Memorandum: Analysis of Clean Water Act and EPA Regulations for Local Government under Conditions of Climate Change to Optimize Water Quality and Resilience

New York City's Department of Design and Construction

Town+Gown: NYC Water In and Water Out Innovative Water Research Working Group

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To: Town+Gown:NYC Water In and Water Out Innovative Water Research Working Group

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Re: Analysis of Clean Water Act and EPA Regulations for Local Government under Conditions of Climate Change to Optimize Water Quality and Resilience

I. Introduction

The Clean Water Act of 1972 (CWA or Act) represents a landmark achievement in environmental law to manage, across all 50 states, water pollution as a result of America's historical and ongoing industrialization, by addressing critical water quality issues and fostering collaboration among federal, state, and local authorities. Although, it has made a positive change in the state of the waters in the United States, new challenges like non-point source pollution, the effects of identified environmental threats, and new emerging pollutants call for greater understanding of how the CWA works as a federal law, on its own, and with respect to other federal laws related to water, and continued enhancement and investment in water-related infrastructure and water management. Nevertheless, the cooperative framework set up by the CWA will continue to be important in addressing these challenges in order to ensure that the country's water resources are conserved for future use.

The CWA stands as one of the most comprehensive and impactful environmental laws in the history of the United States. Meant to rehabilitate and protect the country's water bodies, the CWA tackled emerging issues on pollution through regulating discharges and establishing water quality standards. It remains ~~to be~~ an important tool of safeguarding the aquatic environment and the health of the people in the country. The CWA is one federal law that is directly related to water.

The other federal law that directly relates to water is the federal Safe Drinking Water Act signed in 1974.[1] The federal Toxic Substances Control Act of 1976[2] and the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980[3] also regulate aspects of water. Although the CWA has played a great role in the improvement of water quality in the United States by reducing point source pollution and enhancing the wastewater treatment facilities since its enactment in 1972, challenges remain. This memo analyzes the CWA only.

II. Analysis of CWA

A. Legislative History and Purpose

The legislative history of the Act dates back to the Federal Water Pollution Control Act of 1948 (FWPCA), which was the first federal legislation that aimed at controlling water pollution in the United States.[4] However, the FWPCA was limited in scope and enforcement, relying heavily on state-level implementation.[5] By the 1960s, the inadequacies of the FWPCA became evident as industrial and urban expansion led to widespread water contamination. In response to the need for increased federal intervention, the Congress passed additional amendments to the FWPCA in 1972 that significantly altered the Act and it is now referred to as the CWA. The Act set high objectives, for instance, to make the effluent concentrations of pollutants in navigable waters zero by 1985 and all the water bodies to be fishable and swimmable by 1983.[6]

The Act came into existence at a time when the American society was becoming more conscious of the environment. Some of the major environmental catastrophes that occurred at the time highlighted the need for increased legislation. For example, the Cuyahoga River in Ohio, which infamously caught fire multiple times in 1969 due to industrial waste historically dumped in “water bodies” without treatment, became a symbol of environmental degradation. Likewise, in the same year of 1969, the Santa Barbara oil spill gave a clear indication of how aquatic ecosystems

are affected by industrialization. Cholera outbreaks, contaminated drinking water supply and polluted water sources also contributed to the increasing pressure for action. Additional public awareness and advocacy were critical in the formation of the CWA. The first Earth Day in 1970 mobilized millions of Americans to demand stronger environmental protections, while influential works like Rachel Carson's "Silent Spring" (1962) brought attention to the ecological and human health impacts of pollution.[7] Scientific studies further emphasized the need for federal action, revealing how untreated sewage, industrial discharges, and agricultural runoff were causing issues such as eutrophication and fish kills.[8] The disasters, the scientific findings, and increased awareness and actions of the public therefore laid the groundwork for the CWA. Although the initial goals outlined in the of passage of the law in 1983 and then amended in 1985 were not achieved, subsequent changes reset the law's timeline without erasing its purpose.

Subsequent amendments to the CWA, for instance, shifted focus toward enforceable technology-based standards, requiring industrial dischargers to adopt the "best available control technology" (BACT) for toxic pollutants under § 1311(b)(2)(A) and § 1314(b)(2), while mandating "best conventional technology" (BCT) for conventional pollutants like sewage under § 1314(b)(4)(B).[9] This approach recognized technological and economic objectives as more realistic than fixed schedules of work. Despite the expiration of the original deadlines, the CWA still contains a visionary preamble as a part of its statutory language,[10] subsequent amendments focused on adaptative strategies to meet those goals, state-federal relations and sources of financing. Courts endorsed this structure, maintaining the goals as permanent directives instead of the promises that they were at one point in time.[11] The CWA evolved into a dynamic framework, balancing its aspirational aims with the recognition that restoring the nation's waters demands sustained, flexible effort.

B. FWPCA as amended in 1972

Prior to 1972, the FWPCA, one of the nation's first federal environmental laws, lacked enforceable federal standards, relying instead on state-led initiatives and voluntary cooperation.[12] Driven by growing environmental activism and bipartisan support, Congress passed the 1972 Amendments (commonly referred to as the Clean Water Act, though the official name change occurred later), which President Nixon signed into law on October 18, 1972.[13] These amendments marked a paradigm shift by establishing a federal regulatory structure with clear, enforceable objectives: to restore and maintain the chemical, physical, and biological integrity of the nation's waters and to achieve "zero discharge" of pollutants by 1985. By the 1980s, measurable improvements in water quality were evident, though challenges like nonpoint source pollution and emerging contaminants persisted.[14]

The CWA is codified in Title 33, Chapter 26 of the U.S. Code. Central to the 1972 Amendments was the creation of a comprehensive permitting system under the National Pollutant Discharge Elimination System (NPDES) (Section 402, 33 U.S.C. § 1342), which required industries and municipalities to obtain permits for discharging pollutants into navigable waters.[15] Additionally, it prioritized federal oversight by empowering the Environmental Protection Agency (EPA) to delegate to the states to set water quality standards and enforce compliance, while providing states with grants to upgrade wastewater treatment infrastructure. The broader framework for water quality regulation is found in Water Quality Standards (WQS), established under 33 U.S.C. § 1313 discussed later. Notably, the 1972 Amendments expanded the definition of "navigable waters" to include most surface waters, broadening federal jurisdiction to protect interconnected ecosystems like wetlands and streams.[16]

The 1972 Amendments also institutionalized public participation and accountability. Citizens were granted the right to sue violators of the Act (Section 505, 33 U.S.C. § 1365), empowering grassroots environmental advocacy.[17] Furthermore, the law established funding mechanisms, such as the Construction Grants Program, which allocated billions to modernize sewage treatment plants.[18] The funds from the Construction Grants Program, established under Section 201 of the 1972 Clean Water Act (33 U.S.C. § 1281), were allocated directly to municipalities and local governments to finance the construction and modernization of publicly owned sewage treatment plants. The statutory language explicitly prioritized funding for "municipalities", requiring applicants to demonstrate the ability to operate and maintain the facilities, which effectively limited eligibility to local governments or regional sewer authorities.

States played an administrative role, assisting the EPA in reviewing applications and distributing funds, but the grants themselves flowed to local entities responsible for wastewater infrastructure. The program mandated that federal grants cover up to 75% of project costs (later reduced to 55%), with local governments covering the remaining share (33 U.S.C. § 1282(a)). Over $60 billion was disbursed between 1972 and 1990, with the majority supporting upgrades to municipal systems to meet the CWA's technology-based effluent limits (33 U.S.C. § 1311(b)). The municipal program was phased out in 1987 and replaced by the Clean Water State Revolving Fund (CWSRF) under 33 U.S.C. § 1383, which shifted financing to state-administered loan programs but maintained a focus on local wastewater projects.

While the ambitious "zero discharge" goal remains unrealized, the amendments catalyzed significant reductions in industrial and municipal pollution. The 1972 FWPCA Amendments laid the groundwork for modern water governance, blending regulatory rigor with adaptive

management a legacy reinforced by subsequent updates, such as the 1977 and 1987 amendments, which refined standards and addressed gaps.

The 1972 Amendments established the foundational prohibition that "the discharge of any pollutant by any person shall be unlawful" under Section 301 (33 U.S.C. § 1311),[19] The CWA defines the term "discharge" unambiguously under Section 502(12) (33 U.S.C. § 1362(12)) as:

> "[A]ny addition of any pollutant to navigable waters from any point source" and "any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft…"[20]

This definition is central to the Act's regulatory structure. This concept underpins Sections 301 and 402 (33 U.S.C. §§ 1311, 1342), which establish prohibitions on unpermitted discharges and create the NPDES permitting program, which regulates point source discharges into U.S. waters. The definition of "point source" encompasses three key elements:

- pollutants, broadly defined to include industrial, municipal, and agricultural waste;
- point sources, defined as discernible conveyances like pipes or ditches through which pollutants are released; and
- navigable waters, interpreted expansively to cover most surface waters within U.S. jurisdiction.

Under the CWA, 33 U.S.C. § 1362(14) defines "point source" as:

> "[A]ny 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 pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture."[21]

The Act also required states to set water quality standards for their water bodies. While the term "water quality standards" is not explicitly defined in the CWA under its statutory definitions (Section 502, 33 U.S.C. § 1362), the Act establishes their foundational framework through Section 303 (33 U.S.C. § 1313).[22] This section outlines the structure and requirements of these standards, comprising three core elements.

- First, states must designate the intended uses of water bodies, such as recreation, aquatic life protection, or drinking water supply.
- Second, they must adopt scientifically supported water quality criteria either numeric limits or narrative descriptions to ensure those designated uses are safeguarded.
- Third, an antidegradation policy is required to prevent the deterioration of existing water quality, prioritizing protection for high-quality or ecologically significant waters.

Implementation of these standards involves state submission to EPA for approval, alongside mandated periodic review and revision to adapt to evolving environmental and scientific needs. Though the CWA does not provide a formal definition of "water quality standards," Section 303 effectively defines their purpose and operational components, positioning them as a cornerstone of the Act's regulatory approach to preserving water resources.[23] Likewise, the CWA does not clearly define the terms "water" or "water bodies" in its statutory text (33 U.S.C. § 1251 et seq.). However, the Act's jurisdiction hinges on the term "navigable waters," which is defined in Section 502(7) (33 U.S.C. § 1362(7)) as "waters of the United States, including the territorial seas."[24] While this definition does not directly address "water" or "water bodies" in isolation, it establishes the scope of the CWA's regulatory authority over surface waters.

The term "waters of the United States" (WOTUS) has been interpreted through regulations and court rulings to include rivers, lakes, wetlands, streams, and other water bodies with a significant nexus to interstate commerce or ecological function.[25] For example, the EPA's and Army Corps of Engineers' regulatory definitions (e.g., the 2023 Revised Definition of WOTUS) clarify that it encompasses traditional navigable waters, tributaries, adjacent wetlands, and interstate waters, among others.[26] Thus, while "water" or "water bodies" lack standalone definitions in the CWA, the Act's focus on "navigable waters" and its expansive regulatory interpretations effectively define the types of water bodies subject to federal protection. This framework has been shaped by key Supreme Court cases (e.g., *Rapanos v. United States*, 2006) and evolving EPA rules,[27] reflecting the CWA's intent to broadly safeguard water resources from pollution and degradation.[28]

C. Amendments of 1977

The 1977 Amendments to the CWA emerged as a pivotal response to scientific and regulatory shortcomings in the original 1972 framework. While the 1972 Amendments established the foundational prohibition that "the discharge of any pollutant by any person shall be unlawful" under Section 301 (33 U.S.C. § 1311),[29] its broad language failed to address the complexities of industrial discharges, municipal wastewater variability, and inconsistent state water quality standards. For example, industries such as steel manufacturing and chemical production often exploited loopholes in the 1972 Amendments by claiming compliance with vague "best practicable" guidelines, even as toxic discharges like mercury and cyanide continued to contaminate rivers.

By 1977, lawmakers recognized the need for a more nuanced approach, one that balanced economic feasibility with ecological protection. The 1977 Amendments thus introduced technology-based effluent limitations (TBELs), requiring dischargers to adopt the "best practicable control technology" (BPT) by 1977 and the "best available technology economically achievable" (BAT) by 1984 (33 U.S.C. § 1314(b)).[30] These standards targeted priority pollutants like toxic metals (e.g., lead, arsenic) and organic chemicals (e.g., benzene, chlorinated solvents), shifting the CWA from blanket prohibitions to a permit-driven system under Section 402's NPDES (33 U.S.C. § 1342).[31] For instance, the NPDES permit for a DuPont chemical plant in Virginia now mandated real-time monitoring of phenol discharges, a carcinogen previously unregulated under the 1972 Act.

Crucially, the 1977 Amendments refined state roles under Section 303 (33 U.S.C. § 1313),[32] mandating that states adopt water quality standards (WQS) "based on the latest scientific knowledge" to protect designated uses such as aquatic life, recreation, and drinking water. This marked a departure from the 1972 Amendments' vague delegation, ensuring standards were "reviewable and enforceable" by the EPA.[33] The changes reflected mounting evidence from ecological studies, including findings that low-level pollutants like polychlorinated biphenyls (PCBs) caused bioaccumulation in fish, threatening human health a crisis exemplified by the Hudson River, where PCB concentrations in striped bass exceeded 10 ppm, prompting New York to ban commercial fishing in 1976.[34]

Similarly, research on eutrophication in the Great Lakes demonstrated that nutrient discharges, even within prior limits, degraded ecosystems through oxygen depletion; Lake Erie's "dead zone," spanning 2,400 square miles by 1970, became a rallying cry for stricter phosphorus

controls.[35] The amendments also responded to failures in municipal wastewater management, such as Boston's Deer Island treatment plant, which routinely discharged untreated sewage into Massachusetts Bay during heavy rains due to outdated infrastructure. By anchoring permits to TBELs and science-based WQS, the 1977 Amendments transformed the CWA into a preventive framework, addressing cumulative risks rather than isolated violations.

For example, the revised Section 304 required the EPA to publish "water quality criteria" for 65 toxic pollutants, including explicit thresholds for carcinogens like vinyl chloride (0.002 mg/L), ensuring permits incorporated health-based limits.[36] These reforms laid the groundwork for landmark enforcement cases, such as *United States v. Hamel* (1980), where a Minnesota mining company faced $1.2 million in penalties for violating BAT standards a stark contrast to the lax penalties under the 1972 regime.[37] Ultimately, the 1977 Amendments not only bridged gaps in the CWA but also established a blueprint for adaptive governance, proving that environmental regulation could evolve alongside scientific discovery and industrial innovation to safeguard the nation's waters.[38]

D. Amendment of 1987

The 1987 Water Quality Act, building on the 1977 reforms, addressed persistent gaps in the CWA by integrating water quality-based effluent limitations (WQBELs) with existing technology-based standards (TBELs). Recognizing that technology alone could not guarantee ecosystem protection evident in persistent "hotspots" like New Jersey's Passaic River, where industrial mercury discharges met TBELs but still rendered fish unsafe to eat Congress revised Section 402 to require NPDES permits to include "such conditions as are necessary to assure compliance with applicable water quality standards".[39] This statutory shift compelled regulators

to ensure discharges would not "cause or contribute to a violation of water quality standards",[40] effectively mandating adaptive permit limits tied to real-world ecological impacts. For example, in the Chesapeake Bay, nitrogen and phosphorus runoff from agricultural and urban sources, though compliant with TBELs, fueled algal blooms that suffocated marine life. The 1987 Amendments required Maryland to impose WQBELs on poultry farms, slashing nitrogen loads by 40% by 1995 through buffer zones and manure management.[41]

Section 303 was further strengthened, requiring states to base WQS on "sound scientific rationale" and "quantifiable data".[42] States now had to submit biennial reports to the EPA detailing waterbody impairments and remediation plans a process formalized as the Total Maximum Daily Load (TMDL) program.[43] The TMDL framework gained prominence in addressing pollution in the Mississippi River Basin, where nutrient runoff from Midwestern farms caused a hypoxic "dead zone" in the Gulf of Mexico. By 1990, Louisiana's TMDL plan mandated a 30% reduction in nitrate discharges from fertilizer use, enforced through cooperative agreements with Iowa and Illinois.[44]

The EPA's oversight role expanded, empowering it to reject inadequately protective state standards, as seen in *Arkansas v. Oklahoma* (1992), where the Supreme Court upheld the EPA's authority to block Arkansas's lax selenium limits that threatened Oklahoma's fisheries.[45] The 1987 Amendments also revolutionized pretreatment standards under Section 307.[46] Previously focused on preventing operational interference at municipal plants, the revised program mandated that industrial dischargers to publicly owned treatment works (POTWs) eliminate toxics like cadmium, benzene, and hexavalent chromium through "categorical pretreatment standards".[47] For instance, electroplating facilities in California's Silicon Valley, which had discharged cyanide-laced

wastewater into San Jose's treatment plant, were required to install ion-exchange systems to meet new numeric limits of 0.02 mg/L for cyanide.

Facilities now faced mandatory monitoring, enforceable through EPA sanctions,[48] including daily fines up to $25,000 for violations a stark escalation from the pre-1987 maximum of $10,000 per violation.[49] This curbed "pass-through" pollution, reducing toxins in receiving waters by an estimated 70% by 1995, with notable success in Ohio's Black River, where carcinogenic polycyclic aromatic hydrocarbons (PAHs) from steel mills dropped by 85% after pretreatment upgrades.[50] By marrying technology-driven limits with ecosystem-specific safeguards and rigorous pretreatment mandates, the 1987 Amendments cemented the CWA's role as a dynamic, science-forward statute, proving that environmental regulation could adapt to both industrial complexity and ecological urgency.

Moreover, Water quality standards (WQS) are the backbone of the CWA's regulatory framework. These standards are built upon three antidegradation tiers that guide permitting decisions and ensure that water bodies maintain their designated uses. The tiered antidegradation framework was formalized in 1983 through the EPA's Water Quality Standards Regulation (40 CFR §131.12), under the authority of the CWA. Tier 1 applies universally, protecting existing uses of a water body and the water quality necessary to support those uses. This is the statutory floor for all U.S. waters.[51] Tier 2 applies to high-quality waters that exceed the requirements for fishable and swimmable use. In these waters, degradation is permissible only if it is necessary to support significant social or economic development. Regulators must demonstrate that lower water quality is unavoidable and still protective of designated uses. Tier 2 decisions often spark controversy, as they require weighing environmental impacts against economic benefits. Tier 3 applies to

Outstanding National Resource Waters (ONRWs), which include waters of exceptional ecological or recreational value, such as national parks and wilderness streams. In these cases, water quality must be maintained and protected without any degradation, even if a proposed project would otherwise qualify for a permit.[52] The designation of Tier 3 status is politically sensitive and administratively demanding, but it serves as the highest form of waterbody protection available under federal law.

In recent years, the EPA has emphasized the integration of antidegradation reviews into permitting processes. Tier-based classifications help states and balance environmental protection with development pressures, but challenges persist particularly when state and federal priorities diverge. For instance, some states have declined to adopt Tier 3 protections despite scientific evidence supporting ONRW designation.

E. Wet Weather Quality Act of 2000 and Wet Weather Standards

The environmental challenges of the 1990s, marked by storms of escalating intensity and duration, exposed critical vulnerabilities in the United States' water quality framework, prompted a reevaluation of the Act's capacity to address wet weather risks. Initial efforts to mitigate these threats emerged in 1994 with federal policies targeting combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs). As part of a broader effort to strengthen CWA implementation and improve municipal wastewater management, in 1994, the EPA, during the Clinton administration, set forth policies regarding wet weather standards primarily focused on addressing stormwater runoff, CSOs, and SSOs.[53] The EPA articulated the purpose of these measures as a commitment "to establish a comprehensive national approach to controlling [CSOs and SSOs] through the implementation of the CWA's NPDES program," ensuring "cost-effective solutions

to minimize impacts on water quality, aquatic ecosystems, and public health."[54] By introducing the CSO Control Policy, expanding stormwater regulations, strengthening total maximum daily load (TMDL) enforcement, and promoting sewer infrastructure investments, these policies set the stage for modern stormwater and wastewater management practices and later became codified under the Wet Weather Water Quality Act of 2000, amending CWA § 402(q).[55] Wet weather events must still comply with state-established water quality standards, which include designated uses for water bodies, numeric and narrative water quality criteria, and antidegradation policies.[56] These wet weather policies laid the groundwork for modern stormwater and overflow management regulations, influencing subsequent federal and state initiatives in the 2000 Act.

Despite the CSO Control Policy established in 1994, by the early 2000s, increasing storms of escalating intensity and duration and weather events of this nature continued to reveal systemic gaps in the 1994 policy framework, spurring Congress to enact the Wet Weather Quality Act of 2000. Grounded in the legislative intent to "modernize infrastructure resilience, enhance monitoring of episodic pollution events, and safeguard communities from the escalating threats posed by climate-amplified precipitation," the 2000 Act established enforceable "wet weather standards" to address "the inadequacy of existing systems to manage volatile hydrological conditions."[57] These standards introduced adaptive discharge limits, expanded green infrastructure incentives, and mandated real-time water quality reporting, reshaping the regulatory landscape to prioritize proactive risk mitigation over reactive management.

While the 2000 Act does not explicitly define "wet weather standards," several key sections establish parameters for regulating stormwater runoff, CSOs, SSOs, and other wet weather discharges.[58] Though CSOs and SSOs lack explicit statutory definitions in the CWA, they are

regulated through the NPDES program and EPA policies.[59] Wet weather standards under the CWA refer to regulations and management strategies that address water quality issues caused by these observed environmental risks and their consequent discharges into navigable waters (as defined in 33 U.S.C. § 1362(7)), including rivers, lakes, streams, and other water bodies protected under the Act.[60] These standards aim to prevent excessive pollutant loads entering water bodies during and after wet weather events.

Under the CWA, EPA delegates to the states the requirement to establish water quality standards, including designated uses and criteria for protecting those uses. [61] When setting these standards, they must consider wet weather impacts and implement controls to mitigate pollution from stormwater and CSOs and SSOs. The NPDES permit program under the 2000 Amendment plays a crucial role in regulating these discharges by requiring municipalities and industries to implement best management practices (BMPs) and technologies such as green infrastructure to manage stormwater effectively. States and their regulated municipalities increasingly deploy green infrastructure statutorily defined in 33 U.S.C. § 1362(27) as "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters." Examples include rain gardens, permeable pavements, and stormwater retention basins, to comply with wet weather water quality standards under the 2000 Amendment.[62] The EPA encourages incorporating such measures to reduce pollutant loads and maintain compliance with designated water quality standards, particularly for Tier 2 and Tier 3 waters, which require higher protection levels.[63]

Additionally, the 2000 Act created the Use Attainability Analysis (UAA) process that allows states to reassess designated uses of water bodies that may be affected by wet weather discharges. If a water body cannot meet certain standards due to natural or human-caused conditions, states may modify the designated use based on scientific assessments. Specifically, the UAA process, codified under the Act's water quality standards regulations,[64] is a scientific and technical assessment that allows states and to evaluate whether the designated uses of a water body (e.g., recreation, aquatic life protection, or drinking water supply) are attainable given physical, chemical, biological, or economic constraints such as irreversible habitat alterations, hydrologic modifications, or legacy pollution exacerbated by wet weather discharges. If a UAA demonstrates that achieving a designated use is unfeasible, states may propose a less stringent use (e.g., downgrading from "swimmable" to "industrial use"), provided they ensure protection of existing uses and comply with the Act's antidegradation requirements.

F. Integrated Planning and the Water Infrastructure Improvement Act of 2019 (WIIA)

In response to growing municipal concerns over the financial and operational burdens of complying with overlapping CWA requirements, the EPA introduced an Integrated Municipal Stormwater and Wastewater Planning Approach Framework in 2012. This non-binding guidance encouraged municipalities to prioritize water quality investments holistically, allowing them to sequence compliance obligations based on greatest environmental benefit while considering local fiscal constraints and community goals.[65] The integrated planning framework recognized that municipalities face concurrent obligations under multiple CWA provisions, including CSO controls, SSOs under municipal separate storm sewer system (MS4) permitting, TMDL implementation, and effluent limit guidelines under applicable NPDES permits. Rather than

addressing these obligations in silos, integrated planning allows local governments to develop comprehensive strategies that promote flexibility, innovation, and cost-effective compliance.[66]

This framework was codified through the Water Infrastructure Improvement Act of 2019 (WIIA), which amended the CWA to formally authorize integrated plans and required the EPA to take them into account when enforcing or issuing permits under the Act. Specifically, WIIA amended Section 402 subsection (p) codified at 33 U.S.C. § 1342(p), which directs the EPA to "inform the municipality of the opportunity to develop an integrated plan" and requires the EPA to incorporate any approved plan into permits or consent decrees.[67] Importantly, WIIA also affirms that integrated plans can be judicially enforceable, thereby enhancing their legal significance in compliance and enforcement contexts. Under WIIA, municipalities are empowered to include both gray and green infrastructure components within their integrated plans. Green infrastructure is particularly emphasized due to its dual benefits of stormwater management and community benefits. For instance, the City of Cincinnati's integrated plan includes extensive green infrastructure installations designed to reduce CSOs while revitalizing urban neighborhoods.

As of 2022, over 27 municipalities had developed integrated plans, with at least 13 incorporating their plans into enforceable permits, consent decrees, or administrative orders. A 2021 EPA Report to Congress details how integrated planning has led to more affordable and effective compliance strategies, especially in economically disadvantaged communities.[68] For example, the City of Springfield, Massachusetts, used an integrated plan to prioritize sewer separation projects and green infrastructure in low-income neighborhoods, thereby advancing both environmental justice and water quality objectives.[69]

Integrated planning also supports climate resilience by enabling municipalities to anticipate future precipitation patterns and incorporate adaptive infrastructure into long-term water management. According to EPA data, at least 12 of the existing plans explicitly incorporate climate considerations such as sea-level rise, increased storm intensity, and future precipitation modeling.[70] From a regulatory standpoint, WIIA reinforces the cooperative federalism model by requiring states and EPA regional offices to coordinate with municipalities throughout the integrated planning process. The statute mandates extensive public participation and stakeholder engagement, ensuring that community voices inform decisions about prioritization, funding, and infrastructure design. In practice, integrated planning can provide the following key benefits:

a) Accelerated water quality improvements by sequencing high-priority projects first.
b) Cost savings through efficient scheduling and resource allocation.
c) Increased public trust and transparency via community involvement.
d) Multi-benefit solutions that address stormwater while enhancing parks, transportation corridors, and green spaces.[71]

Importantly, WIIA also provides a statutory basis for revising or renegotiating existing consent decrees.[72] This provision is especially critical for cities facing outdated or overly rigid enforcement schedules. For example, the City of Lima, Ohio, successfully renegotiated its CSO consent decree with EPA after incorporating green infrastructure alternatives, ultimately achieving greater water quality improvements at reduced cost.[73] The EPA supports the implementation of integrated planning through a suite of tools, including the Integrated Planning StoryMap, which highlights municipal success stories organized by geographic region.[74] These case studies

demonstrate how integrated planning facilitates tailored, community-specific solutions rather than one-size-fits-all mandates.

While the WIIA codification of integrated planning marks a significant step forward, challenges remain. Not all EPA regions have embraced the approach uniformly, and some municipalities report difficulties in navigating the approval process or securing funding for innovative projects.[75] Nevertheless, the institutionalization of integrated planning within the CWA framework signals a paradigm shift: from what municipalities can view as rigid command-and-control regulation from their state regulators to adaptive, collaborative governance grounded in environmental pragmatism that complies with the CWA.

G. Cooperative Federalism and Role of the States

The Act operates under a framework of cooperative federalism, where federal standards provide a baseline for water quality, while states and local governments play key roles in implementation and enforcement. The Environmental Protection Agency (EPA) oversees the administration of the CWA, setting national water quality criteria and regulating discharges through the NPDES permit system.[76] The EPA also retains authority to take enforcement actions against violators, particularly when state oversight is insufficient.[77] States are tasked with setting water quality standards for their water bodies, which must meet or exceed federal criteria. The "more stringent than" states provision enables states to impose requirements beyond federal minimums.[78] New York is one of the 25 "more stringent than" states.[79]

Additionally, states issue NPDES permits, monitor compliance, and enforce regulations.[80] Section 401 of the CWA empowers states to certify that federally permitted activities, such as

pipeline construction, comply with state water quality standards.[81] Local governments, on the other hand, often manage stormwater runoff, maintain wastewater treatment plants, and address non-point source pollution through local ordinances and infrastructure projects.[82] Coordination between federal, state, and local entities is not without challenges. Disputes can arise when federal priorities conflict with state or local interests. For instance, defining the scope of "Waters of the United States" (WOTUS) has been a contentious issue, with recent Supreme Court cases and administrative rule changes affecting the interpretation and implementation of the CWA.[83] Moreover, funding limitations at the state and local levels can hinder the effective implementation of CWA programs, particularly for infrastructure improvements.[84]

The CWA provides a comprehensive and sound framework for water protection raised critical legal and political controversy. Among the most contentious issues is the definition of WOTUS, which determines the reach of federal jurisdiction. In *Rapanos v. United States* (2006), the Supreme Court reviewed whether isolated wetlands fell under CWA authority.[85] The Court was divided and it produced a majority opinion that did not provide a standard. Justice Scalia argued for a narrow interpretation, limiting jurisdiction to relatively permanent waters, while Justice Kennedy proposed a "significant nexus" test. This legal loophole put regulators as well as permit applicants in a state of confusion and uncertainty.

The debate reignited in *Sackett v. EPA* (2023), where the Court dramatically narrowed WOTUS.[86] It held that only those wetlands can be protected under federal laws that have a surface connection with water that has been navigable from time immemorial. This marked a departure from decades of precedent and restricted EPA authority. In response to this, the EPA and the Army Corps of Engineers developed a new WOTUS rule that can be in harmony with Sackett.[87] This

rule rolled back further Obama-era protections and started new legal action and the undefined situation in states. These decisions show that there has always been a clash between environmental laws and property rights. They also highlight the limitations of statutory language that has not kept pace with evolving ecological science or modern hydrology.

III. New York City Case Study

A. Relation between NYS and NYC.

The Department of Environmental Conservation (DEC) in New York State has the primary role in implementing the CWA. Wastewater discharges are regulated under the New York State SPDES, which requires compliance with federal and state water quality standards.[88] The New York City Department of Environmental Protection (DEP) operates the City's water supply system, which is subject largely to the federal Clean Drinking Water Act, and what is referred to as its sewer system, which consists of its sewer and stormwater subsurface distribution system and 14 wastewater treatment facilities (now referred to as wastewater resource recovery facilities) and is subject largely to the CWA.[89] These agencies coordinate efforts to address local pollution challenges, protect drinking water sources, and manage wastewater treatment facilities.

Disputes also arise between state and federal regulators under Section 401 of the CWA, which allows states to certify that federally licensed projects will not degrade water quality. In *California v. FERC* (1990), the Supreme Court upheld the state's authority to impose environmental conditions on hydropower licenses.[90] More recently, states have used Section 401 to block or delay major infrastructure projects like gas pipelines. This has drawn criticism from industry groups and federal agencies, prompting attempts to narrow state certification powers through administrative rulemaking. Beyond legal battles, funding skirmishes constrain effective

CWA implementation. Although Congress established the Clean Water State Revolving Fund to provide low-interest loans for water infrastructure, the system is underfunded.[91] Aging infrastructure and climate-induced pressures such as heavier rainfall and sea-level rise have increased the cost of compliance. Local governments often lack the financial capacity to upgrade systems or implement advanced treatment technologies, especially in underserved communities.

B. Consent Decrees

The use of consent decrees as a means of enforcing the Clean Water Act (CWA) remains essential. In cases where negotiations fail or violations are severe, the EPA, in cooperation with the Department of Justice (DOJ), may seek judicial approval to initiate legal action and secure a consent decree. Such decrees typically include enforceable compliance measures, time-bound implementation schedules, monetary penalties, and extensive ongoing reporting obligations.[92] A notable example is the consent decree between the EPA and the City of New York concerning the Hillview Reservoir. The city had not covered the open-air reservoir for years, which created a high risk of contamination of the drinking water. In 2019, the DOJ sued under the SDWA, which has jurisdictional connection to the CWA's objectives. The adoption of the decree was a directive to New York City to initiate the erection of protective structures which was estimated to cost $2.975 billion and also pay a $1 million civil penalty.[93] This case is a good example of how the federal government has been able to compel compliance through negotiated but legal agreements.

The EPA has been changing its attitude towards consent decrees over the years, particularly after it introduced the Integrated Planning Framework in 2012, which was later enacted into law in 2019 through WIIA.[94] Under this legal structure, the municipalities are encouraged to have co-ordinated plans that identify priority water quality improvement projects and their costs. They can

be included in consent decrees and help cities improve the ways of structuring compliance plans. Lima, Ohio, offers a compelling case study. Lima was under a strict compliance schedule of the consent decree with the EPA but was able to get the consent decree amended to include green infrastructure projects and community revitalization facets.[95] This reflects a broader shift from punitive enforcement to collaborative problem-solving, in line with the cooperative federalism principles embedded in the CWA.

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