging underground and cutting pipes, can release particulate lead.⁶³ The new materials from partial LSL replacements can increase corrosion⁶⁴ and create galvanic corrosion,⁶⁵ which creates a new source of lead in the pipe and further increases contamination. Additionally, fusing a lead pipe with another material can cause corrosion of the metals which will then affect the water supply.⁶⁶ Many replacement pipes are made of copper, which can cause electrochemical reactions that release lead ions.⁶⁷

EPA's Science Advisory Board notes that partial replacements do not "reliably reduce drinking water lead levels in the short term, ranging from days to months, and potentially even longer."⁶⁸ Other organizations echo this sentiment; in 2018, the National Resources Defense Council (NRDC) called for a ban on partial lead-pipe replacements in the interest of protecting public health. Per the NRDC, partial replacements will at best waste money and at worst substantially increase lead levels.

60. *LEAP – For Homeowners*, VA. DEP'T OF HEALTH, <https://www.vdh.virginia.gov/drinking-water/fcap/leap/leap-for-homeowners/> (last visited Apr. 3, 2024).

61. *Lead and Copper Rule Revisions, Service Line Inventory Requirements*, MD. DEP'T OF ENV'T, https://mde.maryland.gov/programs/water/water_supply/Documents/MDE_LCRR_SL_Inventory_Guidance.pdf (last visited Nov. 20, 2023).

62. *Id.*

63. Elise Deshombres et al., *Short- and Long-Term Lead Release after Partial Lead Service Line Replacements in a Metropolitan Water Distribution System*, 51 ENV'T SCI. & TECH. 9507, 9507 (2017); Evelyne Doré et al., *Study of the Long-Term Impacts of Lead Release from Full and Partially Replaced Harvested Lead Service Lines*, 149 WATER RES. 566, 566 (2018); Justin St. Clair et al., *Long-Term Behavior of Simulated Partial Lead Service Line Replacements*, 33 ENV'T ENG'G SCI. 53, 53 (2016).

64. Deshombres et al., *supra* note 63, at 9507.

65. Gregory Welter et al., THE WATER RSCH. FOUND., *Galvanic Corrosion Following Partial Lead Service Line Replacement*, 178-79 (2013).

66. Cyndi Roper, *The Hidden Costs & Dangers of Partial Lead Pipe Replacements*, NAT. RES. DEF. COUNCIL (Mar. 12, 2018), <https://www.nrdc.org/bio/cyndi-roper/hidden-costs-dangers-partial-lead-pipe-replacements>.

67. Melissae Fellet, *All or Nothing is a Better Strategy for Keeping Drinking Water Lead Levels Low*, CHEM. & ENG'G NEWS (July 13, 2016), <https://cen.acs.org/articles/94/web/2016/07/nothing-better-strategy-keeping-drinking.html>.

68. Deborah L. Swackhamer & Jeffrey K. Griffiths, *SAB Evaluation of the Effectiveness of Partial Lead Service Line Replacements*, EPA (Sept. 28, 2011), https://www.epa.gov/sites/default/files/2015-09/documents/sab_evaluation_partial_lead_service_lines_epa-sab-11-015.pdf.

Additionally, partial replacements are more likely to occur in low-income neighborhoods, as those who are unable to afford the cost of private replacements will opt for partial replacements instead.⁶⁹ States such as Michigan, New Jersey, and Illinois⁷⁰ have all banned partial LSL replacements, except in the case of emergency, to protect the health and well-being of their most vulnerable residents. Tenants, a uniquely vulnerable group, and low-income homeowners no longer have the option to partially replace lead service lines because of the increased risk. Funding partial replacements creates a heightened health risk to residents and increases the disparity between wealthier communities who can afford a full replacement.⁷¹ While the risks of lead contamination are concerning and require immediate action, partial replacements cause more harm than good.⁷² The cost inefficiencies, increased risk of contamination, and disproportionate impact on historically marginalized communities all emphasize the adverse impact of partial replacements.

C. Models of Successful State-Led Lead-Pipe Replacement Initiatives

Recognizing this widespread issue and its effects on vulnerable populations, many states have implemented policies for LSL. Unlike the District's current replacement plan, which requires homeowner consent, various states around the country have mandated full LSL removal for all residents.⁷³ For example, Madison, Wisconsin, successfully passed legislation mandating the replacement of all its lead pipes in 2001.⁷⁴ However, there was pushback from homeowners due to the cost-sharing model and a long battle with regulators and lawmakers based on the mandated replacement requirement rather than offering a voluntary system.⁷⁵ Madison is one of the first cities to require full replacements for all residents rather than follow a voluntary model.⁷⁶ However, homeowners had to pay for the pipe replacements on their private property, costing around \$1,300 individually (half of which was later reimbursed by the city).⁷⁷ Ultimately,

69. ENV'T DEF. FUND, LEAD PIPES AND ENVIRONMENTAL JUSTICE 2 (2020).

70. Tom Neltner et al., *State Legislation Requires Replacement of 1/4 of the Country's Lead Pipes*, ENV'T DEF. FUND (July 19, 2021) <https://blogs.edf.org/health/2021/07/19/state-legislation-requires-replacement-of-%C2%BC-of-the-countrys-lead-pipes/>.

71. St. Clair et al., *supra* note 63, at 53.

72. *Id.* at 58-59.

73. D.C. Code § 34-2158 (2024) [hereinafter *Lead Service Line Replacement Assistance*].

74. *Madison Lead Pipe Replacement Program*, CTR. FOR NEIGHBORHOOD TECH., https://cnt.org/sites/default/files/pdf/CaseStudy_Madison.pdf (last visited Apr. 3, 2024).

75. Cheryl Corley, *Avoiding A Future Crisis, Madison Removed Lead Water Pipes 15 Years Ago*, NPR (Mar. 31, 2016) <https://www.npr.org/2016/03/31/472567733/Avoiding-A-Future-Crisis-Madison-Removed-Lead-Water-Pipes-15-Years-Ago>.

76. *Id.*

77. Corley, *supra* note 75.

Madison was able to meet its goal and remove all 8,000 lead water pipes after spending \$15.5 million over 11 years.⁷⁸ Following the success of this program, Lansing, Michigan also replaced its 12,150 lead pipes for an estimated \$44.5 million in 2004, primarily funded by increasing water rates across the city.⁷⁹ The upfront cost for Madison homeowners and the water rate increase for Lansing residents both pose equity concerns, but the system used in Madison isolates the costs to homeowners.⁸⁰ In Lansing, all residents, including tenants and landlords, faced a water-rate increase, spreading the costs over a longer period and a larger population.⁸¹ Both cities successfully removed all LSLs but required financial contributions from citizens, creating a disparate impact on lower-income residents.⁸²

Most notable, however, are the replacements of nearly 24,000 pipes in Newark, New Jersey in under 3 years without a rate increase or requiring homeowners to cover the upfront costs.⁸³ A \$120 million bond from Essex County allowed officials to implement the replacement plan by spreading the cost widely across all residents and over a longer period through the bond repayment.⁸⁴ This model ensures all residents receive a full replacement and benefits the city by reducing the social and economic costs of lead exposure. The city adopted an ordinance to mandate the replacements of all lead service lines to expedite the process.⁸⁵ The city ordinance also allowed for city officials to replace the lead line even if property owners were not available to provide consent—a particularly important aspect in a city where more than 70% of residents rent property (and landlords may be inaccessible during the replacement process).⁸⁶ While some homeowners may object to this, the interest in public health and safety provides a good reason for the government to conduct the replacements without consent.⁸⁷

78. *Id.*

79. *Lansing Lead Pipe Replacement Program*, CTR. FOR NEIGHBORHOOD TECH., https://cnt.org/sites/default/files/pdf/CaseStudy_Lansing.pdf (last visited Oct. 15, 2023) [hereinafter *Lansing Lead*].

80. Corley, *supra* note 75.

81. *Lansing Lead*, *supra* note 79.

82. *Fact Sheet: The Biden-Harris Lead Pipe and Paint Action Plan*, *supra* note 30 (describing the disproportionate impact of lead exposure on minority and low-income communities, which is further exacerbated by the financial barriers to full LSL replacement).

83. Joan Leary Matthews, *Meeting the Challenge of Lead Service Line Replacements*, NAT. RES. DEF. COUNCIL (May 16, 2022), <https://www.nrdc.org/bio/joan-leary-matthews/meeting-challenge-lead-service-line-replacements>.

84. Mark J. Bonamo, *Essex County Bond Plan Eliminates Need for Newark Homeowners to Pay \$1K For Lead Service Replacement Lines*, TAP INTO NEWARK (Aug. 26, 2019, 3:50 PM), <https://www.tapinto.net/towns/newark/sections/newark-water-crisis/articles/essex-county-bond-plan-eliminates-need-for-newark-homeowners-to-pay-1k-for-lead-service-replacement-lines>.

85. Matthews, *supra* note 83.

86. *Id.*

87. *Id.*

The Biden-Harris Administration has prioritized LSL replacements with a particular focus on vulnerable communities through collaboration with local officials, water utilities, labor unions, and other organizations committed to accelerating lead-pipe replacements.⁸⁸ The District is ahead of many states concerning these goals but there are still many opportunities for environmental justice-focused programs to ensure all residents have access to safe drinking water. These state-led initiatives provide examples of how the District can ensure full LSL replacements at no cost for all communities, regardless of homeowner status, neighborhood location, or access to financial resources.

II. CURRENT LSL REPLACEMENT PLAN IN THE DISTRICT

The increased awareness about lead pipes around the nation and funding for replacements provide a favorable start to eliminating this issue. However, many of these initiatives are not accessible to the areas that need it most.⁸⁹ Vulnerable populations are not effectively receiving funding and many replacement programs are difficult to take advantage of, especially for people of color or low-income populations.⁹⁰

A. The Voluntary Cost-Sharing Model and Partial Replacements Inhibit Equitable Replacement

The District, like many other cities with lead service line replacement initiatives, requires property owners to cover part of the cost of replacements, creating a direct financial barrier for full replacements.⁹¹ As the NRDC noted, this program is “likely causing a true environmental injustice” because lower-income residents, who are predominantly in Black communities, may not be able to pay for LSL replacements.⁹² Those who cannot afford the upfront cost, which averages to around \$2,000 but can be as expensive as

88. See H.R. 3684, 117th Cong. (2021) [hereinafter *Bipartisan Infrastructure Law*] (prioritizing the elimination of lead service lines in the United States and providing an investment of \$55 billion in funding for states and local communities to expand access to clean drinking water); see also Deidre McPhillips, *EPA Proposes Requirement to Remove Lead Pipes from U.S. Water Systems Within Ten Years*, CNN (Nov. 30, 2023, 6:00 AM EST), <https://www.cnn.com/2023/11/30/health/lead-water-pipes-removed-10-years-epa-proposed-rule/index.html> (describing the proposed EPA rule as of Nov. 30, 2023, which would accelerate LSL replacement goals to eliminate nearly all lines nationwide within the next 10 years).

89. ENV'T DEF. FUND, *supra* note 69, at 8.

90. *Id.* at 7–8.

91. *Lead Pipe Replacement and Safer Drinking Water*, DEP'T OF ENERGY & ENV'T, <https://doee.dc.gov/service/lead-pipe-replacement-and-safer-drinking-water> (last visited Apr. 3, 2024).

92. Erik Olson, *Here's What's Needed to Fix the EPA's Outdated Lead in Tap Water Rule*, NAT. RES. DEF. COUNCIL (Oct. 9, 2019), <https://www.nrdc.org/bio/erik-d-olson/heres-whats-needed-fix-epas-outdated-lead-tap-water-rule>.

\$10,000, will often opt for the more dangerous but more affordable partial replacements.⁹³ Based on a study conducted in the District from 2009-2018, a neighborhood's household income is a major predictor of whether the LSL replacement is full or partial.⁹⁴

The current laws in place disadvantage renters and therefore disproportionately impact lower-income and minority populations. D.C. Code section 34-2158 bars partial LSL replacements by the District of Columbia Water and Sewer Authority (D.C. Water), which includes all lines located under public property.⁹⁵ However, the replacement of lines on private property is subject to the consent of the property owner.⁹⁶ The law does not require notification to or consent from tenants.⁹⁷ Under the current law, a property owner may consent to a partial replacement, or D.C. Water may follow through with a partial replacement if there is no response from the property owner within 120 days.⁹⁸ Additionally, the code allows for partial replacements if "necessary to repair a damaged or leaking water service line" and requests the consent of the private property owner.⁹⁹ D.C. Water will cover the cost of the replacements on the public property but property owners are responsible for paying for the private LSL replacements.¹⁰⁰

If D.C. Water does not have sufficient funds from the District or the private property owner to replace a portion of a lead water service line on private property, D.C. Water shall not replace the portion of the lead water service line on public property unless:

(A) The replacement is necessary to repair a damaged or leaking lead water service line; or

(B) In the event of an exceedance of a lead action level, the replacement is required pursuant to 40 C.F.R. § 141.84 to address the lead exposure.¹⁰¹

93. Tom Neltner, *An Environmental Justice Case Study: How Lead Pipe Replacement Programs Favor Wealthier Residents*, ENV'T DEF. FUND (Jan. 4, 2022), <https://blogs.edf.org/health/2022/01/04/an-environmental-justice-case-study-how-lead-pipe-replacement-programs-favor-wealthier-residents/>.

94. *Id.*

95. *Id.* § (a)(1).

96. *Id.*

97. *Id.*

98. *Id.* § (B).

99. *Id.* § (C).

100. *Lead Service Line Replacement Assistance*, *supra* note 73, § (3).

101. *Id.* § 4(B).

Based on this law, a lead service line will not be replaced if D.C. Water does not have adequate funds and property owners cannot afford the costs.¹⁰² While this is a good choice to avoid partial replacements, it results in a disproportionate impact on vulnerable communities not receiving any replacements.¹⁰³ A study conducted on more than 3,400 LSL replacements in the District found significant disparities between low- and high-income neighborhoods by creating financial barriers for lower-income populations.¹⁰⁴ Only 0.1% of residential service lines were replaced in neighborhoods with low median household incomes and the highest percentage of Black households. This is compared to 2.3% of households voluntarily replacing lead service lines in neighborhoods with nearly double the median household income and a majority of non-Black residents.¹⁰⁵ Higher-income neighborhoods have a higher probability of paying for the full replacement of an LSL, while residents in lower-income neighborhoods are more likely to opt for partial LSL replacements and accept the risk of greater lead exposure that comes from that process.¹⁰⁶ Predominantly minority wards with lower household incomes had around 40% full replacement rates, compared to a 73% replacement rate for high-income, less diverse neighborhoods.¹⁰⁷ The direct link between racial segregation and environmental hazards, which contributes to poor health outcomes, emphasizes the need for LSL replacement plans to place a particular focus on vulnerable populations.¹⁰⁸ With a greater risk of lead exposure and fewer resources to address lead contamination, lower-income and minority populations need LSL replacement initiatives with a focus on environmental justice.¹⁰⁹

Additionally, residents who rent rather than own property must rely on their landlords to initiate the process. Although a little over half of District residents rent their homes, there is a clear disparity between Black and white families.¹¹⁰ As of 2019, more than 72% of white families own their homes compared to 42% of Black families owning their homes.¹¹¹ Generally, people with lower incomes as well as Black and Hispanic Americans are more likely

102. *Id.*

103. Neltner, *supra* note 93.

104. *Id.*

105. ENV'T DEF. FUND, *supra* note 69, at 7.

106. Neltner, *supra* note 93.

107. Baehler et al., *supra* note 53, at 362.

108. ENV'T DEF. FUND, *supra* note 69, at 2.

109. *Id.*

110. Ally Schweitzer, *For Many Black Washingtonians, Homeownership Remains Out of Reach*, NAT'L PUB. RADIO (Feb. 14, 2020), <https://www.npr.org/local/305/2020/02/14/806030768/for-many-black-washingtonians-homeownership-remains-out-of-reach>.

111. ALANNA MCCARGO & JUNG HYUN CHOI, *CLOSING THE GAPS: BUILDING BLACK WEALTH THROUGH HOMEOWNERSHIP* 4 (Urb. Inst. ed., 2020).

to rent rather than own.¹¹² There is current legislation in place to ensure landlords disclose the existence of known lead water pipes to tenants¹¹³ with civil fines and penalties imposed on owners for failure to do so.¹¹⁴ Although this is an important first step in protecting tenants, there can still be delays in information sharing and action being taken.¹¹⁵

Moreover, requiring customers to pay for the LSL replacements raises environmental justice concerns, especially in neighborhoods predominantly comprised of people of color.¹¹⁶ Even for homeowners who have complete control over replacing their LSLs, the upfront costs nonetheless provide obstacles to obtaining a full replacement. However, the current system of lead service line replacements follows a cost-sharing model, where property owners financially contribute to the pipe replacements.¹¹⁷ This will result in slower rates of pipe replacements for low-income, minority, and other vulnerable populations, leading to more adverse health risks.¹¹⁸ Additionally, it may incentivize more low-income residents to opt for partial replacements of pipes rather than full, creating more potentially harmful risks for already vulnerable communities.¹¹⁹

B. Lead-Free D.C. by 2030

The District has responded to this complex problem in 2019 with the Lead-Free DC Initiative—a plan to replace all pipes by 2030.¹²⁰ The Initiative plans to “accelerate lead line replacement” of the estimated 41,157¹²¹ service lines that still contain lead or galvanized iron pipe. In the four years since this program was enacted, the District has replaced a little over 4,000 LSLs.¹²² In June 2023, the District provided an updated program

112. Katherine Schaeffer, *Key Facts About Housing Affordability in the U.S.*, PEW RSCH. CTR. (Mar. 23, 2022), <https://www.pewresearch.org/short-reads/2022/03/23/key-facts-about-housing-affordability-in-the-u-s/>.

113. Amendment to Lead Service Line Priority Replacement Assistance Act of 2004, 22-567 (D.C. 2019).

114. Neltner, *supra* note 93.

115. See Press Release, U.S. Dep’t of Hous. & Urb. Dev., Landlord Pleads Guilty to Lying About Lead Paint Hazards (July 11, 2001) (on file with HUD archives) (providing an example of a nine-year delay between enactment and enforcement of federal lead paint notification requirements, during which time many tenants were unknowingly exposed to lead contamination).

116. Neltner, *supra* note 93.

117. Baehler et al., *supra* note 53, at 354.

118. *Id.*

119. *Id.*

120. DC WATER, LEAD SERVICE LINE REPLACEMENT PLAN (2023).

121. See *id.* at 4 (providing a number update from the initial estimate of 28,000 pipes in 2019. This estimation is based on the number of pipes with verified and suspected lead plus a portion of the remaining pipes with no information about lead levels at the moment).

122. *Id.* (citing the introduction statement from DC Water’s CEO and General Manager, David L. Gadis).

emphasizing an “aggressive” approach to still meet the 2030 deadline, highlighting that securing further funding is essential to stay on track.¹²³ This model is based on the Biden-Harris Justice40 Initiative to “prioritize lead service line removal in disadvantaged communities that are already marginalized, underserved, and overburdened by pollution.”¹²⁴ D.C. Water has estimated it will cost \$1.51 billion to fund the entire Lead-Free by 2030 Initiative while still needing ratepayer contributions based on the number of LSLs to replace and the focus on providing discounted or free replacements to vulnerable communities.¹²⁵

The current funding model for Lead-Free DC incorporates a form of cost-sharing, requiring homeowners to contribute to the cost of the lead pipe replacements. Out of the total \$1.51 billion needed to meet the goal, the source of \$885 million, which is 58% of the total amount, has not been identified yet.¹²⁶ There are many sources of federal funding for Lead-Free DC, including the Bipartisan Infrastructure Bill contributing \$143 million (10%), the American Rescue Plan Act (ARPA) committing \$15 million (1%), and D.C. Water’s Capital Improvement Program Budget providing \$471 million from ratepayers (31%). However, there is still a large gap in meeting the required amount needed to successfully complete the program.¹²⁷

Perhaps the biggest obstacle to achieving Lead-Free by 2030 is obtaining adequate funding sources to ensure vulnerable populations have equal access to LSL replacements.¹²⁸ A variety of District-specific programs offer sources of funding directly to residents to cover the costs of private LSL replacements. For example, the Lead Pipe Replacement Assistance Program allows property owners to recover some or all of their incurred LSL replacement costs, depending on household size and income.¹²⁹ Through the Department of Energy and the Environment (DOEE), District residents may apply for assistance to fully cover the cost of LSL replacements, but the process is lengthy and requires collaboration between DOEE, D.C. Water, the property owner, and all household residents.¹³⁰

Additionally, the District’s General Fund has allocated a Lead Service Line Priority Replacement Assistance Fund (“D.C. Fund”) to provide homeowners with grants of up to \$2,500 for private LSL replacement assistance.¹³¹ According to the D.C. Code, households with known lead

123. *Id.* at 1.

124. *Id.* at 9.

125. *Id.* at 18.

126. *Id.*

127. *Id.*

128. *Id.* at 19.

129. *Lead Pipe Replacement Assistance Program*, DEP’T OF ENERGY & ENV’T, <https://doee.dc.gov/node/1451331> (last visited Nov. 29, 2023).

130. *Id.*

131. D.C. CODE § 34-2151.

service lines and an income of 60% or less than the average area income are eligible for this grant, and allocation of grants will prioritize vulnerable populations such as children, and women who are nursing or pregnant.¹³² The D.C. Fund uses a tiered approach based on household income to determine the percentage of total incurred costs that can be reimbursed.¹³³ The Lead Pipe Replacement Assistance Program and the D.C. Fund provide ample resources for residents but require knowledge of their availability in order to be accessed, which can disadvantage vulnerable communities.

III. AMENDING THE PROPOSED LSL REPLACEMENT PLAN BY PRIORITIZING VULNERABLE COMMUNITIES

To ensure that all communities have access to affordable and feasible LSL replacements, the District needs to prioritize vulnerable communities. Specifically, the District should: (1) ban partial replacements of pipes and ensure all initiatives are full LSL replacements; (2) seek more funding options to decrease the burden on homeowners and vulnerable communities through local and federal programs; and (3) offer opportunities for private funding through municipal bonds.

A. The District Must Ban Partial LSL Replacements

Given that vulnerable communities are most at risk of exposure to lead-contaminated water, and they are more likely to opt for partial LSL replacements rather than full LSL replacements based on financial limitations, the District should completely remove the option of partial replacements altogether. By only allowing residents to conduct a full LSL removal, the city will be furthering environmental justice initiatives and ensuring that vulnerable communities do not see exacerbated consequences of this initiative.

The District has already taken a big step in this direction. Past models around the country have emphasized focusing on vulnerable communities and ensuring equitable access to LSL replacements, including Madison, Lansing, and Newark.¹³⁴ Following this, District officials have increased the overall budget for this program to meet its goals. In October 2019, District Mayor Muriel Bowser approved an ordinance to appropriate \$1.8 million to fund the Lead Pipe Replacement Assistance Program, an initiative to address

132. *Id.* § 34-2153.

133. *Id.*

134. *See* discussion *supra* Section I(C).

past partial LSL replacements remaining on private property.¹³⁵ For homeowners who had a partial LSL replacements but were not able to replace the portion on their private property due to financial constraints, this ordinance will reduce overall resident exposure to lead, especially in low-income communities. Prioritizing financial assistance to address partial LSL replacements for homeowners that may have been financially excluded from past programs is an important step in the right direction, especially for environmental justice.¹³⁶ Communities predominantly comprised of people of color and low-income residents already bear a disproportionate burden of lead exposure; financial obstacles only exacerbate the health consequences by delaying full LSL replacements.¹³⁷

A complete ban on partial LSL replacements is less common but certainly possible; Illinois, New Jersey, and Michigan have already enacted a ban on partial replacements and are leading the nationwide effort to replace LSLs in all communities.¹³⁸ Banning partial replacements may slow the overall process because it will require more funding for full replacements; however, it will ultimately decrease the amount of lead exposure to residents, even with a delay in the replacements.¹³⁹ A partial replacement may seem more attractive for its efficiency, but District officials should properly conduct full replacements and ensure equitable access across all neighborhoods.¹⁴⁰ A replacement is reliant on coordination between a variety of stakeholders—including property owners, city officials, water-service providers, and tenants—which may lengthen the process, but will ultimately result in an overall benefit to all.¹⁴¹

This is also an attractive option for low-income households who may not have the resources to pay for a full replacement but would like to take steps toward addressing their lead service lines.¹⁴² However, it is ultimately a more expensive and dangerous process than opting for a full replacement.¹⁴³ Additionally, it creates a risk of future contamination when the remainder of

135. Tom Neltner, *City of Washington, DC Requires Lead Pipe Disclosure and Tackles Past Partial LSL Replacements*, ENV'T DEF. FUND (Jan. 28, 2019) <https://blogs.edf.org/health/2019/01/28/dc-lsl-disclosure-partial-lsl-replacements/>.

136. *Id.*

137. ENV'T DEF. FUND, *supra* note 69, at 2, 11.

138. Neltner et al., *supra* note 70.

139. Roya Alkafaji, *EPA Should Ensure Federal Funds Do Not Support Harmful Partial LSL Replacements*, ENV'T DEF. FUND (Nov. 8, 2022), <https://blogs.edf.org/health/2022/11/08/epa-should-ensure-federal-funds-do-not-support-harmful-partial-lsl-replacements/>.

140. Suchi Saxena et al., *Lead Service Line Replacement Stakeholders Gather at Chicago Fed to Share Fundings and Financing Strategies*, FED. RESERVE BANK OF CHI. (Dec. 2022), <https://www.chicagofed.org/research/lead/lead-service-line-replacement-funding-and-financing-strategies>.

141. *Id.*

142. *Id.*

143. Alkafaji, *supra* note 139.

the line is eventually replaced.¹⁴⁴ Dividing LSL replacements across different intervals runs the risk of disturbing the lead pipes multiple times and heightens the risk of contamination; replacing the entire service line at one time is the safest option.¹⁴⁵

B. Reallocate and Centralize District Funding

Given the disparity in access to these types of resources for vulnerable populations, the best route would be for the District to first obtain funding for the program directly and then provide free LSL replacements for all residents. This funding is already set aside for LSL replacements to ease the financial burden for homeowners, so the District should reallocate these resources to Lead-Free DC and offset the costs imposed on property owners. This achieves the same goal of providing equitable access to lead-free water but removes the barriers for disadvantaged and vulnerable communities.

While these external sources of funding may not cover the entirety of the remaining \$885 million needed to meet the goals of the Lead-Free DC plan, they could provide a starting point for filling this gap. Additionally, by pooling all LSL replacement funding available for residents, the District could streamline the accessibility and allocation of these resources. Rather than disperse financial resources across different organizations and require different processes for obtaining it, residents could work directly with D.C. Water to get funding for full LSL replacements. This would eliminate bottlenecks in the process because residents would not have to wait for reimbursement approval from an external source before requesting LSL replacements with D.C. Water. The District could also create a tiered process wherein wealthier communities contribute a certain amount of money that is funneled to disadvantaged communities. This system could rely on overall household income, the number of residents per household, history of segregation in particular neighborhoods, and other vulnerability assessments.

C. Issue Municipal Bonds

Another option is for the District to offer a municipal bond to help fund the LSL replacement plan. The \$4 trillion municipal bond market has the capacity to finance funding gaps, and LSL replacements could be an attractive initiative for these private capital markets.¹⁴⁶ A bond used to finance major water system infrastructure improvements is an attractive opportunity for investors given the low default rates and market rates of

144. *Id.*

145. *Id.*

146. Saxena et al., *supra* note 140.

return. Under D.C. Code section 1-204.61, the District may issue “general obligation bonds” for capital projects, which it has done in the past for a variety of public initiatives—including Washington Metropolitan Area Transit Authority improvements in 2023 to expand the metro rail to Dulles International Airport.¹⁴⁷ Given the large amount of money needed, D.C. Water will need high credit ratings to attract private capital investments at low rates. However, other cities have used municipal bonds for water infrastructure projects, providing an example of how this can be accomplished successfully.

For example, Denver, Colorado also uses bond sales to finance water infrastructure projects.¹⁴⁸ Recently, the city brought in \$350 million, the largest bond sale in Denver Water’s history, from two major credit agencies to finance a five-year capital program that includes replacing LSLs throughout the community.¹⁴⁹ This recent sale had the lowest interest rate ever seen for a Denver Water bond sale, allowing the city to repay bonds with funds from water sales over a 30-year period.¹⁵⁰ Investors also benefit from purchasing the bonds from Denver Water, which has a triple-A rating for its financial stability.¹⁵¹ This emphasizes the incentive for the District to request bond funding for LSL replacements; establishing relationships with credit agencies can prove the city’s financial stability and pave the way for future investment opportunities.

While this may seem like a lofty goal, using municipal bonds for city-funded projects has been successfully implemented before. In Buffalo, New York, the Buffalo Sewer Authority issued environmental impact bonds to finance sewage infrastructure improvements.¹⁵² Morgan Stanley priced these tax-exempt bonds with the option to refinance or retire the bonds after seven years, providing financial flexibility and lower debt-service costs.¹⁵³ There is a significant benefit to following this example; prioritizing LSL replacements is a sound investment for the city itself. The Environmental Defense Fund estimates that each full LSL replaced would yield \$22,000 in societal benefits

147. D.C. CODE § 1-204.61 (1997); *Metropolitan Washington District of Columbia Airports Taxable Dulles Metrorail Capital D*, MUNICIPALBONDS.COM, <https://www.municipalbonds.com/bonds/issue/592643BS8/> (last visited Apr. 3, 2024).

148. Cathy Proctor & Jay Adams, *Investing \$2.4 Billion into the System Serving 1.5 Million People*, DENVER WATER (Oct. 12, 2022) https://www.denverwater.org/tap/investing-23-billion-system-serving-15-million-people?size=n_21_n.

149. *Id.*

150. Cathy Proctor, *Denver Water’s Record Bond Sale Helps Keep Water Rates Low*, YOURHUB (May 17, 2021), <https://yourhub.denverpost.com/blog/2021/05/denver-waters-record-bond-sale-helps-keep-water-rates-low/277994/>.

151. *Id.*

152. Saxena et al., *supra* note 140.

153. Chip Barnett, *Buffalo Sewer Authority Closes on Largest U.S. Environmental Impact Bond*, BOND BUYER (June 28, 2021), <https://www.bondbuyer.com/news/buffalo-sewer-authority-sells-largest-u-s-environmental-impact-bond>.

from reduced mortality from cardiovascular disease alone.¹⁵⁴ This yields a return of over three dollars per dollar invested. Additionally, a 2019 study showed that removing lead from the entire state of Minnesota would cost anywhere between \$1.5 and \$4.1 billion over 20 years, but that the benefits, including “mental acuity and IQ” improvements and the “resulting increases in lifetime productivity, earnings, and taxes paid” would range from \$4.2 to \$8.5 billion.¹⁵⁵ Offering a municipal bond will bring more awareness about LSL replacement programs to private companies and offer the District the financial resources needed to ensure it is done equitably for all residents.

CONCLUSION

In general, LSL replacement plans are a high priority nationwide, and the District has received a lot of attention for its plan. Given the significant health risks of lead poisoning and the dangers of long-term exposure, replacement initiatives should ensure that low-income and minority groups have adequate resources to access safe water. Although the District has ambitious goals to provide clean water for all its residents by 2030, there are gaps in the framework that disproportionately threaten vulnerable communities. The voluntary cost-sharing model of LSL replacements currently in place is an inequitable proposal and threatens the safety of many District residents, particularly those who rent or rely on external consent to initiate the replacement process. Additionally, partial LSL replacement methods increase the risk of lead exposure, a practice that is more likely to occur in communities with at-risk populations.

The disproportionate impact of lead poisoning on vulnerable populations emphasizes the need for a government-led replacement program at no cost to its residents. To ensure environmental justice goals are reached, the District should ban partial replacements altogether and mandate full replacements for all LSLs. Through a centralized funding source and municipal bonds, the District can ensure a healthier and more equitable community by providing the financial resources for mandatory full LSL replacements for residents. Lead-Free DC by 2030 can be achieved as long as vulnerable communities are prioritized and supported throughout the process.

154. See Neltner, *supra* note 14 (explaining how EDF estimates that each full LSL replaced would yield \$22,000 in societal benefits).

155. *Lead in Minnesota Drinking Water: Assessment of Eliminating Lead in Minnesota Drinking Water*, MINN. DEP'T OF HEALTH DIV. (Mar. 8, 2019), <https://www.health.state.mn.us/communities/environment/water/docs/leadreport.pdf>.